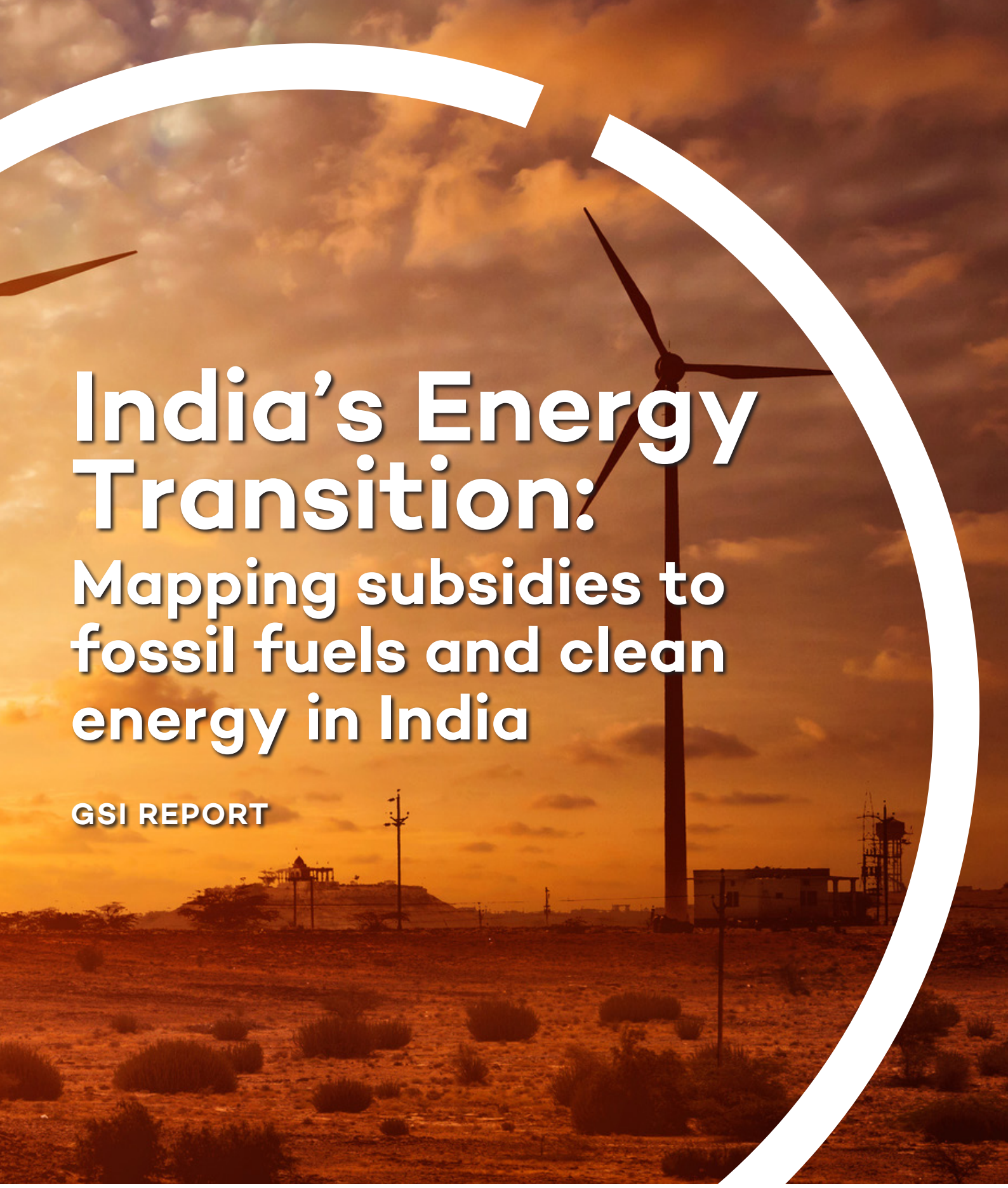

India's Energy Transition:

Mapping subsidies to fossil fuels and clean energy in India

GSI REPORT

IISD International Institute for Sustainable Development

Global Subsidies Initiative

ODI

ICF

International Institute for Sustainable Development

The International Institute for Sustainable Development (IISD) is one of the world's leading centres of research and innovation. The Institute provides practical solutions to the growing challenges and opportunities of integrating environmental and social priorities with economic development. We report on international negotiations and share knowledge gained through collaborative projects, resulting in more rigorous research, stronger global networks, and better engagement among researchers, citizens, businesses and policy-makers.

IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core operating support from the Government of Canada, provided through the International Development Research Centre (IDRC) and from the Province of Manitoba. The Institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations, the private sector and individuals.

Head Office

111 Lombard Avenue, Suite 325
Winnipeg, Manitoba
Canada R3B 0T4

Tel: +1 (204) 958-7700
Website: www.iisd.org
Twitter: @IISD_news

About GSI

The IISD Global Subsidies Initiative (GSI) supports international processes, national governments and civil society organizations to align subsidies with sustainable development. GSI does this by promoting transparency on the nature and size of subsidies; evaluating the economic, social and environmental impacts of subsidies; and, where necessary, advising on how inefficient and wasteful subsidies can best be reformed. GSI is headquartered in Geneva, Switzerland, and works with partners located around the world.

Its principal funders have included the governments of Denmark, Finland, New Zealand, Norway, Sweden, Switzerland and the United Kingdom, as well as the KR Foundation.

Global Subsidies Initiative

International Environment House 2,
9 chemin de Balexert
1219 Châtelaine
Geneva, Switzerland

Tel: +1 (204) 958-7700
Website: www.iisd.org/gsi
Twitter: @globalsubsidies

About ODI

The Overseas Development Institute (ODI) is the UK's leading independent think tank on international development and humanitarian issues. Our mission is to inspire and inform policy and practice which lead to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods in developing countries. We do this by locking together high quality applied research, practical policy advice, and policy-focused dissemination and debate. We work with partners in the public and private sectors, in both developing and developed countries.

Overseas Development Institute

203 Blackfriars Road
London, England
United Kingdom SE1 8NJ

Tel: +1 (204) 958-7700
Website: www.odi.org
Twitter: @odidev

About ICF

ICF (NASDAQ:ICFI) is a global consulting and technology services provider with more than 5,000 professionals.ICF is one of the world's leading consulting firms in areas of climate change, carbon finance, carbon markets, and international development. Year-after-year, ICF has been recognized as a leading carbon market advisory firm. For the sixth straight year, ICF has been honored by companies participating in the Environmental Finance and Carbon Finance survey for its outstanding work in carbon strategy and greenhouse gas mitigation. ICF is one of the world's leading climate adaptation consultancies, having received the top awards from the Climate Change Business Journal for climate risk management in the past few years. CCBJ has also noted that ICF is the largest climate adaptation consultancy. .

ICF

302-307, Ashoka Estate
24 Barakhamba Road
New Delhi, 110001, India

Tel: +91-11-4354-3080
Website: www.icf.com
Twitter: @ICF

India's Energy Transition: Mapping subsidies to fossil fuels and clean energy in India
November 2017

GSI
- Vibhuti Garg
- Ivetta Gerasimchuk
- Kaushik Ranjan Bandyopadhyay
- Christopher Beaton

ICF
- Gurpreet Chugh
- Ajit Gupta
- Apurva Jain
- Ramit Malhotra
- Garima Sodhi
- Sagun Tripathi

ODI
- Shelagh Whitley
- Leah Worrall
- Andrew Scott
- Sejal Patel

India's Energy Transition:

Mapping subsidies to fossil fuels and clean energy in India

GSI REPORT

November 2017

Acknowledgements

This report was led by Vibhuti Garg, with contributions from Ivetta Gerasimchuk, Kaushik Ranjan Bandyopadhyay and Christopher Beaton of the Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development (IISD) (www.iisd.org/gsi), and Shelagh Whitley, Leah Worrall, Andrew Scott and Sejal Patel from the Overseas Development Institute (ODI).

The report is also co-authored by team led by Gurpreet Chugh, with contribution from Ajit Gupta, Ramit Malhotra, Apurva Jain, Garima Sodhi, and Sagun Tripathi from ICF who carried out the research and estimation of energy subsidies on electricity transmission and distribution, coal and renewables.

The authors would like to thank the William and Flora Hewlett Foundation, the Oak Foundation and the European Climate Foundation for their generous support of this research project and publication. The authors are grateful to the following peer reviewers for their invaluable feedback and suggestions on earlier drafts of this paper:

- Vikas Mehta, Portfolio Director, Growald Family Fund
- James Docherty
- Aditya Ramji
- Vijoleta Gordeljevic, Health and Climate Change Coordinator, Health and Environment Alliance (HEAL)
- Dr. Somit Dasgupta, Member (Economic and Commercial), Central Electricity Authority, CEA
- Dr. S.K. Chatterjee, Joint Chief (Regulatory Affairs), Central Electricity Regulatory Commission
- Mr. Shantanu Dixit, Group Coordinator, Prayas Energy
- Harro van Asselt, Senior Research Fellow, Stockholm Environment Institute

The opinions expressed and the arguments employed in this report do not necessarily reflect those of the funders and peer reviewers, nor should they be attributed to them.

Executive Summary

India is the world's third largest economy with a rapidly expanding population, and hence substantial increases in energy demand. India's government is looking for ways to power further economic growth needed to raise the living standards of about one fifth of Indians who still live in poverty (World Bank, 2016). The government also seeks to expand electricity access to the 240 million people without grid electricity (International Energy Agency [IEA], 2015), to improve the quality of electricity supply and to boost per capita energy consumption.

Energy subsidies reviewed in this report are key to India's development trajectory. These subsidies determine how India's energy demand is and will be met, locking in several critical choices. Which energy sources will power India's economic growth: renewables or the fossil fuels that accounted for up to 92 per cent of the country's total primary energy supply in 2015 (BP, 2017a)? Which industries and households—poor or rich—are to enjoy affordable energy? Which investments are to pay off or become stranded? Energy subsidies also lock in the choice of how polluted or clean the Indian environment will be, with important implications for the climate and health of Indians.

This report maps out the context, magnitude, trends and impacts of India's energy subsidies. The aim of the study is to enhance transparency and dialogue on energy choices in India and assist in tracking the shift in government support from fossil fuels to renewables, in line with the country's goals of increasing access to low-carbon and energy-efficient services.

India's Energy Policies and the Role of Subsidies

At present, India follows an "all-of-the-above" approach to energy supply, in particular promoting electricity based on both clean energy and fossil fuels. Meanwhile, India's Nationally Determined Contribution, linked to the Paris Agreement on climate change, aims to cut the country's emissions intensity by up to 35 per cent and increase the share of power sourced from low-carbon sources to at least 40 per cent of the total generation by 2022 (equivalent to 175 GW) (Government of India, 2016).

India uses several levers to shape its energy mix, including subsidies in the form of fiscal incentives, regulated energy prices and other forms of government support. For example, the Clean Environment Cess on the use of coal discourages the production and consumption of coal by increasing its cost, while part of the government revenue from the cess is reallocated to support renewable energy development.

As a member of the G20, India committed in 2009 to "phase out inefficient fossil fuel subsidies that encourage wasteful consumption, while providing targeted support for the poorest" (G20, 2009). India already has significant experience reforming its energy subsidies: its pricing reforms, mainly for gasoline (2010) and diesel (2014), cut the country's energy subsidies bill in 2014 by USD 15 billion (IEA, 2015), while leading in parallel to the implementation of the world's largest cash transfer program targeted to the vulnerable households.

Inventory of Energy Subsidies in India

This report presents the first inventory of all energy subsidies in India, apart from subsidies to nuclear power and large hydropower, which were excluded due to the lack of data. The reviewed subsidies are grouped according to the energy type they benefit: a) coal; b) oil and gas; c) renewable energy. In addition, we single out the grouping of subsidies to d) electricity transmission and distribution (T&D) that are, in theory, neutral to the energy source, though in practice benefit mostly coal because of its dominance in India's electricity generation. Table ES1 includes more detail on what activities are included in each of the groupings. The inventory covers three financial years: FY2014, FY2015 and FY2016.[1]

[1] Where available, data for FY2017 are provided. However, at the time of the publication, the FY2017 data were incomplete.

COAL	OIL AND GAS
Coal mining (exploration, access, appraisal, development, extraction and preparation, storage and transportation, decommissioning, environmental and social rehabilitation) Coal import Coal-fired electricity generation and consumption of coal in other uses	Production of oil and natural gas (exploration, access, appraisal, development, extraction and preparation, storage and transportation, decommissioning, environmental and social rehabilitation) Oil and gas import Refining Consumption of oil and gas products in household use, transport, power generation and industry (for example fertilizer)
TRANSMISSION & DISTRIBUTION	**RENEWABLE ENERGY**
Utilities and grids for electricity T&D	Production and consumption of solar, wind, small hydro, biogas, geothermal energy on- and off-grid; renewable energy applications

Table ES1. Groupings of subsidies discussed in this report

The first step of the analysis was subsidy identification. The identified subsidies have been quantified where possible, but many still remain unquantified. The total values of subsidies in each of the four groupings are reported only for subsidies conferred at the level of the central government. The report itself provides examples and values of certain state-level energy subsidies for illustrative purposes.

To assist in the analysis, the description of the identified energy subsidies uses three parallel classifications. The first classification draws on the renowned approach of the Organisation for Economic Co-operation and Development (OECD), which is also adopted and applied by the Global Subsidies Initiative (GSI) in other studies and countries (OECD, 2015; GSI, 2010). This classification is based on these subsidy mechanisms: a) budgetary transfers (this category does not include government loans and government loan guarantees[2]), b) government revenue foregone (tax breaks), c) provision of government-owned goods and services below market value (for example, the use of rail and other government infrastructure at below-market rates or preferential access to land; this category does not include investments of state-owned enterprises[3]), and d) market and price support (such as regulated fuel prices).

The second classification indicates whether subsidy beneficiaries are energy producers, energy consumers or both (including prosumers in the case of renewable energy subsidies). The third classification is based on stimulated activity in the value chain and varies depending on the energy type (for example, exploration, access, appraisal, development, extraction and preparation, storage and transportation, decommissioning, environmental and social rehabilitation in the case of coal mining). Many subsidies are found to be cross-cutting through different activities, for example, both coal mining and transport.

Findings: Trends in Energy Subsidies in India

The total value of energy subsidies from the central government, quantified in this inventory, has declined substantially between FY2014 and FY2016, from INR 216,408 crore (USD 35.8 billion) in FY2014 to INR 133,841 crore (USD 20.4 billion) in FY2016 (in current prices). In addition, the inventory identified a range of subsidies that could not be quantified due to lack of data. However, even this incomplete quantification of subsidies is representative of the overall trends.

[2] For a review of India's government loans to fossil fuels, see Garg & Bossong (2015).
[3] For a review of investments of state-owned enterprises in India see & Bossong. (2015).

Figure ES1 presents the main trends in energy subsidies in India. In FY2014 oil and gas subsidies, mainly in the consumption sphere, were by far the largest of all energy subsidies in India, at INR 157,678 crore (USD 26 billion). In FY2016, oil and gas subsidies amounted to INR 44,654 crore (USD 6.8 billion), implying a reduction by almost three quarters, partially due to India's reforms and partially due to the decrease in the world price for oil. Subsidies to electricity T&D increased from INR 40,331 crore (USD 6.7 billion) in FY2014 to INR 64,896 crore (USD 9.9 billion) in FY2016, and this grouping became the main recipient of energy subsidies in India. The total subsidies to coal have remained relatively stable over the reviewed years and amounted to INR 14,979 crore (USD 2.3 billion) in FY2016. Subsidies to renewables have significantly increased from INR 2,607 crore (USD 431 million) in FY2014 to INR 9,310 crore (USD 1.4 billion) in FY2016. Overall, the scale of support to fossil fuels (coal, oil and gas) has remained more significant than subsidies to renewables through the entire review period.

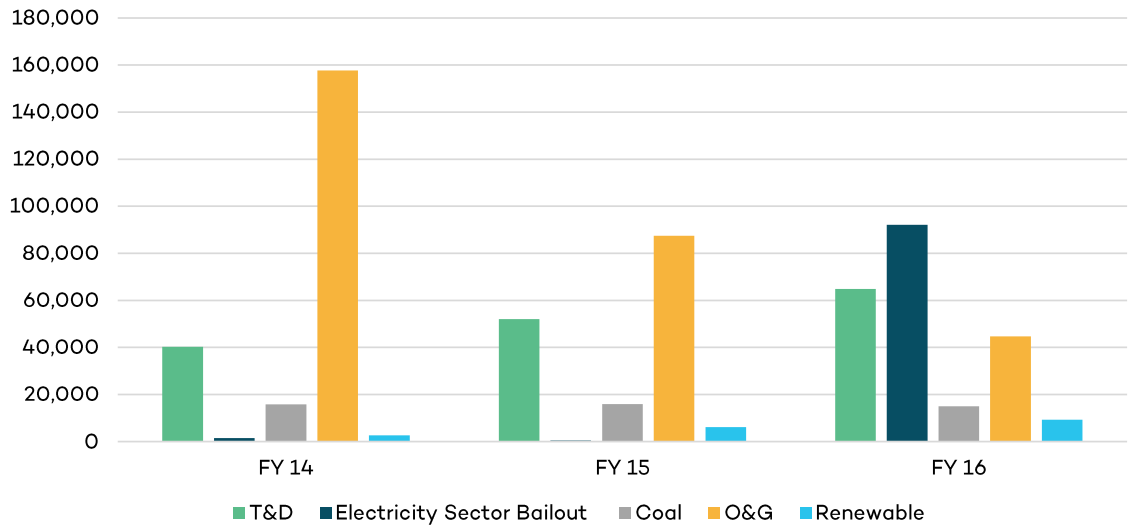

Figure ES1. Subsidies to coal, oil & gas, renewables and electricity T&D in India, FY2014–2016 (INR Crore)

Source: Author's calculations

Subsidies to Electricity T&D

Electricity T&D in India faces several challenges, such as ageing infrastructure and a lack of financial resources for existing utilities, as well as expanding access for Indians still living without electricity. Subsidies seek to strengthen T&D infrastructure and provide financial support to distribution utilities under a range of programs that are funded by both central and state governments.

Subsidies to T&D are, in theory, neutral to energy types, as the T&D infrastructure channels power regardless of its origin. However, because of the coal dominance in India's electricity generation, in practice, these subsidies can also be described as benefitting fossil fuels. This is particularly the case where T&D subsidies entrench a centralized form of power system to the detriment of off-grid or mini-grid renewable energy solutions.

This inventory has identified 14 subsidies to T&D provided by the central government. Their total value has increased from INR 40,331 crore (USD 6.7 billion) in FY2014 to INR 64,896 crore (USD 9.9 billion) in FY2016.[4] There are two main reasons for this increase. First, allocations under ongoing schemes were increased, including in the form of budgetary transfers to distribution companies (DISCOMs) to cover losses for supplying power at low rates to agriculture and household consumers. Second, new schemes were introduced, such as the National Electricity Fund Scheme and the Power Sector Development Fund.

[4] This excludes debt taken over by various state governments under UDAY (INR 92,113 crore in FY2016 and INR 78,689 crore in FY2017).

The central subsidies to T&D are likely to increase further as the government announced another new scheme, Saubhagya, in September 2017. The objective of Saubhagya is to provide universal electricity access to all households in India by December 31, 2018. The total cost of the scheme is budgeted at INR 16,320 crore (USD 2.5 billion), based on an average of INR 5,400 (USD 84) per connection (Bridge to India, 2017).

In addition, the central and the state governments have provided bailout packages to DISCOMs from time to time to improve their operational and financial performance. A Financial Restructuring of State DISCOMs scheme was introduced in 2012, but it did not change the poor financial health of DISCOMs. This led to another restructuring scheme announced by the government, Ujwal DISCOM Assurance Yojana (UDAY), under which the government has committed to taking over 75 per cent of DISCOMs' debt, totalling INR 170,000 crore (USD 25 billion), over a two-year period in FY2016 and FY2017. In this inventory, the value of UDAY is excluded in the totals of subsidies to T&D for methodological reasons and marked as a standalone Electricity Sector Bailout in Figure ES1 (see more details in the main report).

For illustrative purposes at the state level, T&D subsidies have been quantified only for Rajasthan. The report identified four subsidies with a total value increasing from INR 3,904 crore (USD 645 million) in FY2014 to INR 4,884 crore (USD 746 million) in FY2016. Most state-level support in Rajasthan was provided to distribution utilities for losses incurred by selling electricity at below cost-recovery levels.

Subsidies to Renewable Energy

Renewable energy generation has witnessed massive growth, with installed capacities doubling over the last five years (2012–2017), from 12 to 17.5 per cent of installed national capacity. The strong push to renewable energy is largely driven by the government's renewable energy targets. The government has provided a range of subsidies to the sector to accelerate the deployment of renewable energy.

The inventory identifies 24 renewable energy subsidies provided by the central government. The total value of these subsidies has increased from INR 2,607 crore (USD 431 million) in FY2014 to INR 9,311 crore (USD 1.4 billion) in FY2016. By FY2016, two thirds of these subsidies were tax exemptions, such as the exemption from excise and custom duties, as well as benefits with respect to the income tax. Further, direct budgetary transfers to renewables under various schemes have increased by approximately 400 per cent in the last four years. This is mainly due to the introduction of new schemes and increased allocation under ongoing schemes. Given government targets to increase renewable energy capacity, subsidy support to the sector is expected to continue or even increase in the near future.

For illustrative purposes at the state level, the inventory highlights renewable energy subsidies for one state: Tamil Nadu. The analysis shows five subsidies provided by the Tamil Nadu government, and their total value has grown from INR 94 crore (USD 16 million) in FY2014 to INR 287 crore (USD 44 million) in FY2016. This includes transfers of funds and liabilities for promoting solar power and feed-in tariffs for generators.

Subsidies to Coal

Coal India Ltd is the main government-owned coal mining company, which operates through its various subsidiaries and was responsible for nearly 84 per cent of total coal production in India in FY2016 (Coal Controller's Organisation Kolkata, Ministry of Coal, 2015; Coal India Ltd., 2017). The Coal Mines Special Provision Act, 2015 is aimed at opening up the sector for commercial mining by private companies.

The report identified 18 subsidies provided by the central government to both coal mining and coal consumption, predominantly in power generation. But financial information was not publicly available for six of these subsidies, which thus remained unquantified.

This inventory finds that total subsidies for the coal mining sector have decreased from INR 15,791 crore (USD 2.6 billion) in FY2014 to INR 14,979 crore (USD 2.3 billion) in FY2016. Subsidies are largely provided through tax breaks (government revenue foregone), with concessional duties and taxes making up around 90 per cent of total coal subsidies. Budgetary transfers only account for 10 per cent of the total subsidy amount over the review period. Aims of the subsidies include: to improve the conservation and safety of coal mines, exploration in difficult areas, special benefits to employees and not complying with coal washing requirements. Due to major overhauls in the tax system through the introduction of the Goods and Services Tax (GST), coal subsidies are likely to change in 2017 and future years. Insufficient data were available for an indicative estimate to be prepared, but given the effective tax exemption under the GST, it is likely that central subsidies for coal will increase. It is difficult to identify if net subsidization will rise or fall, because the GST absorbs state-level taxation, effectively removing any state-level tax subsidies, and it was not possible to review these existing state-level tax subsidies in this study.

Coal-fired electricity generation benefits from subsidies such as income tax exemptions and access to land at preferential rates. This study was unable to quantify subsidies to coal-fired generation and other coal consumption in India due to lack of data. Measures of support to coal consumption in India include the overall coal pricing regime and concessional import duty on coal.

For illustrative purposes at the state level, coal subsidies were analyzed for Chhattisgarh. The analysis identified that one subsidy provided by the Chhattisgarh government increased from INR 1,127 crore (USD 186 million) in FY2014 to INR 1,590 crore (USD 243 million) in FY2016. The aim of this subsidy was a lower value-added tax on the sale of coal in the state.

Subsidies to Oil and Gas

India's demand for petroleum products and natural gas has increased in tandem with its economic growth, resulting in a growing reliance on imports from overseas. In 2016 domestic production supplied less than 20 per cent of its own demand for crude oil and petroleum and 40 per cent of its demand for natural gas (BP, 2017a). Government policy has sought to disincentivize inefficient consumption through a reduction in direct budgetary support for petroleum products, and increase domestic exploration and production through research and development, tax exemptions and access to exploration blocks (without formal bidding).

A total of 38 subsidies provided by the central government was identified, but financial information was not publicly available for 12 of these subsidies that thus remained unquantified. This inventory finds that total oil and gas subsidies have decreased from 157,678 crore (USD 26 billion) in FY2014 to INR 44,654 crore (USD 6.8 billion) in FY2016. In FY2014, only a fraction of subsidies (5.4 per cent) were direct spending (with the majority provided through tax breaks, etc.), while by FY2016 almost half of all subsidies were provided through direct transfers.

This largely reflects the deregulation of diesel and gasoline prices and the sharp fall in world oil prices from 2014 that led to the removal of most, though not all, subsidies in India's transport sector. By contrast, the ultimate goal of the absolute majority of the oil and gas subsidies discussed in this report is to lower the end price of oil and gas products to end consumers, particularly consumers of liquefied petroleum gas (LPG) and kerosene for household use. In the transport sector, the only remaining subsidies were under-recoveries for diesel up to FY2015 that stopped with the elimination of diesel subsidies in 2014 (calendar year) as well as diesel subsidies in drought- and rain-affected areas worth INR 7.4 crore (USD 1 million) in FY2017.

Many producer subsidies, such as tax exemptions and concessional royalties, could not be estimated due to insufficient information in the public domain.

The government's recent announcements to reduce subsidies to kerosene and LPG mean it is likely that expenditure will continue to decline in the near future if oil prices on the world market remain constant. A sudden sharp increase in global oil prices could trigger increases in subsidy values.

Oil and gas sector subsidies have been not been quantified at the state level, owing to data and time limitations.

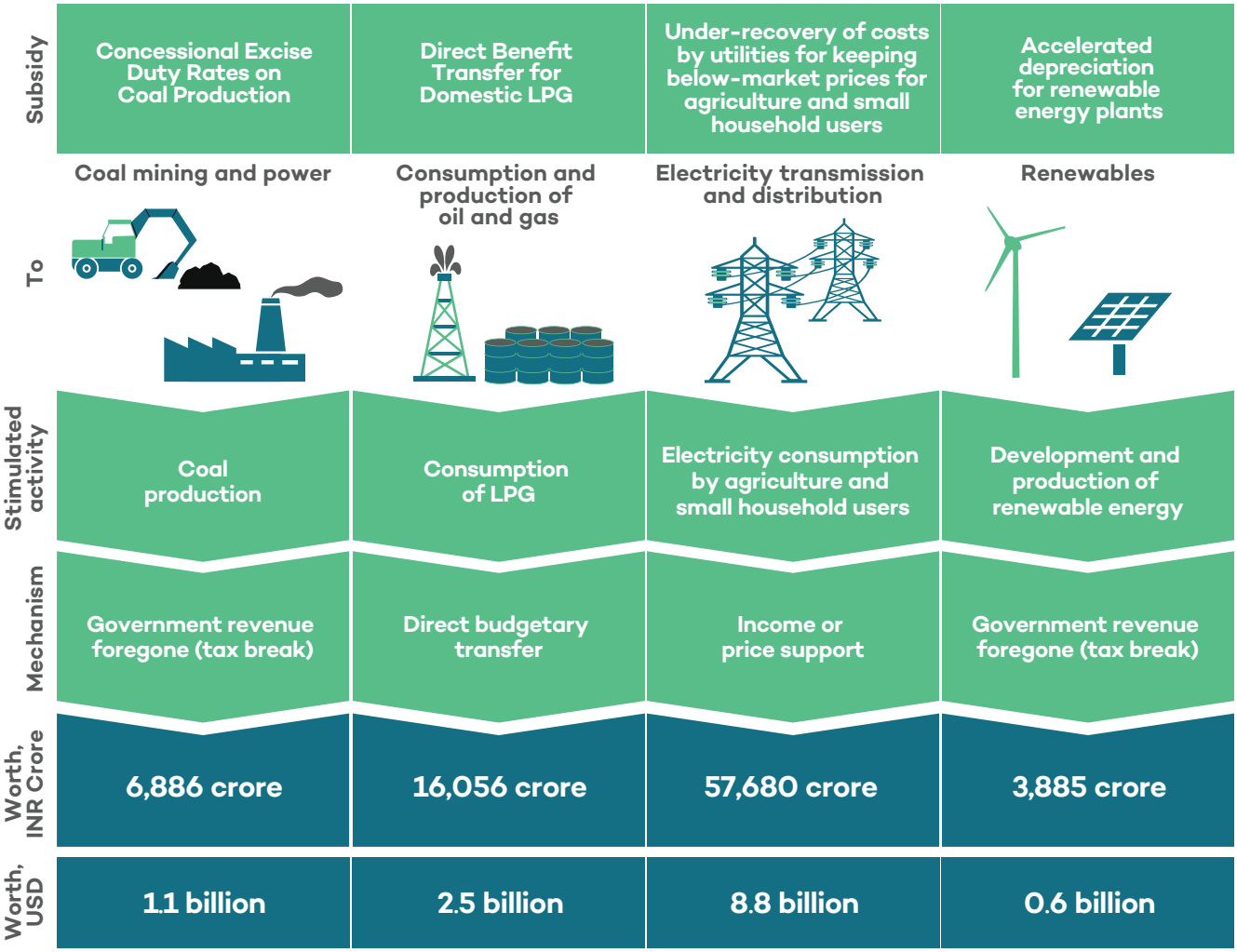

Figure ES2. Largest subsidies provided by the Government of India to each energy type in FY2016.
Source: IISD-GSI

Impacts of Subsidies

Energy subsidies are a cost to the central and state governments: directly, in the case of fiscal transfers, or indirectly through foregone government revenue. Energy subsidies also have wide ramifications beyond government budgets, including on the markets, society and the environment.

Economic impacts. Consumer subsidies reduce costs of energy to consumers, thus artificially inflating demand, while producer subsidies reduce the costs of energy production, thus driving potentially unneeded supply. Both consumption and production subsidies lock in energy choices for present and future generations. Subsidies are generally believed to reduce the efficiency of resource allocation in the economy, and to distort the playing field for different energy types. These impacts of subsidies are critical to the success of major development and capital-intensive and long-lived infrastructure projects that anchor energy systems. Whenever investment decisions rely on such subsidies, however, their removal increases the risk of asset stranding.

Social welfare impacts. In India, electricity, kerosene and LPG are subsidized to protect consumers. However, if untargeted, consumer subsidies benefit the rich and the middle class more than the poor. In India, it is estimated that 87 per cent of electricity subsidy payments are received by households above the poverty line (Climate Home, 2017). The majority of people living below the poverty line rely on biomass (e.g., wood, dung), and hence receive little or no benefit from these subsidies.

Impacts on energy access. Many subsidies are introduced to provide access to modern electricity and clean energy for cooking and other needs. Relying on the T&D subsidies discussed in this report—for example, the rural electrification program, Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY) and the Saubhagya scheme introduced in September 2017—the Government of India aims to achieve universal access to electricity by December 31, 2018. However, some T&D subsidies entrench a centralized form of power system to the detriment of off-grid or mini-grid renewable energy solutions. Relying on several LPG subsidies and biogas subsidies, the National Mission on Clean Cooking aims to achieve universal access to clean cooking by 2022, with a complimentary aim of 75 per cent LPG coverage by 2019.

Health and environmental impacts. In India, fossil fuel and biomass-based energy are major causes of air pollution, particularly emissions from transport, coal-fired power plants and traditional cookstoves. The latter primarily affects the health of women and children, who are responsible for meal preparation and spend more time at home being exposed to toxic fumes from smoky open fires. The associated health costs are estimated at 3 per cent of India's GDP. One estimate has India accounting for half of all global deaths due to ambient air pollution (1.8 million deaths in India in 2015) (Landrigan et al., 2017). Recent estimates find that reforms to fossil fuel subsidies and fuel taxation could help India prevent 65 per cent of the premature deaths caused by air pollution (Health and Environment Alliance, 2017). In particular, India's many LPG subsidies seek to expand access to clean cooking with positive impacts on health, while kerosene subsidies still lead to more indoor pollution and slow down the proliferation of healthier solar energy. Further, any increase in fossil fuel consumption and production due to subsidies leads to greater negative environmental impacts such as greenhouse gas emissions driving climate change, water pollution and soil contamination and subsidence.

Conclusions and Recommendations

To inform their decisions, policy-makers and other stakeholders in India need a coherent and clear presentation of information on energy subsidies: their costs and impacts, including potential distortion of the playing field for different energy types. This inventory makes the first attempt to bring together such information not just on fossil fuel subsidies, but also on subsidies to renewables as cleaner, healthier and increasingly cheaper alternatives. However, the inventory has revealed significant gaps in subsidy reporting. Many of the identified subsidies could not be quantified due to data limitations.

Based on the analysis, there are three recommendations that stand out:

1) The Government of India can benefit from improved energy subsidy reporting by launching an inter-agency process of consultations and information sharing.
2) There is a need for comprehensive evaluation of the efficiency and impacts of different energy subsidies against their stated policy objectives. At present, fossil fuel subsidies may act as a barrier to the development of renewable energy—an impact that, in its turn, the government attempts to overcome with renewable energy subsidies. Further, some energy subsidies introduced to protect the poorest may not be delivering against this objective due to insufficient targeting. Energy subsidies also have intended and unintended impacts on the health of Indians, their energy access, the environment and greenhouse gas emissions. Evaluation and rationalization of energy subsidies in India can help better allocate government support to those who are in need of it the most.

3) China and Indonesia, India's largest peers in Asia and fellow members of the G20, have both opted for self-reports and peer reviews of fossil fuel subsidies as a first step and practical tool to "phase out inefficient fossil fuel subsidies that encourage wasteful consumption while providing targeted support for the poorest" (G20, 2009). Many other members of the G20 and Asia-Pacific Economic Cooperation have also resorted to peer reviews of fossil fuel subsidies, and many countries are expected to voluntarily report fossil fuel subsidies under the UN Sustainable Development Goals (SDGs). Volunteering for a self-report, a peer-review or an SDG report on fossil fuel subsidies can enable India to address its domestic policy-making needs with the help of the international best practices.

India has accomplished significant improvements in energy access and development of cleaner energy in the past years. Government support at the central and state levels has played a crucial role in this progress—it is a powerful tool that should be used with care and prudence.

Table of Contents

List of Figures

List of Tables

List of Acronyms

AD	accelerated depreciation
ADB	Asian Development Bank
ADNOC	Abu Dhabi National Oil Company
AT&C	Aggregate Technical and Commercial
APM	Administrative Price Mechanism
BCM (or bcm)	billion cubic metres
BEE	Bureau of Energy Efficiency
BPCL	Bharat Petroleum Corporation Limited
BPL	below poverty line
CBA (A&D) Act 1957	Coal Bearing Areas (Acquisition & Development) Act 1957
CBEC	Central Bureau of Excise and Customs
CBM	coal bed methane
CEA	Central Electricity Board
CENVAT	Central Value Added Tax
CERC	Central Electricity Regulatory Commission
CFA	Central Finance Assistance
CIL	Coal India Limited
CM	Chief Minister
CMDLPS	Coal Mines Deposit Linked Pension
CMDPI	Central Mine Planning and Design Institute Limited
CMPFO	Coal Mines Provident Fund Organisation
CMPS	Coal Mines Pension Scheme
CPFS	Coal Mines Provident Fund Scheme
CPSU	Central Public Sector Undertaking
Crore	10 million
CST	Central Sales Tax
ctu	central transmission utility
DBT	Direct Benefit Transfer
DBTL	Direct Benefit Transfer of LPG Scheme
DDUGJY	Deendayal Upadhyaya Gram Jyoti Yojana
DISCOM	distribution companies
E&P	exploration and production
ESMAP	Energy Sector Management Assistance Program
FY	Indian Fiscal Year (April to March) (e.g., FY2012 implies April 2011 to March 2012)
G20	Group of 20
GBI	Generation Based Incentive
GDP	Gross Domestic Product
GoI	Government of India
GSI	Global Subsidies Initiative
GST	Goods and Service Tax
GW	gigawatt

HELP	Hydrocarbon Exploration and Licensing Policy
HPCL	Hindustan Petroleum Corporation Limited
IEA	International Energy Agency
IMF	International Monetary Fund
INR	Indian rupee
IOCL	Indian Oil Corporation Limited
IPDS	Integrated Power Development Scheme
IPP	Independent Power Producer
IREDA	Indian Renewable Energy Development Agency Ltd.
IRENA	International Renewable Energy Agency
ISPRL	Strategic Petroleum Reserves Limited
IT	informaiton technology
JNNSM	Jawaharlal Nehru National Solar Mission
JV	joint venture
KfW	Kreditanstalt fur Wiederaufbau
kWh	kilowatt hour
kWp	kilowatt peak
lakh	100,000
LED	Light-emitting Diode
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
mBTU	million British thermal units
mmt	million tonnes
MBPD	million barrels per day
MMSCM	million metric standard cubic meters
MMT	million metric tonne
MMTPA	million metric tonnes per annum
MNBBL	million barrels
MNRE	Ministry of New and Renewable Energy
MoC	Ministry of Coal
MoF	Ministry of Finance
MoP	Ministry of Power
MoPNG	Ministry of Petroleum and Natural Gas
MoU	Memorandum of Understanding
MRPL	Mangalore Refinery and Petrochemicals Limited
Mtoe	million tonnes of oil equivalent
MW	megawatt
NCEF	National Clean Energy Fund
NDC	Nationally Determined Contribution
NEF	National Electricity Fund
NELP	New Exploration Licensing Policy
NLC	Neyveli Lignite Corporation Limited
NOC	national oil companies
NOFN	National Optical Fibre Network

NTPC	National Thermal Power Corporation
ODI	Overseas Development Institute
OECD	Organisation for Economic Cooperation and Development
OIDB	Oil and the Industry Development Board
OIL	PSE Oil India Limited
OMCs	Oil Marketing Companies
ONGC	Oil and Natural Gas Corporation of India
PDS	Public Distribution System
PIB	Press Information Bureau
PLR	priority lending rate
PM	Particulate matter
POWERGRID	Power Grid Corporation of India Limited
PPAC	Petroleum Planning and Analysis Cell
PSDF	Power System Development Fund
PSE	Public sector enterprise
PSL	priority sector lending
PSU	public sector undertaking
PV	photovoltaic
R&D	research and development
R-APDRP	Restructured Accelerated Power Development and Reform Programme
RDD&D	Research, Design, Development, Demonstration
RGGLVY	Rajiv Gandhi LPG Vitaran Yojana
RGGVY	Rajiv Gandhi Grameen Vidyutikaran Yojna
RPO	Renewable Purchase Obligation
SBI	State Bank of India
SCCL	Singareni Collieries Co. Ltd
SECI	Solar Energy Corporation of India
SED	Stowing Excise Duty
SERC	State Electricity Regulatory Commission
SSRC	Standing Scientific Research Committee
STU	state transmission utilities
T&D	transmission and distribution
TEDA	Tamil Nadu Energy Development Agency
TOE (or toe)	tonnes of oil equivalent
TRANSCO	Government-owned transmission companies
UDAY	Ujwal DISCOM Assurance Yojana
Ujjwala	Pradhan Mantri Ujjwala Yojana
USD	US Dollar
UT	union territories
VAT	value-added tax
VGF	Viability Gap Funding
WTO	World Trade Organization

1.0 Introduction

India is the world's third largest economy with a rapidly expanding population, expected to reach 1.7 billion people by 2050 (United Nations Department of Economic and Social Affairs, 2015; World Development Indicators, 2017). To meet current and future energy demand, the country needs to rapidly expand energy access and energy availability per capita.

India is currently recognized as an "energy-scarce" economy, with close to 240 million people without grid electricity (and many millions more with limited supply) (International Energy Agency [IEA], 2015a; Sarkrer, 2016). The country is the fourth largest net importer of crude oil and petroleum products. India also imports coal to bridge the gap between demand and supply of coal from domestic production. While coal, oil and gas reserves present opportunities for energy access, they are not necessarily pro-poor—particularly given households' need to be connected to the grid to benefit (Granoff et al., 2016). Coal is also associated with health externalities from local pollution (Granoff et al., 2016).

The Government of India (GoI; hereinafter this term is used to refer to the federal government of India) is, in the meantime, positioning itself to capture a share of the global renewable energy market (Ganesan et al., 2014). India has high potential for renewable energy, including in wind and solar. With plummeting renewable energy costs in India (International Renewable Energy Agency [IRENA], 2017), low-carbon technologies present opportunities for low-cost energy access. In 2016, a tender for solar photovoltaic (PV) technology, for example, produced bids of approximately INR 4.78 per kWh (or USD 0.06-0.07 per kWh) (IRENA, 2017).

From the national policy perspective, India's energy targets focus on the expansion of energy access, including rural electrification. Policy-makers are adopting an "all-of-the-above" approach toward this aim, including significant coal capacity in power generation. Another policy priority is to ensure that power prices are kept as low as possible for its consumers.

At the international level, India's Nationally Determined Contribution (NDC) to the Paris Agreement has committed to providing 40 per cent non-fossil fuel electricity capacity (or 175 GW of renewables) by 2022 (GoI, 2015b). It also commits to reducing emissions intensity by 30–35 per cent, and to promoting energy efficiency and less carbon-intensive consumption (GoI, 2015b). The Paris Agreement also commits India to "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development" (United Nations Framework Convention on Climate Change, 2015). Under the G20, India has made a commitment to phasing out "inefficient fossil fuel subsidies that encourage wasteful consumption" (U.S. Department of Treasury, 2009).

In this vein, India has adopted certain policies to address its climate change concerns. These include the use of fiscal instruments like the Clean Environment Cess (tax), as well as cutting fossil fuel consumption subsidies, increasing taxation and deregulating petrol, diesel and natural gas markets. Other policies focus on energy efficiency and renewable market schemes (such as the Perform Achieve and Trade, Renewable Energy Certificates and the Renewable Purchase Obligation schemes).

At the same time, the GoI and state governments continue to subsidize fossil fuels significantly, to the detriment of low-cost and low-carbon options. Though the government has dramatically increased subsidies to renewable energy, this report finds that, in absolute terms, this support is much lower than that provided to coal, oil and gas collectively.

This situation is not unique to India. Governments around the world continue to subsidize and finance the development of fossil fuel reserves, fuelling dangerous climate change with taxpayer dollars that could be better spent on other public goods. Subsidies distort energy markets in favour of oil, gas and coal at the expense of alternative low-carbon alternatives. Removing subsidies would shift investment, forcing energy markets to

operate a more level playing field. Globally, fossil fuel subsidies to consumers have received growing attention and transparency through the publication of global datasets, such as those by the Organisation for Economic Co-operation and Development (OECD) and the International Energy Agency (IEA). As per the IEA Energy Subsidies database, the top five countries (Iran, Russia, Saudi Arabia, China, India) constitute half of the total share of subsidies to fossil fuels. India is the fifth largest country with 6 per cent share in total subsidies to fossil fuels in 2015 (IEA, 2017).

Despite the presence of government expenditure reporting, many governments, including India, lack reporting on energy subsidies. This is due to the fact that indirect measures to government support to energy—such as foregone revenue and below-market-value goods and services—are not always discussed as subsidies. In addition, the aggregation of energy subsidies with subsidies to other sectors in reporting channels makes disaggregation a difficult exercise.

This inventory includes an estimation of direct and indirect energy subsidies for better estimation, through a review of policy and government documents, as well as wider subsidy literature for India. Adopting the World Trade Organization's (WTO) Agreement on Subsidies and Countervailing Measures definition of subsidies, the study develops an inventory of energy subsidies to coal, oil and gas, transmission and distribution (T&D), and renewable energy. It also provides examples of the use of subnational energy subsidies at the state level. The subset of Indian states selected is based on the assumptions of largest subsidies'—due to, for example, the significant scale of coal extraction or renewable generation in respective states.

Firstly, the paper sets out an overview of India's energy sector, with a focus on energy governance, commitments and recent policy developments in the energy subsectors (of coal, oil and gas, T&D and renewable energy). It details the methodology adopted to identify and quantify the subsidies, including classification of the subsidy according to: a) their mechanism b) beneficiary and c) stimulated activity in the value chain. It presents an overview of India's energy subsidies identified in this inventory, also presenting examples at the state level. It provides some analysis on the economic, social and environmental impacts of energy subsidies, with a focus on India. Finally, it provides a review of the policy aspects of all of the subsidies identified, alongside the implications of future policy direction on subsidies.

The Global Subsidies Initiative (GSI) has an established framework and methodology for subsidy identification and quantification and has published a citizen's guide to energy subsidy reforms for India (focused exclusively on fossil fuel consumption subsidies) (Gerasimchuk, Bassi, et al., 2017; Gerasimchuk, Wooders, et al., 2017). This research also builds on parallel GSI studies comparing subsidies to coal and renewables in Turkey, Indonesia and China, and existing analysis of wider energy subsidies by OECD, GSI, Overseas Development Institute (ODI), Oil Change International and the International Monetary Fund (IMF).

The aim of this study is to enhance transparency and dialogue on energy choices in India, with a view to keeping the country on track for its international and national climate and fossil fuel subsidy commitments. It aims to assist in tracking the shift in energy subsidies towards instruments that support the country's goals of increasing access to low-carbon and energy-efficient services.

2.0 India's Energy Sector Overview

2.1 Macroeconomic Situation

India is the world's third largest economy and has shown significant growth in recent years, which can be attributed to the implementation of structural reforms, favourable terms of trade and lower external vulnerabilities. Its share of global GDP (purchasing power parity basis) has increased from 5.9 per cent in 2010 to 6.9 per cent (World Bank, 2017b) in 2015.[5]

Further in terms of year-on-year growth, India's real GDP has grown steeply, at a rate of 6.5 per cent in 2016 and 7.2 per cent in 2017. As per IMF forecasts, India's real GDP is expected to grow at a rate of 7.7 per cent in 2018, and this momentum is expected to continue until 2022, with annual GDP growth reaching as high as 8.2 per cent in 2022 (IMF, 2017). Table 1 shows some of the key macroeconomic indicators for the country.

Table 1. Key macroeconomic indicators

Indicators	Key statistics				
Population*	(billion, 2015)	1.31			
GDP (@constant prices 2010)*	(2015 USD trillion)	2.29			
GDP / Capita*	(2015 USD)	1750			
GDP growth*	(2015 year on year %)	7.9%			
Total primary energy supply**	(million tonnes of oil equivalent 2016)	675			
Electricity consumption**	(Trillion kWh 2016)	1001			
Energy consumption per capita**	(tonnes of oil equivalent/capita 2016)	0.53			
CO_2 emissions***	(billion tonnes of CO_2 2015)	2.47			
Exchange rate****	INR per USD	FY2014	FY2015	FY2016	FY2017
		60.50	61.15	65.46	67.09

**World Bank, 2017a*

*** Ministry of Statistics and Programme Implementation, 2017*

**** Olivier et al., 2016*

***** Reserve Bank of India, 2017*

The economic growth is fuelled by recent reforms. These include promoting the development of industries and entrepreneurship via the Make in India and Start-up India initiatives, removing structural constraints, providing measures to improve the ease of doing business, improving program delivery through direct benefit transfer and other measures like encouraging saving and financial linkages through deepening of banking services and liberalizing foreign direct investment policy in various sectors. These measures have resulted in an improved business environment and enhanced investor confidence, which has been acknowledged by multilateral institutions and reflected in their economic growth forecasts and greater investment inflows.

With rapid economic growth, energy consumption in the country has increased substantially over the last 10 years, leading to an increase in India's share of global energy consumption from 3.7 per cent in 2006 to 5.3 per cent in 2015 (BP, 2016). Despite significant growth in the last few years, there is strong potential for further growth due to various factors, such as limited access to electricity (about 244 million households still do not have any access to electricity [IEA, 2016], while millions more have low-quality electricity for a limited number of hours per day), lower per capita energy consumption (per capita energy consumption of India was one third of the global average in 2014 [IEA, 2014]) and expectations of a continued above-average economic growth rate (IMF, 2017), among others.

Total primary energy consumption of the country has increased from 250 Mtoe to 716 Mtoe in last two decades

[5] Data on macroeconomic variables is reported for financial year.

(Figure 1). In addition to this, the average decadal growth rate has increased from 4.6 per cent in 1996–2005 to 6.3 per cent in 2006–2015. Coal has remained the dominant source of energy, followed by oil, natural gas, renewables and others.

- **Coal**: The share of coal in the total primary energy mix in India is 57 per cent (in 2015), which is high compared with the global average of 29 per cent (Figures 2 and 3). Power generation and industries are major coal-consuming sectors in the country.
- **Oil**: The share of oil in the total primary energy mix is 27 per cent (in 2015), which is slightly less than the global average of 32 per cent (Figures 2 and 3). Transportation, industry and agriculture sectors are the major consuming sectors of petroleum and oil products.
- **Natural gas**: The share of natural gas in the total primary energy mix is 6 per cent (in 2015), which is significantly lower than the global average of 24 per cent (Figures 2 and 3). Fertilizer, industries and power are major gas-consuming sectors in the country. Consumption of natural gas reached 45 billion cubic metres in 2015, which includes both domestic supply and liquefied natural gas (LNG) imports.
- **Renewables**: The share of renewable energy sources (excluding large hydro) in the total primary energy mix is 4 per cent (in 2015), which is comparable with the global average of 2.8 per cent (Figures 2 and 3). The GoI has an ambitious plan to set up renewable energy capacity of 175 GW by 2022. If these targets are achieved, the result will be a major shift in the energy mix towards renewable capacity in the coming years.
- **Hydro**: The share of hydropower-based energy sources in the total primary energy mix is 4 per cent (in 2015), which is slightly less than the global average of 6.8 per cent (Figures 2 and 3). Although an economical resource of energy, hydropower is still untapped in various parts of the country, mainly due to related land and resettlement issues.
- **Nuclear**: The share of nuclear energy is around 1 per cent, which is significantly lower than the global average of 4 per cent (Figures 2 and 3). As per the India Energy Security Scenarios 2047 (Level 2), an initiative by NITI Aayog to develop an energy building tool under different scenarios, India's nuclear generation capacity may increase from 6.7 GW (2017) to 26 GW by 2047 (NITI Aayog, 2017b).

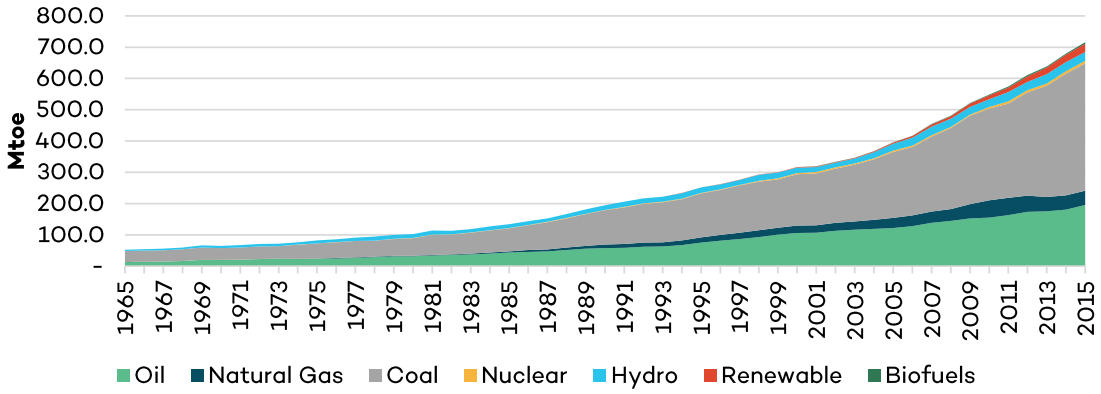

Figure 1. Total primary energy consumption of India

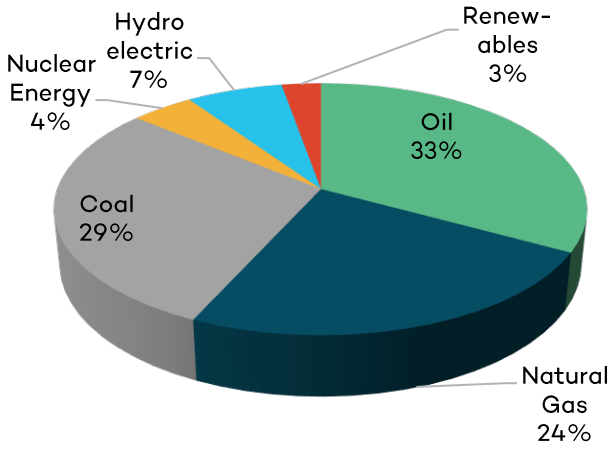

Figure 2. Global primary energy consumption by source in 2015

Source: BP, 2016

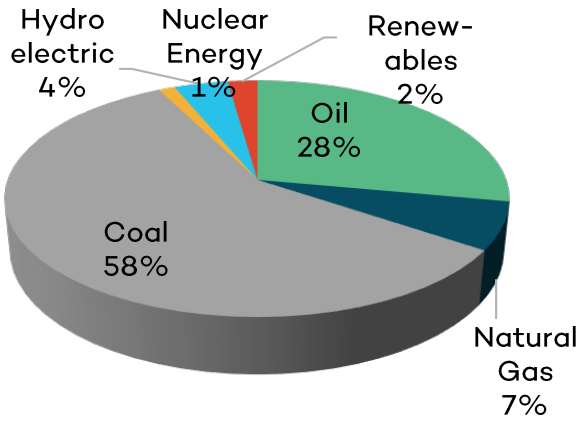

Figure 3. India's primary energy consumption India by source in 2015

Source: BP, 2016

2.2 Energy Sector Governance

The institutional structure of the energy sector is similar to the federal structure of India, which involves devolution of responsibilities from the centre to the states. The governance structure of the coal, renewable energy and electricity sectors is shown in Figure 4. While the coal sector is mainly governed at the central level by the Ministry of Coal, the renewable energy and electricity sectors are governed at both central and state levels.

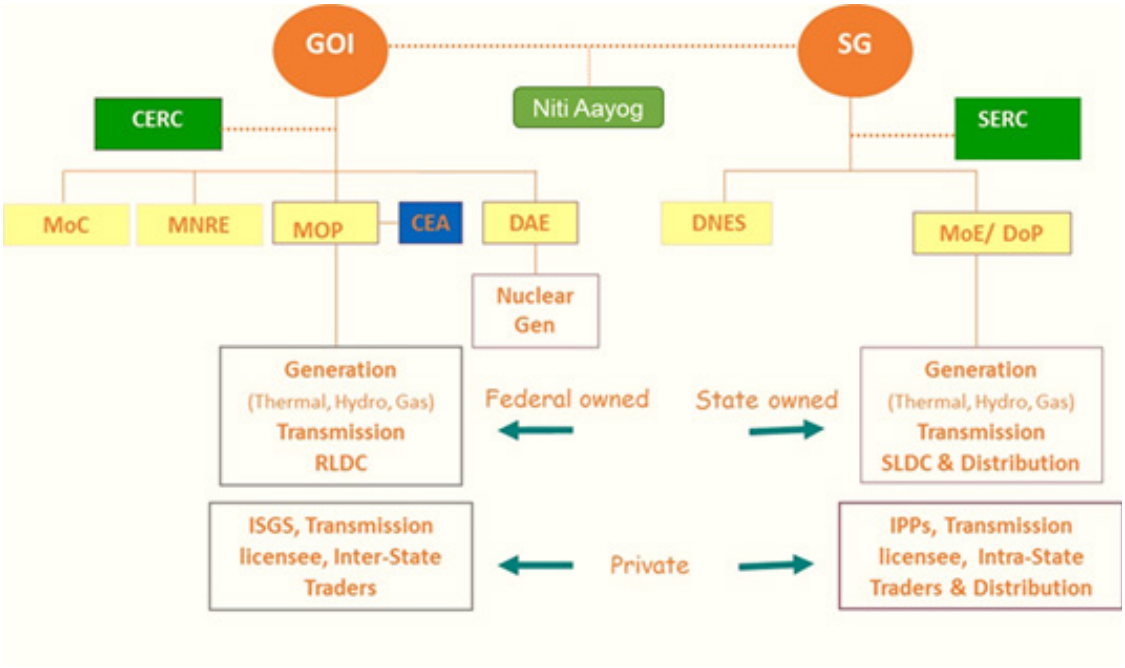

Figure 4. Governance structure of energy sector in India

GOI: Government of India CEA: Central Electricity Authority SG: State Government DEA: Department of Atomic Energy CERC: Central Electricity Regulatory Commission DNES: Department of New and Renewable Energy SERC: State Electricity Regulatory Commission MoE: Ministry of Energy MoC: Ministry of Coal DoP: Department of Power MNRE: Ministry of New and Renewable Energy ISGS: Inter State Generating Station MOP: Ministry of Power IPP: Independent Power Producers

Source: ICF analysis

A brief description of roles and responsibilities of some of the key institutions related to the electricity sector is provided below.

- NITI Aayog: The National Institution for Transforming India (NITI Aayog) is the premier policy think tank of the GoI, providing both directional and policy inputs. The primary role is to assist the central government in designing strategic and long-term policies and programs, while it also provides technical advice to both central and state governments.
- Ministry of Coal (MoC): It is responsible for framing policies and strategies for exploration and development of coal and lignite reserves and sanctioning of important projects. The ministry also governs Coal India Limited (CIL), which is the largest coal mining company in the country.
- Ministry of New and Renewable Energy (MNRE): The broad objective of the MNRE is to develop and deploy new and renewable energy sources. It is mainly responsible for framing policies, research and development and promoting deployment of new and renewable energy sources like solar, wind, biomass, small hydro, biofuels, and geothermal-energy-based projects. The ministry works at the state level through State Nodal Agencies, which act as extended arms of the ministry.
- Ministry of Power (MoP): It is mainly responsible for evolving general policy in the field of electricity. It administers the implementation of the Electricity Act, 2003, the Energy Conservation Act, 2001, the Damodar Valley Corporation Act, 1948 and Bhakra Beas Management Board as provided in the Punjab Reorganisation Act, 1966.
- Central Electricity Authority (CEA): It is a statutory body responsible for advising central government, state governments and regulatory commissions on all technical matters relating to generation, T&D of electricity. CEA prescribes standards on matters such as electrical plants, grid connectivity and installation and operation of meters and safety standards for electricity T&D operations.
- Department of Atomic Energy (DAE): It is engaged in the development of nuclear power technology and applications of radiation technologies across sectors.
- Central and State Electricity Regulatory Commissions (CERC and SERC): These are statutory bodies responsible for developing and implementing regulations for governance of electricity sector. The CREC regulates generating utilities owned by the central government, interstate transmission utilities, power-trading utilities, as well as specifying national grid code and providing guidelines to SERCs. SERCs are mainly responsible for all of this at the state level and electricity T&D sector is regulated by SERCs.
- Central Transmission Utility (CTU): As per the Electricity Act 2003, the functions of the CTU are to:
    - Undertake transmission of energy through the interstate transmission system
    - Discharge all functions of planning and co-ordination for the interstate transmission system with state transmission utilities, central government, state government, generating companies, CERC, licensees, etc.
    - Ensure development of an efficient, coordinated and economical system of interstate transmission lines for smooth flow of electricity from generating stations to load centres
    - Exercise supervision and control over the interstate transmission system
    - Ensure integrated operation of the regional grids through Regional Load Dispatch Centres.

In the oil and gas sector in India, the upstream, midstream and downstream sectors in oil and gas industry belong to the Union List (Article 246, Seventh Schedule) of the Constitution (GoI, n.d.). The principal government body at the central (federal) level that oversees the oil and gas sector is the Ministry of Petroleum and Natural Gas (MoPNG). The ministry is the overarching body that monitors exploration and production of oil and natural gas; refining, distribution and marketing; and import, export and conservation of petroleum products and LNG.

Apart from the MoPNG, certain responsibilities are assigned to the Centre for High Technology, Petroleum Conservation and Research Association and the Oil Industry Safety Directorate as well as other central ministries such as Ministry of Environment and Forests, Ministry of Finance (MoF) and MoP.

At the level of states, various departments and directorates regulate and control activities related to petroleum and natural gas in onshore fields.

While the MoPNG and the Directorate General of Hydrocarbons (DGH) at the central (federal) government level monitors offshore oil and gas resources, the responsibility and ownership of onshore oil and gas reserves lies with the state governments. To facilitate state governments in managing their responsibilities, some states have established dedicated petroleum directorates to monitor oil and gas activities in their jurisdictions (such as in Rajasthan, Gujarat, etc.) while in other states, the departments of industry and commerce of the respective states are performing such tasks (such as in Assam, Tripura, etc.).

The oil and gas sector is dominated by national oil companies (NOCs) that belong to the public sector; however, private sector participation has increased during the last decade. See Figure 5 and Table 2 for the key players in the sector.

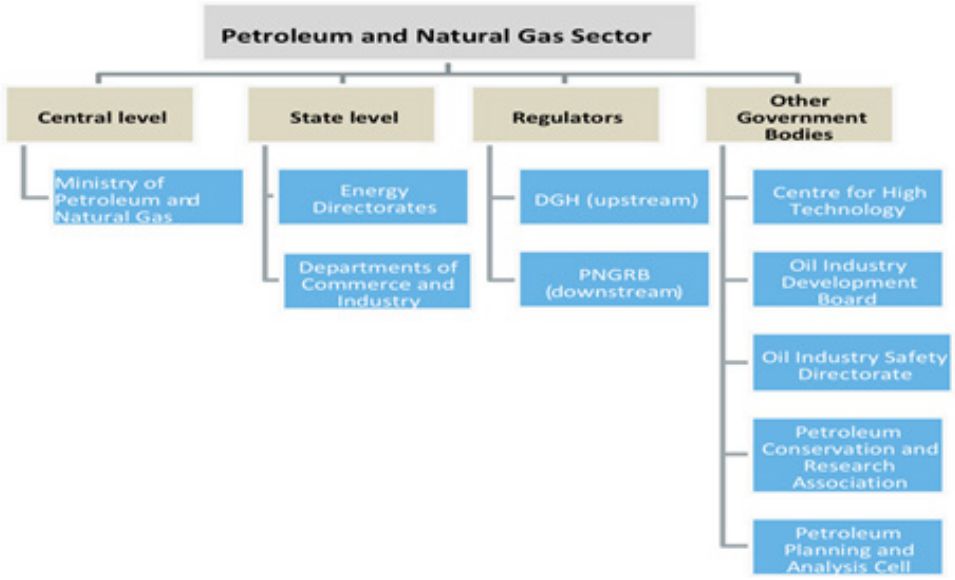

Figure 5. Key government and regulatory bodies involved in the oil and natural gas sector in India

Source: Soni & Chatterjee, 2016

Table 2. Key players in the oil and gas industry

Exploration and Production	Gas Transmission and Distribution	Refining and Marketing
NOCs • Oil and Natural Gas Corp. Ltd. or ONGC (including ONGC Videsh Limited for overseas E&P activity) • Oil India Limited (OIL) • Gujarat State Petroleum Corporation (GSPC) **Private players** • Reliance Industries Ltd. (RIL) • Essar Oil • Cairn India • Niko Resources • BP Plc	**NOCs** • GAIL (India) Ltd. • GSPC • Indian Oil Corporation Limited (IOCL) **Private players** • Reliance Gas Transport • Shell • Ratnagiri Gas & Power Ltd. • Adani **Joint ventures** • Petronet LNG • Indraprastha Gas Ltd. (IGL) • Mahanagar Gas Ltd. (MGL)	**NOCs** • IOCL • Bharat Petroleum Corp. Ltd. (BPCL) • Hindustan Petroleum Corp. Ltd. (HPCL) • ONGC - Mangalore • Refinery & Petrochemicals Ltd. (MRPL) **Private players** • Reliance Industries • Essar Oil • Shell **Joint ventures** • Hindustan Mittal Energy Ltd. (HMEL) • Bharat Oman Refinery Ltd. (BORL)

Source: Ernst and Young, 2016

2.3 Energy Sector Overview

2.3.1 Electricity

Electricity is a regulated sector in India, with the CERC at the central level and SERCs in each of the states. The CERC is responsible mainly for regulating interstate transmission utilities[6] and generating utilities,[7] which are either owned by the central government or are selling electricity to more than one state. SERCs are mainly responsible for regulating the state-owned generating utilities, intrastate transmission utilities and local distribution utilities.[8]

2.3.1.1 Electricity Generation

Electricity generation in India is dominated by coal-based power plants, which accounted for approximately 59 per cent of total installed capacity as of March 31, 2017 (Ministry of Power, 2017b). In terms of electricity generation, the share of coal-based power plants was even higher (around 76 per cent as of March 31, 2017). As per the draft National Electricity Policy, coal-based power generation capacity is expected to increase from 192 GW in FY2017 to around 330–441 GW by 2040.

The second-largest source of electricity generation in terms of installed capacity is renewable energy, with a share of 17.6 per cent as on March 31, 2017. With the government's goal of increasing generation from renewable energy sources—the target of 175 GW of renewable energy-based power plants by 2022—it is expected that the share of renewable energy will increase significantly in the long run. Another major source of power generation in India is hydropower. India is endowed with large hydropower potential. However, the country has not been able to harness this fully due to various issues, including concerns regarding rehabilitation and resettlement, internal river water disputes and flooding. The share of hydropower in the electricity mix was 13.6 per cent as of March 31, 2017 (CEA, 2017a).

[6] Popularly known as "TRANSCO" in India
[7] Popularly known as "GENCO" in India
[8] Popularly known as "DISCOM" in India

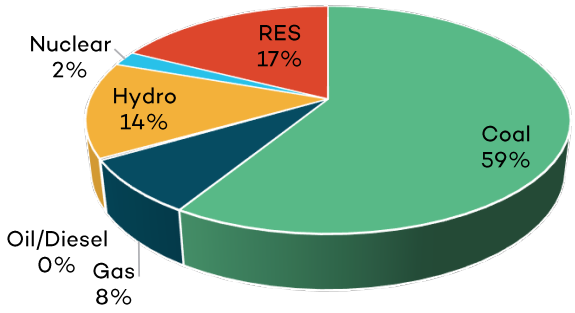

Figure 6. Share of installed capacity by source of energy in India, as of March 31, 2017

Source: CEA, 2017a

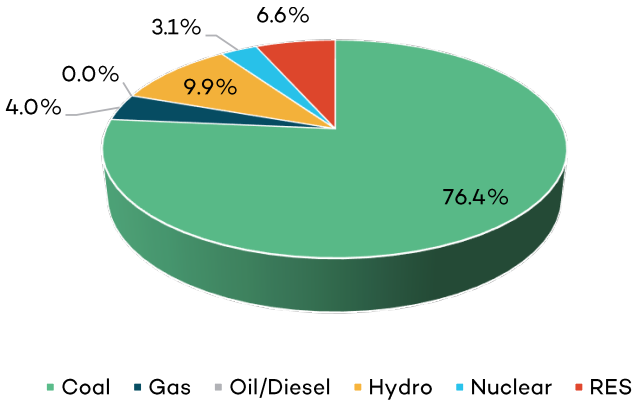

Figure 7. Share of electricity generation by source of energy in India, as of March 31, 2017

Source: CEA, 2017a

In terms of ownership of power generation, around 70 per cent of installed capacity is owned by the government, excluding renewable sources of energy (CEA, 2017b). This includes power plants owned by central government undertakings like the National Thermal Power Corporation, National Hydro Power Corporation, the Nuclear Power Corporation of India and power plants owned by various state-government-owned entities. The remaining 30 per cent of installed capacity is owned by private companies like Tata Power, Adani Power, Reliance Energy, Torrent Power and other independent power producers.

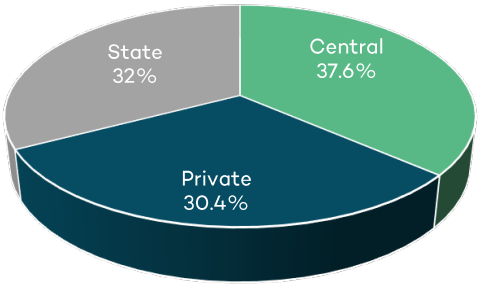

Figure 8. Breakdown of ownership in power generation, as of March 31, 2017

Source: CEA, 2017a

2.3.1.2 Electricity Transmission & Distribution

The Power Grid Corporation of India Limited (POWERGRID)—the CTU of the country—is responsible for wheeling power of central generating utilities and interstate mega independent power producers (IPPs), while state transmission utilities (STUs) are responsible for wheeling of power from state-generating units and state-level IPPs.[9] The CTU plays an important role in the planning of new transmission systems as well as strengthening existing networks at the central level.

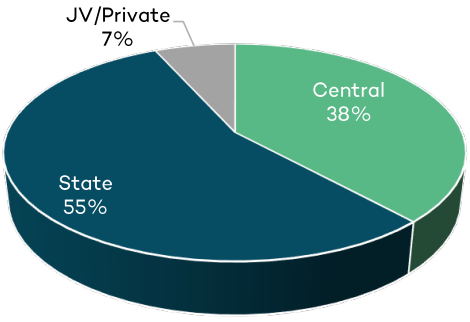

Figure 9. Breakdown of ownership in the transmission sector (intra and interstate), as of March 31, 2017 (in ckm)

Source: CEA, 2017a

Similarly, the STUs are responsible for the development of transmission networks at the state level. The sector is mainly dominated by utilities owned by central and state governments. However, there are very few private sector players in the interstate transmission sector (MoP, 2017d). The private players includes Torrent Power Grid Limited, Jaypee Powergrid Limited, Essar Power Transmission Company Ltd, Jindal Power Limited, Adani Transmission (India) Limited, Torrent Energy Limited, Powerlinks Transmission Ltd, Reliance and Tata Power.

Further, responsibility for distribution and supply of power to rural and urban consumers rests with the states. In most states, there are one or more distribution utilities (distribution licensees) owned by the state government. These distribution utilities operate under the regulatory framework prepared by SERCs and are responsible for distribution and supply of electricity in their licensed areas. However, in some states, distribution utilities that

[9] "Wheeling" refers to "the transfer of electrical power through T&D lines from one utility's service to another's" (Independent Energy Producers Association, n.d.)

are either owned by the private sector or are joint venture companies between state government and private sector are also operating. This includes distribution utilities in the national capital of Delhi (Tata Power Delhi Distribution Limited, BSES Yamuna Power Limited, BSES Rajdhani Power Limited), Mumbai (Tata Power and BSES, Mumbai), Gujarat (Torrent Power, Ahmedabad and Torrent Power, Surat), Uttar Pradesh (Noida Power Company Limited), West Bengal (Calcutta Electric Supply Corporation), Jharkhand (Jamshedpur Utilities and Services Company) and distribution utilities in the state of Odisha. The combined share of these private sector distribution utilities is only 6–7 per cent of total electricity sold to end consumers (PFC, 2016).

2.3.2 Coal

The Indian government nationalized coking coal mines in 1971 and thermal coal mines in 1973. Before the nationalization of the coal mining industry, the coal industry was fully private. The main motive of nationalization was to bring the most essential commodity, coal, under a central regulation so that large coal-consuming industries, like power, cement and steel, could be supplied coal at reasonable rates.

After nationalization of the coal mines in 1971–73, the mining in the sector was undertaken exclusively by public sector companies. Coal India Limited (CIL) was formed as a holding company with eight subsidiaries. Mining was permitted only by government-controlled agencies resulting in a monopolistic structure across the value chain with negligible participation from private players.

The Ministry of Coal and Mines has the overall responsibility for developing policies and strategies on exploration and development of coal and lignite reserves. The ministry has three companies under it, namely CIL, Singareni Collieries Co. Ltd (SCCL) and Neyveli Lignite Corporation Limited (NLC). There are a few state and privately owned companies, which were provided special dispensation at the time of nationalization for their own consumption.

CIL is the main company producing most of the coal in the country, followed by SCCL, NLC and some private and state-owned companies. CIL operates in various states through its subsidiaries and it accounted for 84 per cent of total coal production in 2016 (CIL, 2016b). SCCL is a joint undertaking of Government of Andhra Pradesh and GoI, sharing its equity in a 51:49 ratio, and accounts for 9 per cent of total coal production. The remaining 7 per cent is from the Damodar Valley Corporation, Tata Iron & Steel Company Limited (a captive coal mining company in the private sector) and other captive blocks.

Over the last few years, some parts of the value chain have been deregulated in a controlled manner to increase private participation. The Coal Mines (Nationalisation) Act, 1973 was amended in 1993 to allow coal mining for captive consumption for generation of power. The Mines and Minerals (Development and Regulation) Amendment Act, 2010 introduced a competitive bidding system for the allocation of coal blocks for captive use. Further, the Coal Mines Special Provision Act, 2015, was recently enacted for granting mining licenses to private players without end-use restrictions, facilitating an opening up of the sector for commercial mining. So far, 82 coal mines have been allocated by way of auction or allotment under the provisions of the Coal Mines (Special Provisions) Act, 2015 and the rules made thereunder. Of these 82 coal mines, 31 have been allocated through e-auction and 51 by way of allotment (MoC, 2017a).

2.3.3 Oil and Gas

2.3.3.1 Government Support to the Oil and Gas

The oil and gas industry is one of the most important industries in India and influences many other parts of the economy. Oil and gas are largely consumed as fuel inputs in the industrial production process, in power generation or consumed directly in residential, commercial and transportation sector. Oil and gas accounts for around 35 per cent of India's energy consumption (India Brand Equity Foundation, 2017).

Globally, India had the largest increase in oil consumption in 2016, surpassing Japan to become the third largest oil consumer in the world after the United States and China (BP, 2017b). The compound annual growth rate of oil consumption for the two decades from 1995 to 2015 stood at 4 per cent and that of natural gas consumption for the same period stood at 4.9 per cent (BP, 2017b).

For the last two years, India covered less than 20 per cent of its own demand for crude oil and petroleum products. The estimated import dependency of crude oil for FY2017 stood at 82.1 per cent and has been progressively increasing. Table 3 provides a snapshot of the oil and gas balance of India. In FY2017, total crude oil imports were valued at USD 70.2 billion as compared with USD 64 billion in FY2016. For natural gas, the import dependency is around 40 per cent. Due to expected strong growth in demand, India's dependency on oil and gas imports is likely to increase further.

Table 3. India's oil and gas balance

Details	Unit/Base	FY2015	FY2016	FY2016-17P
Crude oil production in India	**MMT**	**37.5**	**36.9**	**36**
Consumption and Production of Petroleum Products and Natural Gas				
Consumption of petroleum products	**MMT**	**165.5**	**184.7**	**194.2**
LPG	MMT	18.0	19.6	21.05
Gasoline	MMT	19.1	21.8	23.8
Kerosene	MMT	7.1	6.8	5.4
Diesel	MMT	69.4	74.6	76.0
Others	MMT	51.9	61.9	67.95
Production of petroleum products	MMT	220.7	231.2	242.7
LPG	MMT	9.8	10.6	11.3
Gasoline	MMT	32.2	35.3	36.5
Kerosene	MMT	7.6	7.5	6
Diesel	MMT	94.3	98.6	102.1
Others	MMT	76.8	79.2	86.8
Natural gas				
Production	MMSCM	32,693	31,138	30,848
Consumption	MMSCM	51,229	52,448	55,534
Imports and exports				
Crude oil imports	MMT	189.4	202.9	213.9
	USD Billion	112.7	64	70.2
Petroleum product (POL) imports	MMT	21.3	29.5	35.9
	USD Billion	12.1	10	10.6
Petroleum product exports	MMT	63.9	60.5	65.5
	USD Billion	47.3	27.1	29.1
LNG imports	MMSCM	18,536	21,309	24,686
	USD Billion	9.2	6.7	6.1

Source: Petroleum Planning & Analysis Cell (PPAC), 2017b (P stands for provisional)*

The oil and gas sector can be categorized into upstream, midstream and downstream sectors. Upstream comprises the activities associated with exploration and production; midstream comprises T&D; and downstream comprises refining and marketing.

2.3.3.2 Upstream

There are 26 sedimentary basins in India spanning an area of 3.1 million square kilometres. Oil and Natural Gas Corporation (ONGC), a public-sector enterprise (PSE), is the largest upstream company in the exploration and production segment, accounting for approximately 61.5 per cent of the country's total oil output (Directorate General of Hydrocarbons, 2017). The other major oil and gas producers in India include the PSE Oil India Limited (OIL) and private players namely Cairn India and Reliance Industries Limited.

The country's natural gas market is characterized by a supply deficit. The PSEs, ONGC and OIL account for nearly three quarters of the total domestic production. The remaining gas consumption is met through LNG imports (India Brand Equity Foundation, 2017).

2.3.3.3 Midstream

The midstream oil and gas sector in India is quite extensive and the aggregate length of the network is 24,836 km. The network includes crude oil, LPG and petroleum products pipelines. Petroleum products and crude oil comprise 51 per cent and 40 per cent respectively of the total pipeline network. The dominant player in the pipeline or midstream network is the PSE Indian Oil Corporation Limited (IOCL) (Ernst and Young, 2016a). IOCL operates a network of oil and gas pipelines spanning a length of 2,334 km that constitutes nearly 30 per cent of the total pipeline network in the country. The pipeline operated by IOCL has a carrying capacity of 1.6 mmbd of oil and 10 mmscmd of gas (India Brand Equity Foundation, 2017).

2.3.3.4 Downstream

The refining capacity of India is reportedly the fourth largest in the world, following the United States, China and Russia. There are 23 refineries that are currently in operation, of which 18 are PSEs, three are private and two are joint ventures. Thus, the state-owned oil companies comprise the large chunk (55.8 per cent) of the nation's refining capacity and the private players have a share of 37.2 per cent (Ernst and Young, 2016b). The PSE IOCL owns the largest number (10) of these refineries, which have a combined capacity of 1.31 mbpd. The private players include Reliance and Essar. Reliance has also been able to capture a market share of 30 per cent.

India also happens to house some of world's highly complex refineries that are capable of efficiently processing heavier crude grades into quality products. These include Jamnagar refinery (operated by Reliance Industries Limited), Paradip refinery (run by IOCL) and Bathinda refinery (run by HPCL-Mittal Energy Limited, HMEL in short) (Ernst and Young, 2016b).

As for the distribution of petroleum products, in April 2017, the total provisional number of retail outlets stood at 59,595 (including private). IOCL, as of April 2017 (provisional), owned the maximum number of retail outlets in the country (43.98 per cent of total), followed by HPCL (23.46 per cent) and BPCL (24.18 per cent); the remaining outlets are owned by private firms. As of April 1, 2017 (provisional), there were 18,786 LPG distributors in India (PPAC, 2017b).

2.3.4 Renewables

The Indian renewable energy sector is witnessing massive growth, with installed capacities doubling over the last five years, increasing from 24.9 GW in March 2012 to 57.1 GW in March 2017 (see Table 4). The share of renewable energy-based power plants in the country's total installed capacity has increased from 12 per cent to 17.5 per cent during the same period. The strong push for renewable energy is largely being driven by the government's renewabfigule energy target of installing 175 GW of capacity by 2022. This includes 60 GW of wind power, 100 GW of solar power, 10 GW of biomass power and 5 GW of small hydropower plants. These targets are also in line with India's Intended Nationally Determined Contributions (INDC) commitment to reduce carbon emissions by 35 per cent and increase power generation from renewable energy sources to at least 40 per cent of total generation by 2030.

Table 4. Past, present and targeted renewable energy capacities (in MW)

Renewable Energy Source	Installed capacity as on March 2012	Installed capacity as on March 2017	Revised targets by 2022
Solar Power	941	12,288	100,000
Wind Power	17,352	32,280	60,000
Biomass Power	3,225	8,182	10,000
Small Hydro	3,395	4,380	5,000
Total	24,913	57,130	175,000

Source: CEA, 2017a

The government has been providing support to meet these targets. These efforts are now bearing fruit, with the country achieving record capacity additions in recent years. In FY2017, solar power generation capacity of 5.5 GW was added, which increased the total installed solar capacity base to 12 GW. Further, around 18 GW of projects are under different stages of development. Also, India added the highest ever wind capacity increase of 5.5 GW in a single year during FY2017. Wind power accounts for 57 per cent of the total installed capacity of renewable energy in India. The country now ranks fourth in the world in terms of wind power, having an installed capacity of 32 GW. In biomass power, 8.8 GW of capacity has been installed with 162 MW of capacity added during FY2017.

The growth of India's wind and solar sectors has largely been led by private sector investment (see Figures 11 and 12). Nearly 90 per cent of all investments in the renewable sector came from the private sector.

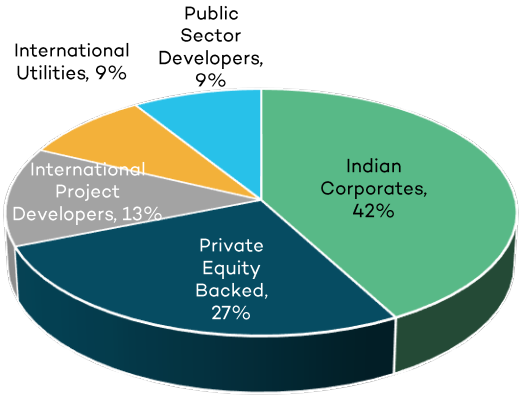

Figure 10. Breakdown of ownership of installed capacity of large solar power plants, as of March 31, 2016

Source: Bridge to India, 2016

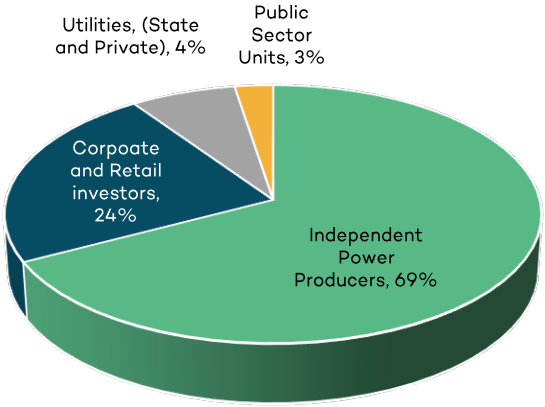

Figure 11. Breakdown of ownership of installed capacity of large wind power plants added in FY2016, as of March 31, 2016

Source: Raikar, 2016, p. 4

2.4 Energy Pricing Policy

2.4.1 Electricity

2.4.1.1 Electricity Generation

There are two types of pricing mechanisms for energy generation in India: a) pricing based on cost-plus regulations and b) market-based pricing determined through competitive bidding. If electricity prices of a generating utility are determined through a competitive bidding process (which can be conducted by distribution utilities, state/central government or through power exchanges), then the competitively discovered price is binding, or else electricity prices are determined by an electricity regulatory commission on the basis of the cost-plus

approach. The cost build-up for calculation of power tariffs is based on two components: fixed cost and variable cost. In the former, components are fixed in nature—for example, return of equity, interest on capital loan, tax and duties, depreciation, interest on capital loan, interest on working capital, administrative and general expenses, foreign exchange rate variation and bad debts. The latter component includes gross station heat rates, specific oil consumption and auxiliary energy consumption.

2.4.1.2 Electricity Consumption

The retail prices of electricity in India are regulated by state energy regulatory commissions. Electricity distribution companies (DISCOMs) submit their Annual Revenue Requirements to the regulatory commissions, which determines electricity tariffs for various consumer categories after conducting proper due diligence on the expenditure claimed by DISCOMs. Retail prices are determined based on the cost-plus approach, which incorporates electricity purchase prices, transmission tariffs, distribution costs, normative losses in local networks and a reasonable return on equity that varies from 14 to 16 per cent, determined on a state-by-state basis.

In some cases, state governments do provide direct subsidies through budgetary allocation to restrict the retail electricity prices for some consumer categories (like agriculture consumers, below poverty line households, etc.) at affordable levels. DISCOMs procure electricity from the following sources:

- Power plants owned by state- or central-government-owned companies
- IPPs
- Captive power plants
- Power trading companies
- Power exchanges

Electricity prices for state- or central-government-owned power plants are determined by state or central electricity regulatory commissions on a cost-plus basis. Power procured from other sources is mostly on the basis of negotiated prices or prices determined through competitive bidding.

2.4.2 Coal

Since 1945, the price at which various types and grades of coal were sold was controlled by the central government, under the provisions of the Colliery Control Order of 1945. Beginning in March 1996, the government gradually deregulated the price of various types and grades of coal. The pricing of coal in India was completely deregulated, pursuant to the Colliery Control Order, 2000, in effect from January 1, 2000.

As no other company was allowed in the field, coal pricing used to be entirely dependent on the price notified by CIL. The price of coal was largely based on a cost-plus approach, revised primarily on the basis of general inflation levels, increases in the costs of production that could not be offset by efficiency improvements and the need for generating internal resources to ensure the viability of projects. There was no indexation with international coal prices. Prices were also dependent on the quality and type of coal. The prices fixed by CIL were applicable to "coal linkages" or a long-term fuel supply agreement. The prices were generally more favourable to core industries like power and steel than other industrial coal consumers.

As of June 2016, the linkages for non-regulated sectors such as steel, aluminum and cement are granted through e-auction. It was also mentioned that only the method of auction will be followed for future contracts after the lapse of existing fuel supply agreements. Later in May 2017, the Cabinet Committee on Economic Affairs approved the Introduction of New More Transparent Coal Allocation Policy for Power Sector, 2017-SHAKTI (Scheme for Harnessing and Allocating Koyala (Coal) Transparently in India) (MoC, 2017d). Under this policy, linkages for the power sector would also be based on either auction of linkages or through power purchase agreements based on competitive bidding of tariffs.

2.4.3 Renewables

In India, there is no single policy for pricing renewable electricity generation. There are several options for renewable energy developers. They can sell electricity to distribution utilities at a feed-in tariff rate or a tariff rate determined through competitive bidding, or to large open access consumers at negotiated prices, or to distribution utilities at lower prices equivalent to the average power purchase cost and claim benefits of Renewable Energy Certificates, which are tradable in markets. In addition, there are various benefits a developer can claim, such as lower duties on equipment, exemption from taxes and low-interest loans for renewable energy projects.

As the renewable energy sector is growing, government support is shifting from feed-in tariffs to market-based mechanisms such as competitive bidding. Recently, some solar power plants have also been set up through a viability gap funding (VGF) mechanism under the National Solar Mission. Under this mechanism, solar power is supplied at a pre-fixed tariff rate and developers bid for a VGF capital subsidy large enough to supply at this rate. Apart from this, there are indirect benefits to developers like tax breaks in the form of accelerated depreciation (AD), under which developers can claim depreciation at a higher rate in the initial years of a project to save their income tax liabilities. This was first introduced in 1994 allowing 100 per cent asset depreciation in the first year, and later reduced to 80 per cent in 2002 before being withdrawn in 2012. The scheme was reintroduced in 2014 at an 80 per cent depreciation rate to incentivize the sector. Recently, these rates were revised to 40 per cent with effect from April 2017.

Project developers also have an option to benefit from generation-based incentives under which the government provides incentives of INR 0.50 per unit of electricity fed into the grid by wind developers. These incentives are over and above the tariff that is approved by state utilities. The plant can be employed for captive generation, but incentives would be in proportion to the sale of electricity to the grid only (excluding generation for captive use). The projects availing themselves of AD benefits are not eligible for the generation-based incentives.

2.4.4 Oil and Gas

The pricing of petroleum products until 1997 was achieved through the Administered Pricing Mechanism (APM), using both a cost-plus pricing system for fuel suppliers and a cross-subsidization policy favouring certain users or fuels. From 1997 onwards, the government started dismantling the APM. The government has intervened several times in the past to control the prices of petroleum products through state-owned oil companies to insulate domestic consumers from international oil price volatility. However, this also led to mounting under-recoveries for downstream oil companies.[10] Part of the under-recovery was usually paid through cash compensation for domestic liquefied petroleum gas (LPG) and Public Distribution System (PDS) kerosene and by issuing special securities to downstream oil marketing companies. Another part was borne by upstream public sector oil and gas companies (OECD, 2014). The residual part was borne by downstream oil companies. With full deregulation of petrol (gasoline) prices in 2010 and diesel prices in 2014, however, the under-recoveries came down significantly. Oil-marketing companies can now periodically increase gasoline and diesel prices, though the changes remain subject to government approval. But the prices of kerosene and LPG continued to be regulated. From June 1, 2013, the Direct Benefit Transfer for LPG Consumer (DBTL) scheme was introduced. The scheme provides for subsidies up to a capped number of LPG cylinders for domestic LPG consumers by transferring funds directly into their bank accounts upon purchase of LPG cylinders at market price. From July 1, 2016, the government also started raising the price of kerosene for the first time in five years (Shyam, 2016). The MoPNG also announced implementation of the Direct Benefit Transfer (DBT) in Kerosene with effect from April 1, 2016 in 33 districts identified by nine state governments, namely Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Punjab, Rajasthan and Gujarat (Team Energy Infrapost, 2016).

[10] The difference between the market-determined consumer price of a petroleum product and the government-controlled price of that product is referred to as the under-recovery per unit of the product.

Prior to 2014, two parallel pricing mechanisms were used for natural gas. The APM continued to be applied in determining the prices for gas produced by public sector oil companies (ONGC and OIL) from fields that were previously allocated to these companies free of cost. The second mechanism (i.e., non-APM or market-determined pricing) was applied to natural gas produced domestically from joint-venture fields and for imported LNG. In order to increase the affordability of natural gas for consumers in the northeastern region of India, which is a perennially energy-scarce region, the central government pegged the price of natural gas there (OECD, 2014). In October 2014, the GoI notified of the New Domestic Natural Gas Pricing Guidelines. Under these guidelines, a transparent new gas pricing formula linked to global markets came into effect from November 1, 2014 (Press Information Bureau [PIB], 2014b). On March 10, 2016, the government announced "freedoms for marketing and pricing gas produced from geologically difficult, high risk and high cost areas, with a provision of a ceiling price based on the landed cost of alternate fuels" (PIB, 2016b).[11] Under this system, natural gas in India began to be priced as an average of imported LNG and benchmark global gas rates. The gas prices are also supposed to be revised every six months by the government. The pricing regime is applicable to all types of natural gas produced domestically irrespective of whether they are conventional or otherwise and whether produced by the public or private sector. The gas pricing formula as per the New Domestic Natural Gas Pricing Guidelines will be applicable until March 31, 2019.

2.5 Taxation Policy

2.5.1 Taxation on Coal, Oil and Gas, Renewables and Electricity in India

The taxation regime in Indian is complex. All taxes levied within India need to be backed by an accompanying law passed by parliament or the state legislature. Two conventional types of taxes in India are: direct taxes (income tax, corporate tax, capital gain tax, security transaction tax, etc.) and indirect taxes (all indirect taxes are now combined with the Goods and Service Tax [GST]). Other taxes include cesses—a tax whose revenues are earmarked for a specific purpose. See Table 5 for a summary of key direct taxes, indirect taxes and cesses applied to different parts of the energy sector in India.

[11] The ceiling price shall be calculated as: lowest of the (i) landed price of imported fuel oil, (ii) weighted average import landed price of substitute fuels (namely coal, fuel oil and naphtha), or (iii) landed price of imported LNG. The weighted average import landed price of substitute fuels in (ii) above will be defined as: 0.3 x price of coal + 0.4 x price of fuel oil + 0.3 x price of naphtha. The MoPNG will notify the periodic revision of the gas price ceiling under these guidelines. In the case of existing discoveries that are yet to commence commercial production as on January 1, 2016, if there is pending arbitration or litigation filed by the contractors directly pertaining to gas pricing covering such fields, this policy guideline shall apply only on the conclusion/withdrawal of such litigation/arbitration and the attendant legal proceedings. All gas fields currently under production will continue to be governed by the pricing regime that is currently applicable to them. (Source: PIB, 2016b).

Table 5. Taxation of coal, oil & gas, renewables and electricity in India

Activity subject to taxation	Direct Taxes	Indirect Taxes	Cess
Companies extracting coal	Upstream operations are taxable on a net income basis, with domestic companies being subject to an income tax rate of 30% and foreign companies to a higher rate of 40%. An additional surcharge of 5% for domestic companies and 2% for foreign companies is also levied if taxable income exceeds INR 10 million.	Royalty on extraction of coal (not subsumed under GST), Excise duty (Subsumed under GST)	Stowing Excise Duty applicable
Consumers of coal (electricity, cement, steel, etc.)		State value-added tax (VAT), central sales tax and service tax on transportation (Subsumed under GST)	Clean Environment Cess applicable
Consumers of electricity (Discoms)		Electricity duty (Subsumed under GST)	No cess applicable
Renewable(IPPs etc.)		Electricity duty (Subsumed under GST)	No cess applicable
Oil & gas		Excise duty, additional duties, central sales tax and state VAT (Five petroleum products—crude oil, natural gas, motor spirit, high-speed diesel and aviation turbine fuel—have been excluded from the GST, while other products such as LPG, naphtha, kerosene, fuel oil, etc. are included, leading to a dual taxation regime)	Cess on domestically produced crude applicable

2.5.2 Clean Environment Cess

The National Clean Energy Fund (NCEF) was created in 2010 as a clean energy cess with the overall objective of funding research and development (R&D) projects in clean energy technologies. The cess was levied on the dispatch of lignite and coal collected through coal producers. Since its inception, the cess has been increased three times, from INR 50 per tonne in 2010 to INR 200 per tonne in March 2015 and INR 400 per tonne in March 2016. The NCEF has grown sharply from INR 1,066 crore in FY2011 to a cumulative collection of INR 49,313 crore in FY2017 (Centre for Science and Environment, 2017). Due to recent increases in the cess, the collection for 2017 (April 2016 to January 2017) alone stands at INR 21,129 crore (Economic Times, 2017a).

2.5.3 Taxation of Oil and Gas in India

Upstream operations in the oil and gas sector are taxed on a net income basis, with domestic companies being subject to an income tax rate of 30 per cent and foreign companies to a higher rate of 40 per cent. An additional surcharge of 5 per cent for domestic companies and 2 per cent for foreign companies is also levied if taxable income exceeds INR 10 million. Excise duties are levied on the consumption of certain petroleum products, based on both value and quantity. Some petroleum products also attract other indirect taxes. For instance, an additional duty is levied on gasoline and diesel, with a special additional excise duty on gasoline. However, the imports of crude oil, gasoline, LPG or kerosene are exempt from custom duties. While the central government taxes the manufacturing of goods through a tax known as Central Value Added Tax (CENVAT in short),[12] states exercise the

[12] If any manufacturer purchases a material that acts as input in the production process and on which the CENVAT duty has already been paid, then the manufacturer can claim this as a credit based on the Central Excise Invoice. When manufactured products are sold, the excise duty that is levied on the product is paid. This excise duty can be adjusted with the credit that was taken at the time of purchasing the input and the residual amount paid. For instance, if the manufacturer availed a CENVAT credit of INR 30,000 at the time of purchasing a product that goes as inputs into the production process and if the associated CENVAT to pay at the time of selling his product is INR 35,000, then the manufacturer will only pay INR 5,000 through cash deposit in the personal ledger account (PLA). This is how CENVAT used to work before GST came along.

right to tax goods at the wholesale or retail levels. However, the tax on interstate sales, known as the central sales tax (CST) is a sheer exception. This "tax is levied by the Central Government but collected and retained by the state of origin" (OECD, 2014). The tax that is levied on the sales of energy products at the state level is a VAT. The VAT rates vary from 5 per cent to 33 per cent, depending on the type of product and the state where that product is sold. From July 1, 2017, the GST that has been introduced through the GST Constitutional (Amendment) Bill, 2016 (GoI, 2016a) subsumes the VAT and CST on some petroleum products and excludes a few others, leading somewhat to a dual taxation regime.

2.5.4 Implications of the GST

The new GST taxation regime was implemented on July 1, 2017. The GST has affected all industries in India, including the power and fuel sectors. Under the current indirect tax regime, there are many concessions and exemptions available to energy. However, the GST regime remains unclear for renewable and electricity sectors, which receive many concessions. At present, there is lot of uncertainty regarding rates of taxation, rebates, interstate trade and the nature of dual control by the central and the state governments, among others.

2.5.4.1 Coal Sector

The GST on coal has been kept low at 5 per cent instead of the standard GST rate of 18 per cent. Coal sectors seem to benefit from the new tax regime because the degree of preferential treatment is higher than the main central tax that the GST has superseded: an excise tax of 6 per cent against a standard rate of 14 per cent. Further, manufacturers, traders and suppliers are now also entitled to claim tax credits; and tax rates for transportation of coal from coal mines under the GST would be charged at a rate of 5 per cent. At the same time, however, elsewhere in the tax system, import duties, which were previously set at 2.5 per cent have been increased to 10 per cent, the standard value for other goods. This is a loss for the parts of sector involved in importation but a gain for domestic producers, as it increases costs for their competition.

2.5.4.2 Renewable Sector

In the renewable energy sector, the tax rate on key equipment like transformers, cables and structures has increased to 18 per cent. The tax rate on input services used by project developers has also increased from 15 per cent to 18 per cent. There is still some lack of clarity on how the GST applies to primary and secondary batteries.

2.5.4.3 Electricity Sector

The sale of electricity has been kept outside the purview of the GST. The GST will, however, have implications for electricity T&D utilities in terms of taxes levied on goods and services used by these utilities. For example, the GST for power transformers under the new regime is 18 per cent, which is higher than the earlier excise duty of 12.5 per cent. Given that the new tax regime was implemented only as of July 2017, its impact in terms of the cost of electricity from both conventional and non-conventional energy resources cannot be ascertained at this stage.

2.5.4.4 Oil and Gas Sector

The Model GST Law, as available after Constitutional Amendment for Goods & Services Tax (GST), provides that the law will not apply to five petroleum products: crude oil, natural gas, high speed diesel, motor spirit (petrol or gasoline) and aviation turbine fuel. Other petroleum products, such as LPG, naphtha, kerosene and fuel oil are included. Consequently, the main products from the oil and gas sector—namely crude oil and natural gas—shall continue to be levied at existing rates.

Although crude oil by itself is exempted, GST will apply to the purchase of goods and services required for exploration and production of crude oil and natural gas, potentially altering the costs of these activities. There is also a customs duty exemption on the import of specific goods for petroleum operations. If the above exemption is done away with and the Integrated Goods and Services Tax (IGST) is levied on import of such goods (CBEC,

n.d.b), the cost will escalate for upstream oil companies due to substantial additional tax implications (Lok Sabha Secretariat, 2017).

In this context, a recent report brought out by the Associated Chambers of Commerce and Industry and the Indian Credit Rating Agency identified many areas where cost escalates for the oil and gas sector due to the levy of GST and replacement of the existing tax regime (Press Trust of India, 2017).

At the foremost, the oil and gas industry may have to comply with dual compliance costs because GST is levied only on select petroleum products like LPG, naptha, kerosene and fuel oil, whereas other petroleum products—crude oil, natural gas, motor spirit high speed diesel and aviation turbine fuel—have not been brought under the ambit of GST. For the exempted set of petroleum products, the existing tax system—namely VAT and excise—would continue at the state and central levels.

Second, the GST system leads to non-creditable tax costs. Earlier taxes on input costs (such as machinery, plants and services) could be credited against taxes on final goods (see footnote 12 for an explanation on how excise tax credit could be obtained under CENVAT earlier). But as the sale of finished products are now kept out of the ambit of GST, tax credits on input GST can no longer be credited against the VAT and excise taxes on these fuels, leading to rising costs for the upstream sector. The report by Associated Chambers of Commerce and Industry and the Indian Credit Rating Agency also draws attention to similar issues for the gas utilities sector, where the GST is levied on transmission tariffs but not the final sale of natural gas, making it unnecessarily complicated for the sector (Press Trust of India, 2017). Also, consumers paying VAT on piped natural gas will not be able to benefit from an input tax credit, making it a less attractive fuel option

Furthermore, as service constitutes a significant part of operating expenses and capital expenditures of upstream companies, the increase in tax rates from 15 to 18 due to GST would adversely affect the financial health of the upstream companies.

3.0 Methodology

This section sets out the research methodology underlying the identification and quantification of subsidies in this report as well as their impact analysis.

3.1 Scope

This report presents the first inventory of all energy subsidies in India, with the exception of subsidies to nuclear and large hydropower.[13] The reviewed subsidies are grouped according to the energy type they benefit: a) coal; b) oil and gas; c) renewable energy. In addition, we single out the grouping of subsidies to d) electricity T&D that are, in theory, neutral to the energy source, though in practice benefit mostly coal because of its dominance in India's electricity generation. The inventory covers three financial years: FY2014, FY2015 and FY2016.[14] The fiscal year in India starts on April 1 and ends on March 31.

The inventory attempts to capture all subsidies provided by the central government to these sectors. Further, because additional subsidies are often provided at a state level, the inventory illustrates the possible scale of state-specific subsidies by identifying and estimating state-level subsidies for one selected state in three of the four sectors, as follows:

- In electricity T&D, Rajasthan was selected on the basis of its cumulative losses of power, commitment towards improving power sector performance and ownership of distribution utilities.
- In renewable, Tamil Nadu was selected on the basis of high renewable penetration and diversification across renewable energy technologies (like wind, solar, biomass, etc.), a large renewable energy project development pipeline and proactive participation in framing state-level policies.
- Because coal production is largely under CIL and its subsidiaries, there are no direct state interventions involved in the coal sector. For indirect subsidies such as foregone taxes, there was a paucity of data for coal consumption in different states. Chhattisgarh was selected on the basis of high coal production volumes and data availability.
- As oil and gas is under the purview of the federal government, the subsidies are also largely administered at the federal level by the MoPNG. Hence the inventory of subsidies produced here consists of consumption and production subsidies at the federal level only.

3.2 Definition of Subsidy Used in this Study

The definition of subsidies provided in Article 1 of the Agreement on Subsidies and Countervailing Measure of the World Trade Organization (WTO, 1994) is the basis of the methodology used by the GSI, presented in Box 1 and Table 6.

[13] Subsidies to nuclear and large hydropower in India were excluded from the scope due to data limitations.
[14] Where available, data for FY2017 is provided in tables and the Annex. However, at the time of the publication, the FY2017 data were incomplete.

Box 1. Definition of Subsidies According to the WTO

The Agreement on Subsidies and Countervailing Measures (ASCM) of the WTO is binding for its 164 members, including India (as of June 11, 2017). It applies to all subsidies and has no provisions specific to the energy sector.

From *Article 1: Definition of a Subsidy (bold text added by this document authors):*

1.1 For the purpose of this Agreement, a subsidy shall be deemed to exist if:

*(a)(1) there is a **financial contribution by a government or any public body** within the territory of a Member (referred to in this Agreement as "government"), i.e. where:*

*(i) a government practice involves a **direct transfer of funds** (e.g. grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g. loan guarantees);*

*(ii) government **revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits)**(1);*

*(iii) a government **provides goods or services other than general infrastructure, or purchases goods**;*

(iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments;

or

*(a)(2) there is any form of **income or price support** in the sense of Article XVI of GATT 1994;*

And

(b) a benefit is thereby conferred.

Source: WTO, 1994

3.3 Subsidy Classifications

This report presents the first inventory of all energy subsidies in India, apart from subsidies to nuclear and large hydropower, which were excluded due to the lack of data. The reviewed subsidies are grouped according to the energy type they benefit: a) coal; b) oil and gas; c) renewable energy, and d) electricity T&D. Table 6 includes more detail on what activities are included in each of the groupings. The inventory covers three financial years: FY 2014 to FY 2016.

Table 6. Groupings of subsidies discussed in this report

COAL	OIL AND GAS
Coal mining (exploration, access, appraisal, development, extraction and preparation, storage and transportation, decommissioning, environmental and social rehabilitation) Coal import Coal-fired electricity generation and consumption of coal in other uses	Production of oil and natural gas (exploration, access, appraisal, development, extraction and preparation, storage and transportation, decommissioning, environmental and social rehabilitation) Oil and gas import Refining Consumption of oil and gas products in household use, transport, power generation and industry (for example fertilizer)
TRANSMISSION & DISTRIBUTION	**RENEWABLE ENERGY**
Utilities and grids for electricity T&D	Production and consumption of solar, wind, small hydro, biogas, geothermal energy on- and off-grid; renewable energy applications

Source: Authors' summary

The total values of subsidies in each of the four groupings are reported only for subsidies provided at the level of the central government. The report itself provides examples and values of certain state-level energy subsidies for illustrative purposes.

To assist in the analysis, the description of the identified energy subsidies uses three parallel classifications. The first classification draws on the OECD's renowned approach, which is also adopted and applied by the GSI in other studies and countries (OECD, 2015b; GSI, 2010). This classification is based on these subsidy mechanisms: a) budgetary transfers (this category does not include government loans and government loan guarantees), b) government revenue foregone (tax breaks), c) provision of government-owned goods and services below market value (e.g., the use of rail and other government infrastructure at below-market rates or preferential access to land; this category does not include investments of state-owned enterprises) and d) market and price support (such as regulated fuel prices).

The second classification indicates whether subsidy beneficiaries are energy producers, energy consumers or both (including prosumers in the case of renewable energy subsidies). The third classification is based on stimulated activity in the value chain and varies depending on the energy type (for example, exploration, access, appraisal, development, extraction and preparation, storage and transportation, decommissioning, environmental and social rehabilitation in the case of coal mining). Many subsidies are found to be cross-cutting through different activities, for example, both coal mining and transport.

Official Indian documents use various terms to refer to different types of subsidies that the inventory uses as appropriate. For instance, the Union Budget refers to direct budgetary transfers as "fiscal subsidies," and these subsidies are commonly spoken of as "off-budget subsidies" in contrast with, for example, tax breaks ("government revenue foregone" in the below Classification I). Box 2 provides more information on the terminology used in this report.

Box 2. Terminology used in this report

The Agreement on Subsidies and Countervailing Measures (ASCM) of the WTO is binding for its 164 members, including India (as of June 11, 2017). It applies to all subsidies and has no provisions specific to the energy sector.

- **Budget estimate** is the amount allocated to a subsidy in the budget for the financial year. For instance, budget estimates for expenditures for the 2017/18 financial year run from April 2017 to March 2018.
- **Actual expenditures** are the final amounts spent that may exceed or fall short of the "budget estimates." Since actual expenditure can only be assessed once the financial year is over and final accounts have been prepared, the actual expenditures presented in Budget 2017/18 are for the earlier financial year, in this case, for the year 2015/16.
- When the financial year is underway, the ministry or department administering a subsidy policy may need more funds than actually allocated to them under budget estimates. These supplementary demands are reflected in the **revised estimates** for the current year. Thus, along with budget estimates for 2017/18, the revised estimates for 2016/17 are also presented in the budget document.

Table 7. Classification I: Typology of energy subsidies depending on their mechanism

Direct and indirect transfer of funds and liabilities	**Direct spending**	**Earmarks**: Special disbursements targeted at the sector. Agency appropriations and contracts: Targets spending on the sector through government budgets. **Research and development support**: Funding for research and development programs **Government procurement of goods or services for above-market rates**
	Government ownership of energy-related enterprises	**Security-related enterprises**: Strategic petroleum reserve; securing foreign energy shipments or key assets. **Municipal utilities and public power**: Significant public ownership of coal- and natural gas-fired electricity stations; some T&D systems for both natural gas and electric power
	Credit support	G**overnment loans and loan guarantees***: market or below-market lending to energy-related enterprises, or to energy-intensive enterprises such as primary metals industries **Subsidized credit to domestic infrastructure and power plants** **Subsidized credit to energy-related exports**
	Insurance and indemnification	**Government insurance/indemnification**: market or below-market risk management/risk-shifting services S**tatutory caps on commercial liability**: can confer substantial subsidies if set well below plausible damage scenarios
	Occupational health and accidents	**Assumption of occupational health and accident liabilities**
	Environmental costs	**Responsibility for closure and post-closure risks:** facility decommissioning and cleanup, long-term monitoring, remediation of contaminated sites, natural resource restoration, litigation **Waste management**: avoidance of fees payable to deal with waste **Environmental damages:** avoidance of liability and remediation to make the environment whole.
Government revenue foregone	**Tax breaks and special taxes**	**Tax expenditures**: Tax expenditures are foregone tax revenues, due to special exemptions, deductions, rate reductions, rebates, credits and deferrals that reduce the amount of tax that would otherwise be payable. **Overall tax burden by industry:** Marginal tax rates are lower than other industry. **Exemptions from excise taxes/special taxes:** excise taxes on fuels, special targeted taxes on energy industry (e.g., based on environmental concerns or "windfall" profits)
Provision of government goods or services below market value	**Government-owned energy minerals**	**Process for mineral leasing**: auctions for larger sites, sole-source for many smaller sites **Royalty relief or reductions in other taxes due on extraction**: reduced, delayed or eliminated royalties are common at both federal and provincial levels. Royalties targeted based on type of energy, type of formation, geography or location of reserve (e.g., deep water). **Process of paying royalties due**: allowable methods to estimate and pay public owners for energy minerals extracted from public lands
	Government-owned natural resources or land	**Access to government-owned natural resources land**: at no charge or for below fair-market rate
	Government-owned infrastructure	**Use of government-provided infrastructure**: at no charge or below fair-market rate
	Government-provided goods or services	**Government-provided goods or services at below-market rates**
Income or price support	**Market price support and regulation**	**Consumption mandates and mandated feed-in tariffs**: fixed consumption shares for total energy use. **Border protection or restrictions**: controls on imports or exports leading to unfair advantages. **Regulatory loopholes**: any legal loopholes, either in the wording of the statute or in its enforcement, that transfers significant market advantage and financial return to particular energy market participants **Regulated prices set at below-market rates**: for consumers (including where there is no financial contribution by government) **Regulated prices set at above-market rates**: including government regulations or import barriers

** Loans and guarantees at preferential rates for a few companies in T&D and coal have been calculated for illustrative purposes, but the values are not included in totals.*

Table 8. Classification II: Typology of energy subsidies depending on their beneficiary

Production
Consumption
Production and Consumption

Table 9. Classification III: Typology of energy subsidies depending on the stimulated link in the value chain

Energy type and stimulated link in the value chain	T&D	Renewables	Electricity Sector Bailout	Coal	Oil and Gas
Exploration, access and appraisal	-	-	-	+	+
Development, extraction and preparation	-	-	-	+	+
Decommissioning and rehabilitation	-	-	-	+	+
Transport and storage	-	-	-	+	+
Grids (various consumers indirectly)	+	-	-	-	-
Power plants	-	+	-	-	-
Consumers (various consumers directly)	+	+	+	+	+
Employees	+	+	-	+	+
Research	+	+	-	+	+
Infrastructure and equipment	-	+	-	+	+
Environment and social rehabilitation	-	-	-	+	+
Renewable energy application	-	+	-	-	-
Cross-cutting through the value chain	+	+	-	+	+

3.4 Sources of Information and Subsidy Quantification

The preferred method of the inventory was drawing information from the official government sources such as documentation pertaining to the process of budget drafting and execution, performance monitoring, reports of state-owned companies, annual reports and tariff orders of electricity DISCOMs. Detailed information on each of the subsidies is provided in Annex 1. The details include the name of the subsidy, its intended policy objective, end recipients, a brief description and quantification, as well as sources of information.

In cases where official sources lack reporting on energy subsidies and their values, different methods of subsidy quantification have been applied in accordance with internationally recognized approaches. Descriptions of quantification methods are provided in relevant parts of the annexes.

All reported values are nominal and calculated for the fiscal year. Values are in INR and converted to USD at annually average exchange rates as per Reserve Bank of India notified rates for each year.

3.5 A Comparison with Other Estimates

The GoI reports on budget expenditure through government documents. Figure 12 demonstrates that the total subsidies identified in this inventory are greater than those reported in the government accounts. The reasons for this are two-fold. First, government accounts tend to under-report on certain types of subsidies such as foregone revenue. Second, subsidies to the energy sector may sometimes be merged with subsidies to other sectors into one budget line, making energy subsidies "invisible."

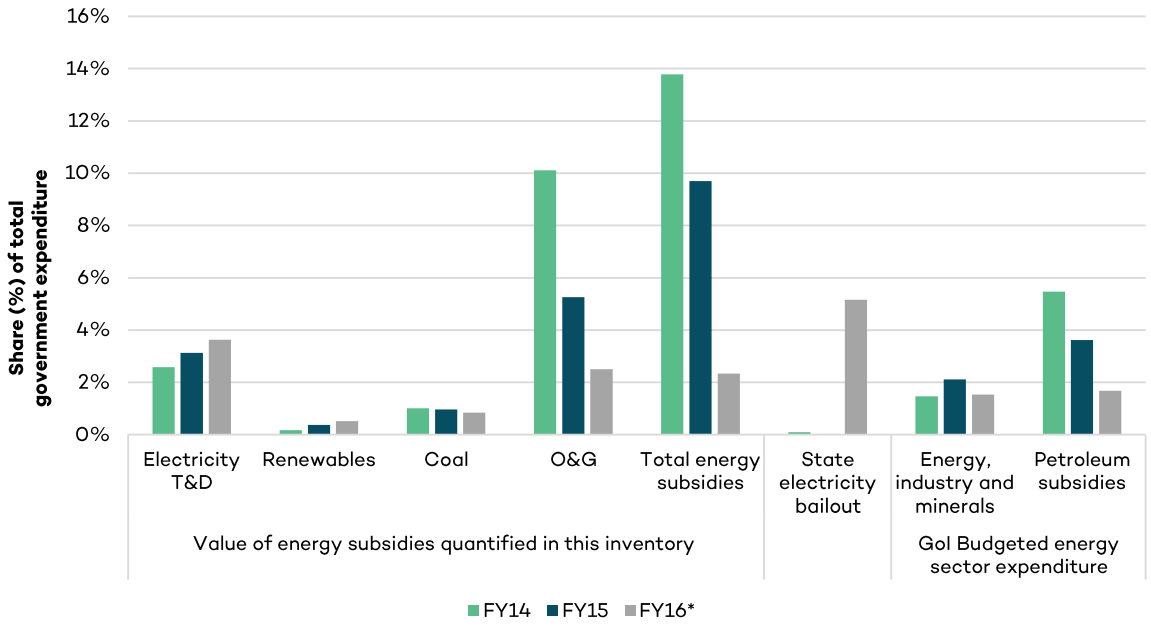

Figure 12. Value of energy subsidies quantified by GSI-IFC-ODI and energy subsidies reported by the Government of India ("budgeted energy sector expenditure"), FY2014–FY2016

Source: Author Analysis, based on data from Ministry of Finance, 2016b

*Notes: (1) Data on budgeted energy sector expenditure are based on reported expenditure in the non-plan and plan sections of the budget, summing where necessary relevant items of expenditure reported under economic services, social services, central assistance for state plans and central assistance to U.T. plans. (2) * For FY2016, figures on budgetary expenditure are based on revised budget instead of actuals.*

Several international databases and studies have also estimated the level of energy subsidies, or fossil fuel subsidies more specifically, in India. An overview is presented in Table 10. These vary depending on the scope and methodology. The most remarkable outlier is the IMF post-tax subsidy estimate, which includes the value of externalities such as impacts on health, congestion and the environment.

The rest of estimates largely triangulate the findings of this inventory. In particular, the IEA estimates of subsidies to fossil fuels and renewables are very similar to the findings of this report despite differences in methodologies and a slight variance in the scope.

Table 10. **International estimates of India's energy subsidies**

Database/ Study	Scope	Estimate (USD)	Year	Methodology
IEA (n.d.a)	Fossil fuels, including electricity based on fossil fuels—consumption subsidies only	19.2 billion	2015	Price-gap approach (domestic prices benchmarked against a free market price)
IEA (2016)	Renewables	2 billion	2015	Price-gap approach (difference between consumer prices and cost of generation)
OECD (n.d.)	Fossil fuels – both production and consumption	10 billion	2015	Bottom-up inventory of subsidies
IMF (2015b)	Fossil fuels – both production and consumption	11.3 billion	2015	Pre-tax subsidies (IEA's price-gap approach)
IMF (2015b)	Fossil fuels – both production and consumption	277 billion	2015	Post-tax subsidies (pre-tax subsidies and externalities)
Garg & Bossong (2015)	Fossil fuels, production only	0.1 billion	Average for 2013-2014	Bottom up-inventory of subsidies
This study	Fossil fuels (T&D, fossil fuels), both production and consumption	19 billion	2016	Bottom-up inventory of subsidies
This study	Renewables	1.4 billion	2016	Bottom-up inventory of subsidies

3.6 Impact Analysis

The formal evaluation of the subsidies in this inventory is outside the scope of this study—subsidy evaluations are a complex exercise, requiring a detailed assessment of an individual policy's effectiveness and efficiency at achieving its objectives, as well as identifying any unintended impacts. Instead, this study seeks to provide high-level insights into these issues by setting out some of the key ways in which India's energy subsidies may be influencing its economy, social welfare and the environment, based on existing knowledge about typical subsidy impacts and general trends in government expenditure. In contrast with the rest of the report, relying mostly on primary sources, the impact analysis section mainly draws on existing literature.

4.0 Overview of Findings

This section outlines trends in energy subsidies in India and summarizes the findings of the report. It also compares the findings of this inventory with the official energy subsidy estimates reported by the GoI as well as with international energy subsidy estimates for India.

4.1 Trends

4.1.1 Energy Categories: Type of Energy

The GoI's support to energy has declined over the years primarily on account of a reduction in oil and gas subsidies, which has been cut in half due to deregulation of petrol and diesel prices and a decline in world oil prices. The emphasis of subsidy support has also shifted from FY2014 to FY2016 to expanding access (through T&D) and scaling up the role of low-carbon alternatives. This has occurred at the expense of subsidy support to fossil fuels.

Between FY2014 and FY2016, the absolute value of energy subsidies has declined (from INR 216,408 crore [USD 35.8 billion] in FY2014 to INR 133,841 crore [USD 20.4 billion] in FY2016). The absolute value of subsidies to T&D and oil and gas are the most significant (FY2014–FY2016). Support to the coal and oil and gas is being reduced, while support to renewables and T&D is being increased (see Figure 13).

Over the reviewed period, oil and gas swapped places with T&D from the first to the second place as the major recipient of government support. The absolute value of T&D subsidies increased during the study period from FY2014 to FY2016 (from INR 40,331 crore [USD 6.7 billion] to INR 64,896 crore [USD 9.9 billion]). Subsidies to oil and gas has reduced by almost three quarters in the same period, from INR 157,678 crore (USD 26 billion) to INR 44,654 crore (USD 6.8 billion). Though subsidies to coal and renewables were less significant in absolute value, coal subsidies remained stable (from INR 14,979 crore [USD 2.3 billion] to INR 14,979 crore [USD 2.2 billion]) and renewable subsidies significantly increased (from INR 2,607 crore [USD 431 million] to INR 9,310 crore [USD 1.4 billion]).

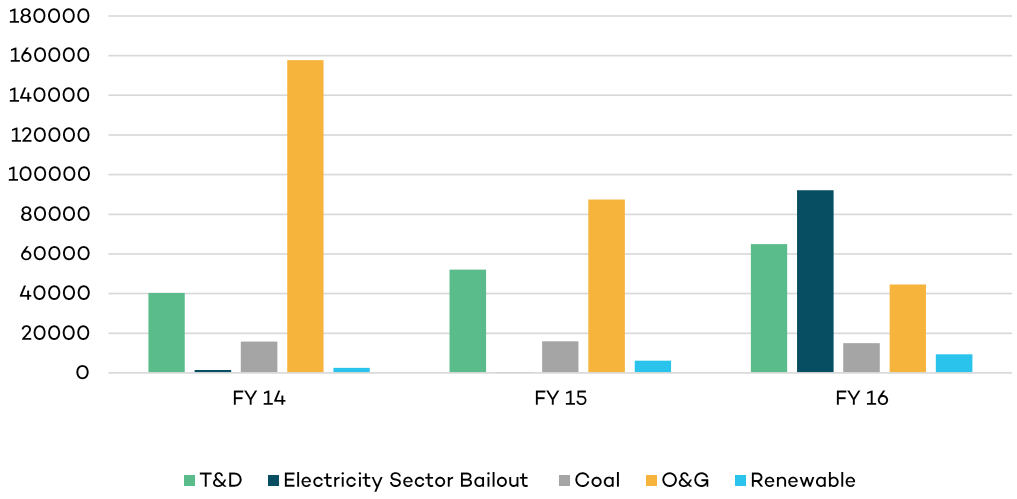

Figure 13. Energy subsidies to coal, oil and gas, T&D and renewable energy, FY2014–FY2016 (INR crore)

Source: Author's calculations

4.1.2 Energy Categories: Mechanisms

The forms of subsidies have not changed much over the years, with income or price support being the dominant instrument from FY2014 to FY2016, though the quantity of such subsidies has gone down substantially, while on the other hand, direct and indirect transfer of funds and liabilities has more than doubled in FY2016. This reflects the fact that low prices for consumers is the main subsidy instrument for different energy types by the government. However, government has initiated reforms like deregulation of fuel prices, which has helped them to reduce their expenditure as income or price support to fossil fuels.

Income or price support is the dominant subsidy instrument both for T&D and oil and gas. In addition, government is providing bailout packages to electricity DISCOMs as direct and indirect transfer of funds. Coal and renewables enjoy government support in the form of incentives and tax exemptions for promotion and development of the sector (see Figure 7).

The income or price support is estimated at INR 177,092 crore (USD 29.2 billion) in FY14 and has halved to INR 69366 crore (USD 10.5 billion) in FY2016 on account of fuel price reforms initiated by the government. The direct and indirect transfer of funds and liabilities is estimated at INR 14,229 crore (USD 2.4 billion) in FY2014 and increased to INR 36,972 crore (USD 5.6 billion) in FY2016. In addition, the government provided direct transfer of funds under the Ujwal Discom Assurance Yojana (UDAY) scheme in 2016 to bail out financially distressed electricity DISCOMs estimated at INR 92,113 crore (USD 14 billion) in FY2016. Government revenue foregone remains relevant, and has remained stable over the study period (INR 25,049 crore in FY2014 to INR 26,712 crore in FY2016). The provision of goods and services below market value is relatively insignificant, compared with other categories; however, some financial estimates are missing.

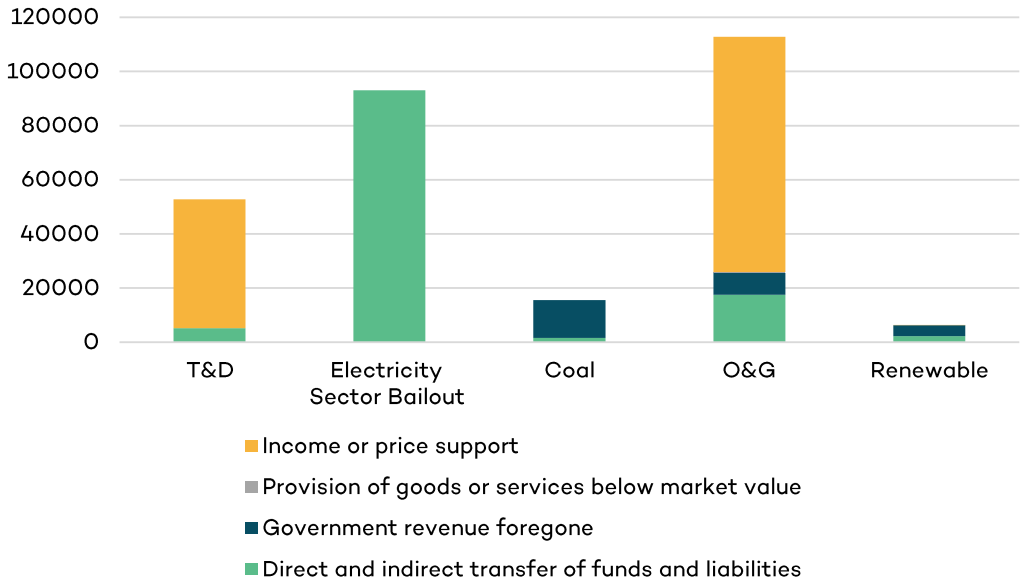

Figure 14. Energy subsidies by fuel and mechanism, FY2014–FY2016 (INR crore)

Source: Author's calculations

4.1.3 Energy Categories: Beneficiary

India's dual energy policy priorities of increasing energy access and increasing per capita energy consumption are reflected in the concentration of energy subsidies across the value chain—increasing both energy production and consumption.

The majority of energy subsidies identified in this study support the consumption of energy, estimated at an annual average of INR 166,467 crore (USD 27 billion) between FY2014 and FY2016. However, subsidies for the production and consumption of energy are small, with an annual average of INR 5,669 crore (USD 896 million) (FY2014–FY2016), excluding the support extended by the government under UDAY scheme. If the bailout package to the electricity sector is included, then subsidies to production and consumption of energy is on average INR 93,063 crore (USD 14 billion) annually. There are a small number of subsidies that were found to support the production of energy (with an annual average of INR 15,404 crore [USD 2.4 billion] during FY2014–FY2016).

Energy subsidies provided to T&D, coal, oil and gas, and renewables all provide support to both production and consumption (see Figure 15).

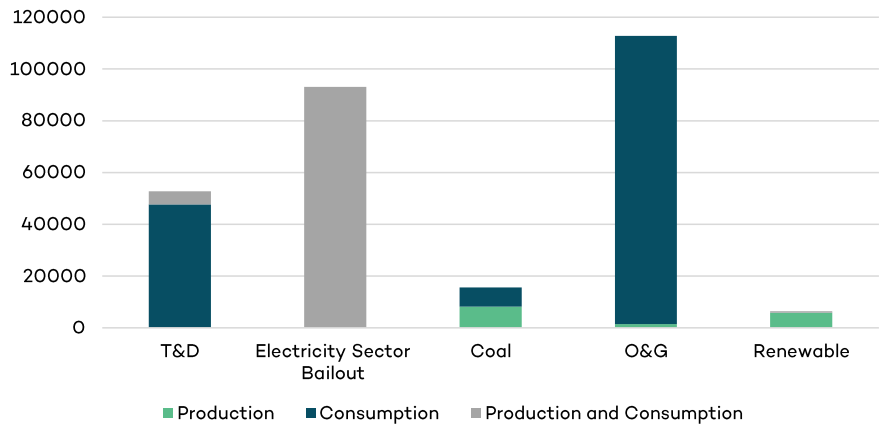

Figure 15. Energy subsidies for production and consumption, by fuel, annual average FY2014–FY2016 (INR crore)

Source: Author's calculations

4.2 Subsidies Provided by States

For each of the energy types, subsidies provided by the state government for one representative state has been quantified owing to data and time limitation.

- T&D – subsidies have been quantified for Rajasthan. Total electricity subsidies by the Rajasthan state government, excluding UDAY (accounted for above), have increased from INR 3,904 crore (USD 645 million) in FY2014 to INR 4,884 crore (USD 746 million) in FY2016. The majority of support was provided for under-recoveries by distribution utilities for keeping below-market prices for certain categories of consumers. Other support was provided to consumers through lower electricity duties and unclaimed return on equity.
- Renewable Energy – subsidies have been quantified for Tamil Nadu. The analysis shows that a total of five subsidies provided by the Tamil Nadu government have increased from INR 94 crore (USD 15.5 million) in FY2014 to INR 287 crore (USD 44 million) in FY2016. This includes direct and indirect transfer of funds and liabilities for promoting solar power and feed-in tariffs for generators.
- Coal – subsidies have been quantified for Chhattisgarh. The analysis shows that only one subsidy provided by the Chhattisgarh government increased from INR 1,127 crore (USD 186 million) in FY2014 to INR 1,590 crore (USD 243 million) in FY2016. The aim of the subsidy was a lower VAT on the sale of coal in the state.
- Oil & Gas – No state-level subsidy has been calculated owing to data limitations.

The next section provides subsidies for each energy type in detail.

5.0 Findings by Energy Type

5.1 Subsidies to Electricity T&D

Both central and state governments provide support for T&D in India in the form of direct budgetary allocation and indirect measures such as tax exemptions. At a central level, this includes budgetary support for extending the T&D network in rural areas under Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY), budgetary support for strengthening the T&D network under the Integrated Power Development Scheme (IPDS), support for construction of transmission networks of strategic importance under the Power System Development Fund program (PSDF) etc. Recently, in September 2017, government announced another scheme, Saubhagya, for providing universal electricity access to all households in India by December 2018. It is budgeted to cost INR 16,320 crore (USD 2.5 billion). State governments further extend these benefits through measures such as budgetary support for selling electricity at lower prices, exemptions from electricity duty and support in securing low-cost financing.

A number of such subsidies have been identified (14 in total). Only three of these have not been quantified, owing to data limitations. The total amount of central government subsidies for the electricity transmission, distribution and consumption sector has increased from INR 40,331 crore (USD 6.7 billion) in FY2014 to INR 64,896 crore (USD 9.9 billion) in FY2016.[15] This is mainly due to two reasons:

a. The introduction of new schemes like National Electricity Fund (NEF) (Interest subsidy) Scheme and the Power Sector Development Fund
b. An increased allocation under various ongoing schemes

In addition, the central and the state governments have provided bailout packages to distribution companies from time to time in order to improve their operational and financial performance. A Financial Restructuring of State DISCOMS scheme was introduced in 2012, but it did not change the poor financial health of DISCOMs, and this led to the UDAY restructuring scheme to bail out the ailing DISCOMs. The government has committed to taking over 75 per cent of DISCOM debt totalling INR 170,000 crore (USD 25 billion) over a two-year period in FY2016 and FY2017.

[15] This excludes debt taken over by various state governments under UDAY (INR 92,113 crore in FY2016 and INR 78,689 crore in FY2017).

Box 2. Bailout Packages to Electricity Sector

Power distribution is the weakest link in the entire value chain of power sector in India and the government has offered financial packages to bail out beleaguered state electricity DISCOMs from time to time. In 2012, the GoI approved the Financial Restructuring Plan with capital incentives for 50 per cent short-term liability to be taken over by state government by issuance of special securities to lenders. Balance 50 per cent loans were restructured by providing a moratorium on principle. However, the DISCOM losses continue to increase.

The outstanding debt and cumulative losses of DISCOMs in India were approximately INR 3.8 lakh crore and INR 4.3 lakh crore, respectively (as of March 2015). The DISCOMs are trapped in a vicious cycle, with operational losses being funded by debt. This poses a huge threat for not only the power sector but also the banking and financial sector at large. In order to overcome this issue, the GoI's MoP launched a scheme, UDAY, which provides for a permanent solution for financial turnaround and revival of DISCOMs.

The scheme empowers DISCOMs with the opportunity to break even in the next 2–3 years, by improving their operational efficiencies, reducing the cost of power purchase, reducing their interest expenses and by enforcing financial discipline through alignment with state finances. Under this scheme, state governments are allowed to take over 75 per cent of DISCOM debt as of September 30, 2015 over a two year period—with 50 per cent of DISCOM debt to be taken over in FY2016 and 25 per cent in FY2017. States can issue non-Statutory Liquidity Ratio, including bonds in the market or directly to the respective financial institutions holding the DISCOM debt to the appropriate extent.

Apart from this, targets have been given to DISCOMs for improving their operational efficiencies, and key performance indicators are being monitored regularly by the central government. Operational efficiency improvement measures and energy-efficiency initiatives, like upgrading distribution transformers, installing smart meters, promoting energy-efficient LED bulbs, agricultural pumps, fans & air-conditioners, etc., are expected to reduce the DISCOMs' losses. Once these targets are achieved, the financial health of DISCOMs is expected to improve.

5.1.1 Direct Transfer of Funds and Liabilities

The support provided by the central government under various schemes and programs is summarized in Table 11 (in INR) and Table 12 (in USD). Direct subsidies accounted for a minor share (10 per cent) of total subsidies provided by the central government in the last three years. It included budgetary support provided to T&D utilities under various schemes and programs like DDUGJY, IPDS and PSDF. Funds allocated for IPDS, which is the largest program targeted towards strengthening of sub-T&D networks, was around INR 1,000 crore (USD 153 million) in FY2016 but the allocated budget for this scheme is 4,500 crore (USD 674 million) in FY2017. Under this scheme, the central government provides funds for strengthening sub-T&D networks in urban areas, which includes metering of distribution transformers, distribution feeders and high tension consumers in urban areas, as well as IT enablement of the distribution sector.

Another major support provided by the government is under the DDUGJY scheme, which is targeted at rural electrification, and for which around INR 4,500 crore (USD 687 million) was provided in FY2016. Under this scheme, the central government provides grants of up to 90 per cent of the project costs (60 per cent for states classified as anything other than "special category" states, which can increase up to 75 per cent if targets are achieved; and 85 per cent for "special category" states, which can increase up to 90 per cent if targets are achieved).

Apart from the above, funds are provided for the development of transmission and sub-transmission networks in northeast states, the implementation of energy-efficiency programs through the Bureau of Energy Efficiency (BEE), research and training activities, the implementation of smart grid pilot projects and support for securing low-cost financing from bilateral and multilateral agencies. The value of the subsidy for low-cost financing from bilateral and multilateral agencies has been estimated for illustrative purpose by subtracting actual interest paid on the loans from these agencies from the interest amount that would have been paid at the coupon rates of corporate bonds issued by POWERGRID for respective years, but the value has not been included in the totals.

5.1.2 Government Revenue Foregone

In addition to direct budgetary transfers, the government provides other supports like lower custom duty on equipment used in the electricity T&D. This includes transformers, energy meters, capacitors, conductors, switchgears and control gears. Some of these pieces of equipment attract concessional basic customs (import) duty rates, ranging from 0 to 7.5 per cent as against the normal rate of 10 per cent. The custom duty on energy meters, capacitors and conductors is 0 per cent, whereas the same for transformers is 10 per cent. The total amount of revenue forgone due to lower custom duty has not been quantified, as specific data on the amount of imported equipment used by electricity T&D utilities is not available in the public domain.

5.1.3 Income or Price Support

State governments also provide a subsidy to distribution utilities for keeping the electricity tariff lower than the cost of supply for agriculture consumers, small domestic consumers and below-poverty-level (BPL) consumers. The direct subsidies provided by state governments have increased from INR 37,052 crore (USD 6.1 billion) in FY2014 to INR 57,680 crore (USD 8.8 billion) in FY2016. This does not include indirect subsidies like exemptions on electricity duty and unclaimed return on equity. As an exception, these state transfers are included into our estimate of total "central" government subsidies due to the fact that they are widespread (they exist across almost every single state) and there is good data allowing for their estimation at an India-wide level. They are also so large that excluding them would significantly under-estimate national subsidies related to electricity transmission and distribution.

Table 11. Central government support to T&D (INR crore)[16]

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	DDUGJY	2,594	2,414	4,500	3,350
	IPDS	575	1,261	1,002	4,524
	Subsidized loans from multilateral organizations	not calculated	not calculated	not calculated	not calculated
	PSDF	not in place	1	1,151	619
	Fund for Power System Improvement in North Eastern States excluding Arunachal Pradesh and Sikkim	not in place	150	247	78
	Fund for Strengthening of Transmission Systems in the States of Arunachal Pradesh and Sikkim	not in place	100	150	255
	Fund for Energy Efficiency and Energy Conservation Activities implemented through Bureau of Energy Efficiency (BEE)	82	41	92	111
	Research and Training support by Ministry of Power	28	95	67	106
	National Electricity Fund (NEF) (Interest subsidy) Scheme	-	1	7	9
	National Smart Grid Mission	not in place	not in place	1	10
	Green energy corridor projects	not in place	not in place	not in place	not in place
2	**Government revenue foregone**				
	Custom duty rebates on transmission and distribution equipment	not calculated	not calculated	not calculated	not calculated
	Excise duty rebates on transmission and distribution equipment	not applicable	not applicable	not applicable	not applicable
3	**Income or Price Support**				
	Under-recovery of costs by distribution utilities for keeping below-market prices for certain categories of consumers	37,052	47,965	57,680	not available
	Total	**40,331**	**52,028**	**64,896**	**9,063**

[16] Where available, data for FY2017 is provided in tables and the Annex. However, at the time of the publication, the FY2017 data were incomplete.

Table 12. Central government support to T&D (USD million)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	DDUGJY	429	395	687	499
	IPDS	95	206	153	674
	Subsidized loans from multilateral organizations	not calculated	not calculated	not calculated	not calculated
	PSDF	not in place	0	176	92
	Fund for Power System Improvement in North Eastern States excluding Arunachal Pradesh and Sikkim	not in place	25	38	12
	Fund for Strengthening of Transmission Systems in the States of Arunachal Pradesh and Sikkim	not in place	16	23	38
	Fund for Energy Efficiency and Energy Conservation Activities implemented through Bureau of Energy Efficiency (BEE)	14	7	14	17
	Research and Training support by Ministry of Power	5	16	10	16
	National Electricity Fund (NEF) (Interest subsidy) Scheme	-	0	1	1
	National Smart Grid Mission	not in place	not in place	0	1
	Green energy corridor projects	not in place	not in place	not in place	not in place
2	**Government revenue foregone**				
	Custom duty rebates on transmission and distribution equipment	not calculated	not calculated	not calculated	not calculated
	Excise duty rebates on transmission and distribution equipment	not applicable	not applicable	not applicable	not applicable
3	**Income or Price Support**				
	Under-recovery of costs by distribution utilities for keeping below-market prices for certain categories of consumers	6,125	7,844	8,811	not available
	Total	**6,667**	**8,509**	**9,914**	**1,351**

5.1.4 Electricity Sector Bailout

Apart from the aforementioned schemes, one of the most recent major initiatives of the central government for improving the financial health of electricity distribution utilities is the implementation of UDAY. The financial support under UDAY was INR 92,113 crore (USD 14 billion) in FY2016 and INR 78,689 crore (USD 11.7 billion) in FY2017. This has been estimated by adding the amount of debt proposed to be taken over by the state governments in FY2016 and FY2017.[17] The central government has also assigned performance targets for each DISCOM and progress against this is monitored at regular intervals. This scheme may act as a complete turnaround for the electricity distribution sectors, if the targets set are achieved, as it will improve the operational performance of distribution utilities, which will result in decreasing the amount of support required from the government.

[17] Only those states that have signed the UDAY MoU have been considered.

Table 13. Electricity sector bailout (state government support to T&D) (INR crore)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Financial Restructuring of State Distribution Companies (Discoms) scheme.	1,500	400	-	-
	Ujwal Discom Assurance Yojana (UDAY)	not in place	not in place	92,113	78,689
	Total	**1,500**	**400**	**92,113**	**78,689**

Table 14. Electricity sector bailout (state government support to T&D) (USD million)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Financial Restructuring of State Distribution Companies (Discoms) scheme.	248	65	-	-
	Ujwal Discom Assurance Yojana (UDAY)	not in place	not in place	14,071	11,729
	Total	**248**	**65**	**14,071**	**11,729**

5.1.5 State-Specific Subsidies

At the state level also, state governments provide direct or indirect support to electricity T&D utilities through a range of measures, including an electricity duty exemption, subsidies to keep electricity tariffs low for some consumer categories and unclaimed return on equity. State-specific subsidies have been identified and estimated only for one selected state: Rajasthan. Rajasthan was selected on the basis of its cumulative losses in electricity T&D, its commitment towards improving power sector performance (signing of central government schemes like UDAY) and its ownership of electric utilities (public utilities). Rajasthan had cumulative losses of INR 12,108 crore (USD 1.8 billion) in FY2016. It was also among the few states that signed UDAY in the early stages and committed to improving the performance of the power sector in a phased manner. The state government owns all of the electric utilities within the state. State-specific subsidies for the state of Rajasthan are provided below.

The support provided by the Rajasthan government to DISCOMs is summarized in Tables 15 and 16. The analysis shows that total subsidies by the state government of Rajasthan (excluding debt taken over under UDAY but including subsidies given to DISCOMs by state government to keep prices low for certain consumer categories) has increased from INR 3,904 crore (USD 645 million) in FY2014 to INR 4,884 crore (USD 746 million) in FY2016. This is mainly due to the state government wishing to maintain low-end consumer tariffs, thus increasing the total value of the subsidy. One of the other largest subsidies to DISCOMs in Rajasthan is an indirect subsidy on account of unclaimed return on equity. As per the provisions of the Electricity Act, 2003 and the Rajasthan Electricity Regulatory Commission (Terms & Conditions for Determination of Tariff) Regulations, 2014, T&D utilities are allowed to claim a return on equity of 15.5 per cent and 16 per cent respectively. However, distribution utilities in Rajasthan do not claim any return on equity (as per the directions of state government) and similarly, transmission utilities claim return on equity at the rate of 12 per cent, resulting in a huge indirect subsidy of INR 2,465 crore (USD 377 million) in FY2016. Further, the government provides indirect support by way of imposing a lower electricity duty on agriculture consumers.

Table 15. State government support to T&D for the State of Rajasthan (INR crore)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Low cost loan from multilateral agencies/bilateral agencies	not calculated	not calculated	not calculated	not calculated
2	**Government revenue foregone**				
	Electricity duty rebates for some consumer categories	507	761	649	not available
3	**Provision of goods or services below market value**				
	Unclaimed return on equity	1,827	2,189	2,465	not available
4	**Income or price support**				
	Under-recovery of costs by Rajasthan distribution utilities for keeping below-market prices for certain categories of consumers*	1,570	3,180	1,770	not available
	Total	**3,904**	**6,130**	**4,884**	**not available**

** Reflecting the Rajasthan sub-component of the state subsidy to DISCOMS to keep prices low that has been reported at the national level.*

Table 16. State government support to T&D for the State of Rajasthan (USD million)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Low-cost loan from multilateral agencies/bilateral agencies	not calculated	not calculated	not calculated	not calculated
2	**Government revenue foregone**				
	Electricity duty rebates for some consumer categories	84	124	99	not available
3	**Provision of goods or services below market value**				
	Unclaimed return on equity	302	358	377	not available
4	**Income or price support**				
	Under-recovery of costs by Rajasthan distribution utilities for keeping below-market prices for certain categories of consumers	260	520	270	not available
	Total	**645**	**1,003**	**746**	**not available**

5.2 Subsidies to Coal

The government provides support in the form of direct and indirect subsidies to coal sector companies (mainly CIL). This includes support for undertaking regional drilling for identification of additional resources of coal and lignite and exploration in difficult areas, funds for conservation and safety of coal mines, financial support for improving environmental conditions in old mined-out areas, special benefits for employees and exemptions from paying duties and taxes for coal mining equipment, among others.

There are a number of policy initiatives and reform measures being taken by government to enhance transparency and fair competition in coal. This includes the deallocation of mines allocated through the MoU route, rationalization of coal linkages, e-auctioning of linkages through a transparent process of competitive bidding and a scheme for Harnessing and Allocating Koyala (Coal) Transparently in India (SHAKTI-2017). Going forward, some of the major challenges faced by the sector are over-reliance on surface mining, ensuring compliance with environmental laws, removing bottlenecks in transportation and increasing private sector participation.

It is important to note that, for identification of producer subsidies, a spectrum of transfers made by/to the government to/by coal producers in India (such as outlays in the MoC's annual budgets, equity infusions in coal mining companies, taxes and levies in the industry, etc.) were comprehensively studied. Many of them have been analyzed and have been found to not qualify as a subsidy. In this respect, it is worthwhile to mention that no producer subsidy is foreseen with regards to government ownership in CIL. The government has earned reasonable returns on the equity infusions in CIL. Further, by 2001/02, the central government laid a mandate of "a minimum internal rate of return of 12 per cent at 85 per cent capacity utilization as cut off for the development of a project" for CIL (CIL, 2017b). With regards to any possible instances in which the government has injected capital into CIL for infrastructure or other special projects, no equity infusions have been made in CIL by MoC.

A number of subsidies (in total 18) have been identified. Only eight of these have not been quantified, owing to data limitations. Total amount of subsidies for the coal mining sector is estimated at INR 15,791 crore (USD 2.6 billion) in FY2014 and INR 14,979 crore (USD2.3 billion) in FY2016 (see Tables 16 and 17 below for full details). This includes indirect subsidies in the form of government revenue foregone due to concessional duties and taxes, which is around 90 per cent of the total subsidies, and direct budgetary support, which is only 10 per cent of the total subsidy.

5.2.1 Direct Transfer of Funds and Liabilities

The production of coal is supported by the MoC through its budget allocation for undertaking expenditure on promotional regional exploration, detailed drilling and research and development programs in the coal sector. In FY2016, actual expenditure on such activities was INR 105 crore (USD 16 million), INR 151 crore (USD 23 million) and INR 18 crore (USD 2.7 million), respectively.

Under the Coal Mines (Conservation & Development) Act, an excise duty (commonly termed as the Stowing Excise Duty or SED) is levied on the coal dispatched for supporting the conservation activities of coal companies—for example, stowing operations, protective works and the development of transport infrastructure in coalfield areas. MoC disburses the net proceeds from SED collection for execution of stowing and other related operations. The current rate of SED is INR 10 per tonne, to be paid to the Coal Controller Organization. The total disbursement from SED stood at INR 250 crore (USD 38 million) as an average.

In addition to this, bilateral organizations have provided low-cost loans to CIL. Credit subsidies have been estimated by subtracting the interest paid by CIL to these bilateral organizations from the interest that would have been paid if the loan were taken from the domestic market. The benchmark interest rate used for comparison was other domestic loans taken by CIL. The total amount of subsidies estimated for subsidized loans from these bilateral organizations was INR 11 crore (USD 1.7 million) in FY2016. The value is not included in totals due to the absence of detailed information on all such loans by CIL and its subsidiaries.

In India, some of the power-generating stations have been provided loans at the base rate, instead of the State Bank of India prime lending rate. For the plants that have obtained loans at the base rate from banks, the difference in the base rate and the market rate would qualify as a subsidy amount. However, in the absence of more detailed information on effective interest rates at the plant level, the determination of subsidy quantification is difficult in this context.

Also, in India, the Central Pollution Control Board issues emission regulations for environment-polluting industries, including power plants. Particulate emissions are affected indirectly by coal washing requirements and directly by emission limits. The use of coal with ash content exceeding 34 per cent is prohibited in thermal power plants (100 MW and more) located more than 500 to 749 km from the pithead, or in urban or sensitive or critically polluted areas in accordance with the Central Pollution Control Board notification of 2002 (later revised in June 2016). The coal washing process is highly capital-intensive and the high costs associated with it make the proposition unviable both for CIL and the power generators. Thus, the power generators in India have refrained from coal washing at the cost of polluting the environment. Thus, non-compliance of the mandate related to coal washing/beneficiation is a producer subsidy.

In order to promote electricity generation, government used to provide incentives by giving a 10-year tax holiday to generating companies. However, in the absence of required information (profit and loss accounts of each generating station), the subsidy cannot be quantified. Moreover, the policy of tax holiday was discontinued in the 2017 budget.

5.2.2 Government Revenue Foregone

The government has approved a number of tax breaks to coal consumers and producers, as coal is a major energy commodity constituting 58 per cent of the total energy mix in India. The coal sector enjoys concessional rates on custom duty for importers; concessional rates on excise duty on the production of coal; rebates on imports of coal mining equipment for coal producers; and lower VAT rates for coal consumers. The value of the subsidies conferred by these tax breaks has been estimated by subtracting the indirect tax paid at the existing tax rates from the amount of tax that would have been paid, if the tax rates were at par with other communities. The total subsidy from lower customs duty and excise on coal was INR 6,452 crore (USD 986 million) and INR 6,886 crore (USD 1.1 billion) in FY2016, respectively.

As of 2017, many of these tax-related subsidies - which represent the large share of total subsidies for coal - will change, following the introduction of the GST. The GST will replace the existing excise tax and absorb all state-related taxes. The coal sector seems to benefit from the new tax regime because the degree of preferential treatment under the GST (a preferential rate of 5 per cent against a standard rate of 18 per cent) is higher than the preferential rate for the excise tax. Further, manufacturers, traders and suppliers are now also entitled to claim tax credits; and tax rates for transportation of coal from coal mines under the GST would be charged at a rate of 5 per cent. However, at the same time, elsewhere in the tax system, the preferential rate for coal under import duties, one of the most expensive subsidies, has been removed. This is a loss for the parts of sector involved in importation but a gain for domestic producers, as it increases costs for their competition. Overall, it is difficult to ascertain net impacts until more data becomes available. Central government subsidies are likely to increase, assuming no significant share in volume consumed. But it is difficult to be certain what the net effect will be on overall tax-related subsidization across India, because the GST has also absorbed all state taxes, and no known data has been compiled on state-level tax-related subsidies.

5.2.3 Provision of Goods or Services Below Market Value

Coal accounted for around 50 per cent freight tonnage and 46 per cent of freight revenue for Indian Railways in FY2015 (PIB, 2015a). The railway freight charges for the coal sector were subsidized earlier. However, due to negative growth in freight revenue, tariffs were increased from August 2016. The freight rates were revised upwards by 8–14 per cent for transporting coal between 200 km and 700 km; and were decreased by 4–13 per cent for distances above 700 km. Freight rates for distances up to 200 km were kept unchanged. As per media reports, a spokesperson from the Ministry of Railways was cited saying that the concessional rate in long distance coal transportation is still causing losses of INR 700 crore (USD 100 million) to Indian Railways (The Telegraph India, 2016).

The non-competitive process for allocating coal blocks could give rise to subsidies, as price discovery is not determined through a market mechanism. As per the Mines and Minerals (Development and Regulation) Act, 1957, the central government may, for the purpose of granting a reconnaissance permit, prospecting license or mining lease in respect of an area containing coal or lignite, use a competitive bidding process for allocating coal blocks for captive mining. However, during the period 2004–2009, the government allocated coal blocks mainly through signing MoUs rather than allocating the blocks through a competitive bidding process. The Comptroller and Auditor General of India has reported that the allocation of coal blocks between 2005 and 2009 might have conferred benefits worth INR 1.86 lakh crore (USD 31 billion dollars) to private companies (Comptroller and Auditor General of India, 2012).

5.2.4 Income or Price Support

Because they dominate around 90 per cent of the coal sector market in India, there is significant intervention from public sector companies with regards to coal distribution and pricing. Although the MoC maintains close proximity

with these public sector companies and influences sellers' abilities to set coal prices in the domestic market, there is no mechanism in the coal sector to set efficiency norms and transparency in price setting. These arbitrary practices are biased towards public sector companies and also hinder a level playing field and competition in the sector. The *Integrated Energy Policy* report (Planning Commission, 2006) on coal reforms by the MoC also suggests the establishment of a regulator in the coal sector for approval of coal price revisions, allocation of coal, monitoring of e-auctions, regulating trading margins, creating a competitive coal market and planning in a scientific manner.

With this background, the Coal Regulatory Authority Bill was introduced in the Lok Sabha in 2013. The bill lapsed with the dissolution of the Lok Sabha in 2014. The proposal for reintroducing the same is under consideration in interministerial consultations.

Because there is no benchmark against which the inefficiencies of CIL can be measured, it is difficult to assess the level of benefit conferred to government companies on account of the absence of a coal regulator.

Table 17. Central government support to coal (INR crore)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Non-incurrence of costs due to non-compliance of mandate related to coal washing/beneficiation	995	1,044	1,064	1,103
	Conservation and Safety in Coal Mines and Development of Transport Infrastructure under Coal Conservation and Development Advisory Committee (CCDA)	261	260	245	351
	Detailed Drilling in Non-CIL /Captive Mining Blocks	185	136	151	90
	Promotional (Regional) Exploration in Coal and Lignite	64	59	105	50
	Coal Mines Pension Scheme	22	22	22	21
	Research and development (R&D) programs in the coal sector	12	18	18	10
	Credit support from multilateral organizations	not calculated	not calculated	not calculated	not calculated
	Environmental measures and subsidence control	1	1	1	1
	Low interest rate loans for power plants	not calculated	not calculated	not calculated	not calculated
2	**Government revenue foregone**				
	Concessional custom duty rates on import of coal	7,991	7,839	6,452	6,688
	Concessional excise duty rates on coal production	6,215	6,526	6,886	not available
	Concessional duty rebates on coal mining equipment	46	59	35	not available
	Income tax exemption for the generation of power	not calculated	not calculated	not calculated	not calculated
3	**Provision of goods or services below market value**				
	Concessional rates railway freight for long distance coal transportation	not calculated	not calculated	not calculated	not calculated
	Government revenue foregone from coal distribution through MoU route (rather than competitive bidding route)	not applicable	not applicable	not applicable	not applicable
	Compensation for land acquired for coal mining purposes	not calculated	not calculated	not calculated	not calculated

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
4	**Income or price support**				
	Pricing of coal	not calculated	not calculated	not calculated	not calculated
	Lack of regulator in coal sector	not calculated	not calculated	not calculated	not calculated
	Total	**15,792**	**15,963**	**14,979**	**8,313**

Table 18. Central government support to coal (USD million)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Non-incurrence of costs due to non-compliance of mandate related to coal washing/beneficiation	165	171	163	164
	Conservation and Safety in Coal Mines and Development of Transport Infrastructure under Coal Conservation and Development advisory Committee (CCDA)	43	43	37	52
	Detailed Drilling in Non-CIL /Captive Mining Blocks	30	22	23	13
	Promotional (Regional) Exploration in Coal and Lignite	11	10	16	7
	Coal Mines Pension Scheme	4	4	3	3
	Research and development (R&D) Programs in the coal sector	2	3	3	1
	Credit support from multilateral organizations	not calculated	not calculated	not calculated	not calculated
	Environmental measures and subsidence control	0	0	0	0
	Low interest rate loans for power plants	not calculated	not calculated	not calculated	not calculated
2	**Government revenue foregone**				
	Concessional custom duty rates on import of coal	1,321	1,282	986	997
	Concessional excise duty rates on coal production	1,027	1,067	1,052	not available
	Concessional duty rebates on coal mining equipment	8	10	5	not available
3	**Provision of goods or services below market value**				
	Concessional rates railway freight for long distance coal transportation	not calculated	not calculated	not calculated	not calculated
	Government revenue foregone from coal distribution through MoU route (rather than competitive bidding route)	not applicable	not applicable	not applicable	not applicable
	Compensation for land acquired for coal mining purposes	not calculated	not calculated	not calculated	not calculated
4	**Income or price support**				
	Pricing of coal	not calculated	not calculated	not calculated	not calculated
	Lack of regulator in coal sector	not calculated	not calculated	not calculated	not calculated
	Total	**2,610**	**2,611**	**2,288**	**1,239**

5.2.5 State-Specific Subsidies

In the coal sector, the MoC has the overall responsibility of determining policies and strategies with respect to exploration and development of coal and lignite reserves, sanctioning of important projects of high value and deciding all coal-related issues. Moreover, the production of coal is dominated by public sector agencies such as CIL and NLC comprising more than 90 per cent of the market. Hence, no subsidy is provided by state governments in the form of direct transfers like drilling, R&D and environmental conservation. However, support in the form of tax breaks—such as concessional VAT rates on the sale of coal—are provided by state governments. This has been estimated for only one state, Chhattisgarh, due to data and time constraints, as summarized in Table 19 (INR) and Table 20 (USD) below. Chhattisgarh was selected as it is one the largest coal-producing states in the country. The sale of coal in Chhattisgarh attracts concessional rates of 5 per cent as compared to 25 per cent peak rates for other energy commodities. The amount of subsidy has been estimated by subtracting the VAT paid at 5 per cent from the amount of VAT that could have been paid at 25 per cent peak rates. In mid-2017, this state-level subsidy was replaced with the introduction of the Goods and Services Tax (GST), which subsumed all such state-level taxes on consumption.

Table 19. State government support to coal for State of Chhattisgarh (INR Crore)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Government revenue foregone**				
	Lower VAT rates on sale of coal in state of Chhattisgarh	1127	1416	1590	not in place
	Total	**1,127**	**1,416**	**1,590**	**not in place**

Table 20. State government support to coal for State of Chhattisgarh (USD million)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Government revenue foregone**				
	Lower VAT rates on sale of coal in state of Chhattisgarh	186	232	243	not in place
	Total	**186**	**232**	**243**	**not in place**

5.3 Subsidies to Oil and Gas

Considering India's growing demand for energy resources in line with the nation's aspiration to reach a double-digit growth rate, coupled with limited indigenous capacity of oil and gas, the reliance on imported crude has continued unabated with an adverse impact on the balance of payment. In view of this, Indian Prime Minister Narendra Modi has "urged all stakeholders to increase the domestic production of oil and gas to reduce import dependence from 77 per cent to 67 per cent by the year 2022" (Lok Sabha Secretariat, 2017). In consonance with this vision of reducing import dependence, several measures have been undertaken to transform India into a refining hub.

To this end, the GoI also provides support to both production and consumption of oil and natural gas in the form of direct budgetary allocations and indirect measures such as tax and duty exemptions, income or price support and the provision of goods and services below market value (for a detailed summary, see Table 21). Subsidies to oil and gas reduced by almost three quarters, from INR 1,57,678 crore (USD 26 billion) to INR 44,654 crore (USD 6.8 billion) (for full details refer to Tables 21 and 22).

5.3.1 Direct Transfer of Funds and Liabilities

Most subsidies that are conferred through the direct transfer of funds and liabilities are subsidies for end-consumers, such as the government's budgetary support for the consumption of sensitive petroleum products and natural gas; and a subsidy for the transportation of petroleum products to remote regions of the country,

like the North East. The magnitude of these subsidies, however, have come down in recent years. This, in part, reflects major efforts by the government to reform the most inefficient subsidies in recent years: petrol prices were deregulated in 2010 and diesel prices were deregulated in 2014; the total volume of subsidized kerosene has been slowly reduced; and in 2016 and 2017 the price of kerosene was increased by a small sum on a regular basis. An important driver of this trend has been the sharp decline in world oil prices since 2014. The government has recently announced further ambitions to reduce its remaining direct subsidies for LPG and kerosene. At the time of publication, no clear details have yet emerged on how this is planned but government officials have confirmed that low-income households will continue to receive subsidies, implying improved targeting (OneIndia, 2017; Economic Times, 2017b).

On the producer side, the direct transfer includes: 1) grants provided by the Oil and the Industry Development Board (OIDB) to support production and R&D; and 2) subsidies provided by India's Strategic Petroleum Reserves Limited (ISPRL) for development of strategic crude reserves.

5.3.2 Government Revenue Foregone

Subsidies conferred through foregone government revenue are primarily in the form of tax support or the exemption of customs and excise duty on the consumption of petroleum products and natural gas and sales tax differential on LPG. On the production side, it is largely in the form of income tax exemption for companies producing crude oil from blocks under the National Exploration Licensing Policy or in the form of differential taxes between Indian and foreign companies engaged in exploration and production or involved in the storage and selling of crude oil in India. Special allowances are also provided for capital investment, the purchase of new machinery, site restoration expenses and for investment in the cross-country pipeline network for distribution and storage facilities.

5.3.3 Provision of Goods or Services Below Market Value

While most consumer subsidies are conferred through regulated product pricing that is paid for through direct transfers, some consumer subsidies do exist on the provision of goods or services, namely the Pradhan Mantri Ujjwala Yojana or "Ujjwala" scheme. This is a scheme that is run by the central government and is intended to provide as many as 0.5 million LPG stoves for BPL households. The selection of beneficiaries under Ujjwala would be decided based on 2011 Socio Economic Caste Census data (Sarkari Yojana, 2017).

As for the production subsidies, the government provides a concessional royalty under the new Hydrocarbon Exploration and Licensing Policy (HELP). HELP aims to enhance domestic oil and gas production by encouraging exploration in sedimentary basins, and introduces a number of measures. The measures include:

- A uniform license regime under which only one license is required in order to explore conventional and non-conventional hydrocarbons (such as oil, gas, coal bed methane, shale oil and gas).
- An open acreage licensing policy that gives companies the option to select exploration blocks without waiting for a formal bidding round and also provides many incentives such as reduced royalty rates for offshore blocks.
- A revenue-sharing model that is intended to reduce delays and administrative costs by moving away from profit-sharing and towards simply revenue-sharing.
- Marketing and pricing freedom and an easy-to-administer revenue-sharing model, and freedom in marketing and pricing, subject to certain limits (GoI, 2016a, 2017a).

5.3.4 Income or Price Support

Until recently, India controlled the prices of four sensitive products to increase their affordability for consumers: petrol, diesel, PDS kerosene and household LPG. Since downstream companies were unable to charge prices that covered their costs, they continued to incur heavy "under-recoveries" over the years: the difference between the

market-determined consumer price of a petroleum product and the government-controlled price. As noted above, the government has, in recent years, taken major steps to reform some of these subsidies (petrol in 2010, diesel in 2014; and ongoing efforts with respect to kerosene and LPG). In addition, world oil prices have fallen. As a result, under-recoveries have been significantly reduced and income support payments for Oil Marketing Companies (OMCs) have fallen in tandem.

Table 21. Subsidies to oil and gas (in INR crore)

	Year / Petroleum Products	FY2014	FY2015	FY2016	FY2017
1	**Direct and Indirect Transfer of Funds and Liabilities**				
	Freight Subsidy on Domestic LPG	16	17	not applicable	not applicable
	Freight Subsidy on PDS Kerosene	5	4	not applicable	not applicable
	Fiscal Subsidy on LPG	1,904	2,272	not applicable	not applicable
	Fiscal Subsidy on Kerosene	676	not applicable	not applicable	not applicable
	DBTL Subsidy on Domestic LPG (Subsidized)^	3,869	3,971	16,056	12,133
	Rajiv Gandhi Gramin LPG Vitaran Yojana	not applicable	not applicable	not applicable	not applicable
	Permanent Cash Advance pertaining to DBTL	1234	not available	5755	not available
	Project Management Expenditure pertaining to DBTL	43	not applicable	200	not available
	DBTK (Actual and BE)	not applicable	not available	not available	0
	Cash Incentives for Kerosene Distribution Reforms*	not applicable	not available	not available	81
	Assistance to states/UTs for establishment of Institutional mechanism for direct transfer of subsidy in cash for PDS kerosene beneficiaries* (RE and BE)	not applicable	not available	not available	2
	Natural Gas Subsidy Scheme for North Eastern States	625	661	660	745
	Diesel Subsidy in Drought and Deficit Rainfall	not available	not available	not available	7
	OIDB grants and subsidies on oil and gas	152	311	275	not available
	Expenditure towards ISPRL towards strategic petroleum reserves*	not available	not available	1,160	2,046
	Capital Outlay on Petroleum	not available	not available	1,153	2,483
2	**Income/Price Support**				
	Underrecovery on diesel#	62,837	10,935	not applicable	not applicable
	Underrecovery on domestic LPG (subsidized)^	46,458	36,580	18	not applicable
	Underrecovery on PDS kerosene	30,574	24,799	11,496	7,595

	Year / Petroleum Products	FY2014	FY2015	FY2016	FY2017
3	**Government Revenue Foregone**				
	Customs duty exemption on imported LPG	not computed	not computed	not computed	not computed
	Excise duty exemption on domestic LPG	4,056	3,703	5,046	5,844
	Sales Tax Differential on LPG under Declared Good Status	not computed	not computed	not computed	not computed
	Customs duty exemption on imported kerosene for use in PDS	not computed	not computed	not computed	not computed
	Excise duty exemption on PDS kerosene	4,280	3,472	1,795	1,230
	Customs duty exemption to power companies purchasing imported LNG	911	534	248	58
	Income tax exemption to companies engaged in production of "mineral oil" from NELP blocks	not computed	not computed	not computed	not computed
	Differential taxes between Indian and foreign companies engaged in E&P	not computed	not computed	not computed	not computed
	Income tax exemption to foreign companies involved in storage and selling of crude oil in India	not computed	not computed	not computed	not computed
	Special allowances to companies engaged in E&P	not computed	not computed	not computed	not computed
	Special allowance/deduction for site restoration expenses	not computed	not computed	not computed	not computed
	Accelerated depreciation on specified assets for mineral oil exploration	not computed	not computed	not computed	not computed
	Allowance for investment in new machinery	not computed	not computed	not computed	not computed
	Allowance/Incentives for investment in cross-country pipeline network for distribution and storage facilities	not computed	not computed	not computed	not computed
	Allowance/Incentives for capital expenditure on research	not computed	not computed	not computed	not computed
	Customs duty exemption to import of specified goods required for petroleum operations	not computed	not computed	not computed	not computed
4	**Provision of Goods and Services Below Market Value**				
	Expenses on LPG subsidies for the poor (Ujjwala Scheme)	not applicable	not applicable	not applicable	2,500
	OMC support for extension of LPG connection to poor families under CSR Scheme	39	225	791	not available
	Concessional Royalty under Hydrocarbon Exploration and Licensing Policy (HELP)	not computed	not computed	not computed	not computed
	Total Consumption Subsidies	**157,679**	**87,483**	**44,654**	**34,724**

 # Underrecovery on diesel is only up to October 18, 2014.

** The figures of these items of subsidies for FY2017 is a revised estimate (RE) as per Union Budget 2017–18 and the value for FY2018 is a budget estimate (BE) as per Union Budget 2017–18.*

^Government has decided to restrict the supply of subsidized LPG cylinders for each consumer to 12 cylinders annually.

Table 22. Subsidies to oil and gas (in USD million)

	Year / Petroleum Products	FY2014	FY2015	FY2016	FY2017
1	**Direct and Indirect Transfer of Funds and Liabilities**				
	Freight Subsidy on Domestic LPG	3	3	not applicable	not applicable
	Freight Subsidy on PDS Kerosene	1	1	not applicable	not applicable
	Fiscal Subsidy on LPG	315	372	not applicable	not applicable
	Fiscal Subsidy on Kerosene	112	not applicable	not applicable	not applicable
	DBTL Subsidy on Domestic LPG (Subsidized)^	640	649	2,453	1,808
	Rajiv Gandhi Gramin LPG Vitaran Yojana	not applicable	not applicable	not applicable	not applicable
	Permanent Cash Advance pertaining to DBTL	204	not available	879	not available
	Project Management Expenditure pertaining to DBTL	7	not applicable	31	not available
	DBTK (Actual and BE)	not applicable	not available	not available	0
	Cash incentives for kerosene distribution reforms*	not applicable	not available	not available	12
	Assistance to states/UTs for establishment of Institutional mechanism for direct transfer of subsidy in cash for PDS kerosene beneficiaries* (RE and BE)	not applicable	not available	not available	0
	Natural Gas Subsidy Scheme for North Eastern States	103	108	101	111
	Diesel Subsidy in Drought and Deficit Rainfall	not available	not available	not available	1
	OIDB grants and subsidies on oil and gas	25	51	42	not available
	Expenditure towards ISPRL towards strategic petroleum reserves*	not available	not available	177	305
	Capital outlay on petroleum	not available	not available	176	370
2	**Income/Price Support**				
	Underrecovery on diesel#	10,387	1,788	not applicable	not applicable
	Underrecovery on domestic LPG (Subsidized)^	7,679	5,982	3	not applicable
	Underrecovery on PDS kerosene	5,054	4,056	1,756	1,132

	Year / Petroleum Products	FY2014	FY2015	FY2016	FY2017
3	**Government Revenue Foregone**				
	Customs duty exemption on imported LPG	not computed	not computed	not computed	not computed
	Excise duty exemption on domestic LPG	670	606	771	871
	Sales tax differential on LPG under Declared Good Status	not computed	not computed	not computed	not computed
	Customs duty exemption on imported kerosene for use in PDS	not computed	not computed	not computed	not computed
	Excise duty exemption on PDS kerosene	707	568	274	183
	Customs duty exemption to power companies purchasing imported LNG	151	87	38	9
	Income tax exemption to companies engaged in production of "mineral oil" from NELP blocks	not computed	not computed	not computed	not computed
	Differential taxes between Indian and foreign companies engaged in E&P	not computed	not computed	not computed	not computed
	Income tax exemption to foreign companies involved in storage and selling of crude oil in India	not computed	not computed	not computed	not computed
	Special allowances to companies engaged in E&P	not computed	not computed	not computed	not computed
	Special allowance/deduction for site restoration expenses	not computed	not computed	not computed	not computed
	Accelerated depreciation on specified assets for mineral oil exploration	not computed	not computed	not computed	not computed
	Allowance for investment in new machinery	not computed	not computed	not computed	not computed
	Allowance/Incentives for investment in cross-country pipeline network for distribution and storage facilities	not computed	not computed	not computed	not computed
	Allowance/Incentives for capital expenditure on research	not computed	not computed	not computed	not computed
	Customs duty exemption to import of specified goods required for petroleum operations	not computed	not computed	not computed	not computed
4	**Provision of Goods and Services Below Market Value**				
	Expenses on LPG subsidies for the poor (Ujjwala Scheme)	not applicable	not applicable	not applicable	373
	OMC support for extension of lpg connection to poor families under CSR Scheme	6	37	121	not available
	Concessional Royalty under Hydrocarbon Exploration and Licensing Policy (HELP)	not computed	not computed	not computed	not computed
	Total Consumption Subsidies	**26,064**	**14,307**	**6,822**	**5,176**

 # Underrecovery on diesel is only up to October 18, 2014

** The figures of these items of subsidies for FY2017 is a revised estimate (RE) as per Union Budget 2017-18 and the value for FY2018 is a budget estimate (BE) as per Union Budget 2017–18*

^Government has taken decision to restrict the supply of subsidized LPG cylinders for each consumer to 12 cylinders annually

5.3.5 State-Specific Subsidies

Like the central government's Ujjwala scheme, the southern state of Karnataka has decided to launch another independent scheme in late 2017 named Mukhya Mantri (Chief Minister's) Anila Bhagya for beneficiaries who do not have a gas connection and belong to the BPL category (PM Jan Dhan Yojana, 2017). Even those who could not manage to get themselves enlisted under the Ujjwala scheme but belong to the BPL category (as above) would be given a free gas connection under Anila Bhagya (Sarkari Yojana, 2017).

Under the Ujjwala scheme, families receive free gas stoves through a subsidy equal to INR 1,600 (USD 25) per family. Under the Anila Bhagya scheme, the value of the subsidy is equal to INR 1,920 (USD 30) per family, which is provided by the state government to the OMCs. Select beneficiaries under Anila Bhagya will get a two-burner stove from the government, while the domestic refilled cylinders can be purchased at the market price (Sarkari Yojana, 2017). However, due to lack of information on the number of families the scheme has benefited, the subsidy has not been calculated.

5.4 Subsidies to Renewables

India's solar photovoltaic (PV) sector has seen significant growth since the launch of Jawaharlal Nehru National Solar Mission (JNNSM) in 2010. Initially, the mission targeted deployment of 20 GW of grid-connected solar power and 2 GW of off-grid solar application by 2022. However, in June 2015 these targets were revised to 100 GW of grid-connected solar power projects, comprised of 40 GW rooftop projects and 60 GW utility-scale projects. Unlike in the solar PV sector, which is still in the developing stage, India's wind power sector is well developed and steadily moving on track to meet the 60 GW target by 2022. Nonetheless, in order to achieve these gigantic targets, the next five years would require solar PV installations of 17.5 GW and wind power installations of 5.5 GW.

Government is providing a number of subsidies through a wide range of mechanisms, including direct subsidies in the form of budgetary support and indirect subsidies through policies such as tax breaks, credit support, services provided below market value and price support incentives for renewable energy projects. They are provided across the value chain of renewable energy projects—that is from R&D to entrepreneurial activity, manufacturing, project development and end-consumption.

A number of subsidies (24) have been identified in the report. Out of these, two subsidies have not been quantified due to limited information available in the public domain. The total subsidies provided by the central government has doubled from INR 2,607 crore (USD 431 million) in FY2014 to INR 9,310 crore (USD 1.4 billion) in FY2016. Owing to data limitation, a lot of subsides could not be estimated for FY2017; however, where data was available, subsidies totalled INR 14,500 crores (USD 2.2 billion) (see Tables 23 and 24 below). This is primarily due to the introduction of new schemes, an increase in expenditure on pre-existing schemes and incremental tax breaks owing to large capacity additions. Further, subsidies provided by state governments have also been quantified for one state, Tamil Nadu. The total subsidies provided by the state government of Tamil Nadu has increased from INR 94 crore (USD 15.5 million) FY2014 to INR 287 crore (USD 43.9 million) in FY2016. This is mainly due to increased government spending on off-grid solar applications.

5.4.1 Direct Transfer of Funds and Liabilities

For the first phase of the JNNSM, 1,100 MW of grid-connected solar plants including 100 MW in capacity of rooftop solar power plants were set up through the bundling of solar power with thermal power from National Thermal Power Corporation generating units. The targets under the first phase were achieved before the stipulated March 2013 deadline. JNNNSM Phase-II aimed to achieve significantly higher scales of targets of 100 GW by 2022. Around INR 4,500 crore (USD 687 million) has been earmarked for JNNSM in the last four years, from FY2014 to FY2017 under different phases. Various grid-connected projects are being tendered via different

schemes under Phase II, such as bundling and reverse bidding-viability gap funding (VGF). The different schemes under Phase II are:

- Defence establishments under the Ministry of Defence setting up grid-connected solar PV projects. As of December 31, 2016, 356 MW has been allocated under the scheme. The total budget is INR 750 crores (USD 115 million) over five years from FY2015 to FY2019.
- Central public sector undertakings (CPSUs) and government organizations setting up grid-connected solar PV power projects. Out of the 60 GW JNNSM utility-scale target, 10 GW are proposed to be deployed by CPSUs. Under the scheme, 1,037 MW of capacity has been allocated with sanctioned funds of INR 1,000 crore (USD 153 million) over four years from FY2015 to FY2018.
- Setting up of grid-connected solar PV power plants on canal banks and canal tops. The scheme targets 100 MW of solar power capacity. Central Finance Assistance (CFA) of INR 69 crore (USD 10.5 million) was disbursed until December 31, 2016 and an additional CFA of INR 159 crore (USD 24.3 million) will be released over FY2017, FY2018 and FY2019.

Further, there is another scheme for the development of solar parks and ultra-mega solar power projects that aims to install over 40 GW of capacity by 2020. A grant of INR 4,050 crore (USD 618.8 million) has been budgeted over five years for 20 GW capacity. In addition, there are plans for providing financial support of up to INR 20 lakh per MW or 30 per cent of the project cost under the same scheme.

Another major support provided through budgetary transfers is the promotion of off-grid applications. A subsidy amount of INR 940 crore (USD 143 million) has been released through various state nodal agencies, channel partners and other government agencies in the last three years. A thrust to rooftop solar in the public and private sectors is also being provided through disbursement of around INR 680 crore (USD 104 million) in FY2016. In addition, support was provided to Market Development and Promotion of Solar Concentrators Based Process Heat Applications (details in box below).

The allocation of funds to the Ministry of New and Renewable Energy (MNRE) stands at INR 5,473 crore (USD 815.8 million) in the Union Budget 2017, as compared to INR 5,036 crore (USD 769.3 million) in 2016. No major schemes were announced during this budget, besides mentioning the second phase of solar park development for 20 GW of capacity. Additionally, the budget extends support to power 2,000 railway stations through solar, under the Indian Railways 1,000 MW solar mission.

Box 4. Market Development and Promotion of Solar Concentrator-Based Process Heat Applications in India

The Market Development and Promotion of Solar Concentrator-Based Process Heat Applications in India (CSH India) aimed to complement the efforts of the GoI to promote the use of solar concentrators for process heat applications by overcoming existing barriers in technology, awareness, capacity, market and financing. The project was implemented by the MNRE with support from the Global Environment Facility; the United Nations Development Programme (UNDP) acts as the Global Environment Facility Executing Agency, providing overall management and guidance.

The project's Component 1 provided technology application packages, support for the introduction of four further CSH India technologies, and standardization of CSH India performance measurements; Component 2 provided awareness and capacity building; Component 3 aimed to support 30 demonstration projects (15,000 m^2) and 60 replication projects (30,000 m^2 of collector area); while Component 4 addressed financial barriers.

Under this project, a capital subsidy of 30 per cent was available for all projects. Special category states like the Himalayan regions and northeastern states could benefit from up to 60 per cent capital subsidy.

The project ran from March 2012 to March 2017 with a total budget outlay of USD 23.75 million, out of which 7.35 million was allocated in the form of subsidies (cash as well as in-kind) from the MNRE. As of December 2014, MNRE had spent close to 2.75 million on this project.

Source: United Nations Development Programme India, 2017;Van Den Akker & Aggarwal, 2015

5.4.2 Government Revenue Foregone

Renewable energy project developers and manufacturers are eligible for concessional duties on excise and customs and accelerated depreciation benefits. Solar components are exempt from excise duties, as compared to the 12.5 per cent duty levied on other similar equipment and appliances used for power generation. In the wind sector, an excise duty of 6 per cent was exempted with effect from October 2015. Similarly, custom duty on selected machinery that includes apparatuses and appliances, transmission equipment and auxiliary equipment and components used for generation from solar sources is exempted. Concessional Custom Duty Certificates and Excise Duty Exemption Certificates are issued by the MNRE for availing duty benefits for setting up solar power plants in India. As of January 2017, concessions aggregating 6,200 MW of capacity have been issued to various solar power developers.

Another indirect benefit applicable for renewable developers is an AD benefit. Developers opting for the AD benefit are allowed to claim higher depreciation on assets during the initial years of operations, thus reducing taxable income. This was first introduced in 1994, when 100 per cent AD was allowed. This was reduced to 80 per cent in 2002, and AD benefits were withdrawn in 2012. It was reintroduced in 2014 at 80 per cent depreciation, which was further reduced to a maximum 40 per cent with effect from April 2017.

Due to large renewable capacity additions in the past five years, government revenue foregone in the form of the above-mentioned tax breaks is estimated to have increased from INR 1,550 crore (USD 256 million) in FY2014 to 10,100 crore (USD 1500 million) in FY2017.

5.4.3 Income or Price Support

In order to incentivize higher-efficiency projects, a Generation Based Incentive (GBI) scheme was introduced in 2009 for wind power projects wherein wind power projects not taking advantage of the AD benefit are eligible for a GBI incentive at the rate of INR 0.50 per unit of power fed to the grid for a period not less than four years and a maximum period of 10 years, subject to a ceiling of INR 1 crore (0.2 million) per MW. A total of INR 1,160 crore (USD 177 million) has been disbursed to registered wind capacity of around 8.5 GW in the last five years under this scheme.

Table 23. Central government support to renewables (INR crore)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct Transfer of Funds and Liabilities**				
	VGF Scheme- 750 MW, 2000 MW, 5000 MW under JNNSM-Phase II	469	469	969	2,594
	Off-Grid and Decentralized Solar Application Scheme	not available	224	685	32
	Scheme for Development of Solar Parks and Ultra Mega Solar Power Projects	not in place	173	366	163
	Support for R&D activities	147	132	92	205
	Grid-Connected SPV Rooftop and Small Solar Power programme	2	4	4	500
	National Biogas and Manure Management Programme (NBMMP)	90	123	131	142
	Scheme for setting up over 300 MW of solar power projects by defence establishments	not in place	150	150	150
	Scheme for setting up 1,000 MW of Grid-Connected Solar PV Power projects by CPSUs under Batch- V of Phase II of JNNSM	not in place	not in place	129	304
	MNRE small hydro incentive schemes	114	107	100	not available
	Financing and non-financing schemes: IREDA and other organizations	39	77	122	not available
	Canal Bank/Canal Top Scheme	not in place	69	76	76
	Support for grid interactive biomass power and bagasse cogeneration in sugar mills	6	78	29	10
	Biomass Gasifier Programme	0	14	14	14
	Small Wind Energy and Hybrid Systems (SWES) Programme	5	10	3	10
	Capital subsidy scheme for promoting solar PV water pumping systems for irrigation purpose	not in place	6	15	not available
	Biogas Power (off-grid) Programme for decentralized power generation applications and thermal applications	6	0	3	not available
	Implementation of Wind Resource Assessment in Uncovered/New Areas under NCEF Scheme and subsequent development.	1	1	2	not available
	Scheme for installation of solar charging stations with LED lanterns	not in place	not in place	not in place	not in place
	Akshay Urja Shops Programme	not available	not available	not available	not available
	Market Development and Promotion of Solar Concentrators Based Process Heat Applications	7	8	not in place	not in place
2	**Government Revenue Foregone**				
	Accelerated depreciation	909	2,686	3,885	5,471
	Tax breaks on excise and custom duty: Solar & wind	642	1,682	2,365	4,660
3	**Provision of Goods or Services Below Market Value**				
	Waiver of interstate transmission charges and losses on transmission of electricity generated from solar and wind plants	not in place	not in place	not in place	not available
4	**Income or Price Support**				
	GBI for grid interactive wind power projects	171	171	171	171
	Total	**2,608**	**6,182**	**9,311**	**14,502**

Table 24. Central government support to renewables (USD million)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct Transfer of Funds and Liabilities**				
	VGF Scheme- 750 MW, 2000 MW, 5000 MW under Jawaharlal Nehru National Solar Mission (JNNSM) Phase II	77	77	148	387
	Off-Grid and Decentralized Solar Application Scheme	not available	37	105	5
	Scheme for development of Solar Parks and Ultra Mega Solar Power Projects	not in place	28	56	24
	Support for R&D activities	24	22	14	31
	Grid Connected SPV Rooftop and Small Solar Power programme	0	1	1	74
	National Biogas and Manure Management Programme (NBMMP)	15	20	20	21
	Scheme for setting up over 300 MW of solar power projects by defence establishments	not in place	25	23	22
	Scheme for setting up 1,000 MW of Grid-Connected Solar PV Power projects by CPSUs under Batch- V of Phase II of JNNSM	not in place	not in place	20	45
	MNRE small hydro incentive Schemes	19	17	15	not available
	Financing and non-financing schemes: IREDA and other organizations	6	13	19	not available
	Canal Bank/Canal Top Scheme	not in place	11	12	11
	Support for grid interactive biomass power and bagasse cogeneration in sugar mills	1	13	4	2
	Biomass Gasifier Programme	0	2	2	2
	Small Wind Energy and Hybrid Systems (SWES) Programme	1	2	0	1
	Capital subsidy scheme for promoting solar PV water pumping systems for irrigation purpose	not in place	1	2	not available
	Biogas Power (off-grid) Programme for decentralized power generation applications and thermal applications	1	0	0	not available
	Implementation of Wind Resource Assessment in Uncovered/New Areas under NCEF Scheme and subsequent development.	0	0	0	not available
	Scheme for installation of Solar Charging Stations with LED Lanterns	not in place	not in place	not in place	not in place
	Akshay Urja Shops Programme	not available	not available	not available	not available
	Market Development and Promotion of Solar Concentrators Based Process Heat Applications	1	1	not in place	not in place
2	**Government Revenue Foregone**				
	Accelerated depreciation	150	439	593	815
	Tax breaks on excise and custom duty: Solar & wind	106	275	361	695
3	**Provision of Goods or Services Below Market Value**				
	Waiver of interstate transmission charges and losses on transmission of electricity generated from solar and wind plants	not in place	not in place	not in place	not available
4	**Income or Price Support**				
	GBI for grid interactive wind power projects	28	28	26	25
	Total	**431**	**1,011**	**1,422**	**2,162**

5.4.4 State-Specific Subsidies

At the state level, state nodal agencies are mainly responsible for effective implementation of schemes at the local level by channelling central sponsored subsidies, implementing demonstration projects and providing assistance to interested parties. The MNRE provides grants to these agencies and also supports R&D activities with the help of academia, government and private entities for technology development.

Subsidies provided by state governments have been quantified for one state: Tamil Nadu. The state was selected on the basis of high renewable penetration and diversification across renewable energy technologies (like wind, solar, biomass, etc.), high renewable energy project development pipelines, pro-active participation in framing state-level policies and the amount of grant-in-aid provided to state. Tamil Nadu had cumulative installed capacity of 9,650 MW as of June 31, 2016, with the highest installed wind capacity and the third highest installed solar capacity in India. Tamil Nadu is among the foremost states to announce a State Solar Policy in 2012 and has been granted the highest amount of grant-in-aid from the central government for development of the renewable energy sector.

State-specific subsidies for Tamil Nadu are provided below in Table 25 (INR) and Table 26 (USD). The analysis shows that total subsidies by the state government has increased from INR 94 crore (USD 15.5 million) in FY2014 to INR 287 crore (USD 43.8 million) in FY2016.[18] The feed-in tariff for power producers is one of the key policy incentives to stimulate renewable development. In Tamil Nadu, wind preferential tariffs have increased from INR 3.96 per unit in 2012 to a levelized tariff of INR 4.16 per unit without AD benefit. However, the solar tariff has reduced significantly from INR 18.45 per unit in 2012, INR 7.01 per unit in 2014, and INR 5.1 per unit in 2016 to INR 4.5 per unit in FY2017, due to the rapidly decreasing costs of solar modules over the years. The government of Tamil Nadu also provides direct support to the Tamil Nadu Energy Development Agency, which includes a capital subsidy on solar appliances, installations of renewable energy appliances in rural areas and the assessment of resources.

Table 25. State government support to renewables in Tamil Nadu (INR crore)

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Off-grid solar PV and thermal applications	3	120	185	not available
	Energization of street lights through solar power	53	53	53	not in place
	Chief Minister's (CM) Solar Powered Green House Scheme	36	36	36	not in place
	CM's Solar Rooftop Capital Incentive Scheme	1	1	1	not available
2	**Income or price support**				
	Feed-in tariff benefits	1	2	13	not available
	Total	**94**	**212**	**287**	**not available**

[18] State government subsidies for FY2017 have not been quantified due to data limitations.

Table 26. **State government support to renewables in Tamil Nadu (USD million)**

S.No.	Subsidy	FY2014	FY2015	FY2016	FY2017
1	**Direct transfer of funds and liabilities**				
	Off-grid solar PV and thermal applications	1	20	28	not available
	Energization of street lights through solar power	9	9	8	not in place
	CM's Solar Powered Green House Scheme	6	6	5	not in place
	CM's Solar Rooftop Capital Incentive Scheme	0.21	0.21	0.20	not available
2	**Income or price support**				
	Feed-in tariff benefits	0.13	0.34	1.92	not available
	Total	**16**	**35**	**44**	**not available**

6.0 The Impacts of India's Energy Subsidies

Energy subsidies matter because energy is at the heart of many important policy objectives. India's economy, the health and social welfare of its people and the integrity of its national and global environment are directly affected by the role that government resources play in influencing the development of the energy sector. The formal evaluation of the subsidies in this inventory is outside the scope of this study—subsidy evaluations are a complex exercise requiring a detailed assessment of an individual policy's effectiveness and efficiency at achieving its objectives, as well as identifying any unintended impacts. Instead, this chapter seeks to provide high-level insights into these issues by setting out some of the key ways in which India's energy subsidies may be influencing its economy, social welfare and the environment, based on existing knowledge about typical subsidy impacts and general trends in government expenditure.

6.1 Energy Subsidies and the Economy

6.1.1 Macroeconomic and Sectoral Impacts

Consumer subsidies reduce costs of energy to consumers artificially, thus inflating demand, while producer subsidies reduce the costs of energy production, thus driving supply. Therefore, both consumption and production subsidies reduce the end prices of energy and lock in energy choices for present and future generations. These impacts of subsidies are critical to the success of major development and infrastructure projects that anchor energy systems and are both capital-intensive and long-lived (Gerasimchuk, Bassi, et al., 2017). Whenever investment decisions rely on such subsidies, however, their removal can lead to a significant risk of stranded assets.

In standard economic theory, subsidies are generally expected to dampen economic growth because they drive resources to less productive uses (Steenblik, n.d.). This may be because they drive resources away from long-term investment and into short-term consumption; or it may be because they drive resources from higher-value to lower-value investment opportunities. This can create an over-dependence on energy-intensive production and consumption (Beattie, 2015).

The exception to this rule is in cases where there is some form of market failure that cannot be easily internalized. For example, renewable energy subsidies are typically intended to help overcome intractable market failures linked to the market entry barriers for infant industries, on the one hand, and the costs of pollution, on the other. In such cases, if they work well, subsidies can be corrective in nature, driving resources into long-term and higher-value investments. Even so, their benefits may not be well captured by indicators such as GDP, due to the fact that externalities are by definition "external" to such metrics. As a result, such impacts are often not considered to be economic, but rather social or environmental (see subsequent subsections on these themes for estimates of their economic value).

Subsidies distort the playing field for different energy types. In particular, the creation, through subsidies, of an artificially cheap fossil energy subsector has dampened the development of alternative energy subsectors (Asian Development Bank [ADB], 2016), including reducing incentives for low-carbon development. This can create "race-to-the-bottom" effects, whereby governments offering fossil fuel subsidies need to introduce renewable energy subsidies in order to help level the playing field across the energy sector.

A review of the results from global and single-country economic modelling studies of fossil fuel subsidy removal suggest that, on an aggregate level, for countries that, like India, are net importers of energy, changes to GDP are likely to be positive due to the incentives resulting from price changes leading to more efficient resource allocation (Ellis, 2009). The same review identified a set of case studies on empirical impacts. This found that although it was difficult to definitively isolate fossil-fuel subsidy reform impacts from other factors, some countries experienced higher growth during periods of energy price increases, while others experienced a short-term fall in GDP followed by quick recovery (Ellis, 2009).

Modelling evidence from India, Indonesia and Thailand suggests that higher energy price shocks from fossil fuel subsidy reform would primarily affect the energy sector and energy-intensive industries (ADB, 2016). In the longer-term, however, firms would adapt by reducing overall demand and increasing their energy productivity, which would ultimately help to dampen the effects of increased energy costs (ADB, 2016). This would result in capital cost savings in the power sector (ADB, 2016).[19] Long-term projections on the re-investment of savings into infrastructure—following the reform of fossil fuel subsidies—can also help to stimulate economic activity (ADB, 2016).

6.1.2 Fiscal Sustainability

Energy subsidies cost money: directly, in the case of fiscal transfers, or indirectly, in the case of policies such as tax exemptions, credit guarantees or the provision of government goods and services at below-market costs.

Depending on a subsidy's design, costs can amount to a significant fiscal burden for governments, putting pressure on deficits, debt-related interest payments, terms of trade and other budgetary commitments. For example, if a government commits to providing a good at a fixed subsidized price, such as kerosene and LPG in India, the costs of the subsidy can increase considerably if international market prices rise Arze del Granado, Coady, & Gillingham, 2010). This was India's experience with regards to oil products during 2005–2014. In recent years, falling world oil prices, in addition to a number of policy reforms, have helped expenditure to fall (see Figure 16). Meanwhile, if the government commits to providing a subsidy to energy generators—such as feed-in tariffs paid for renewable electricity plants—and then production costs fall there can be a sudden influx of new investments, which increases the aggregate policy costs far beyond initial levels. The appropriate design of fiscal policy is therefore important to prevent such burdens.

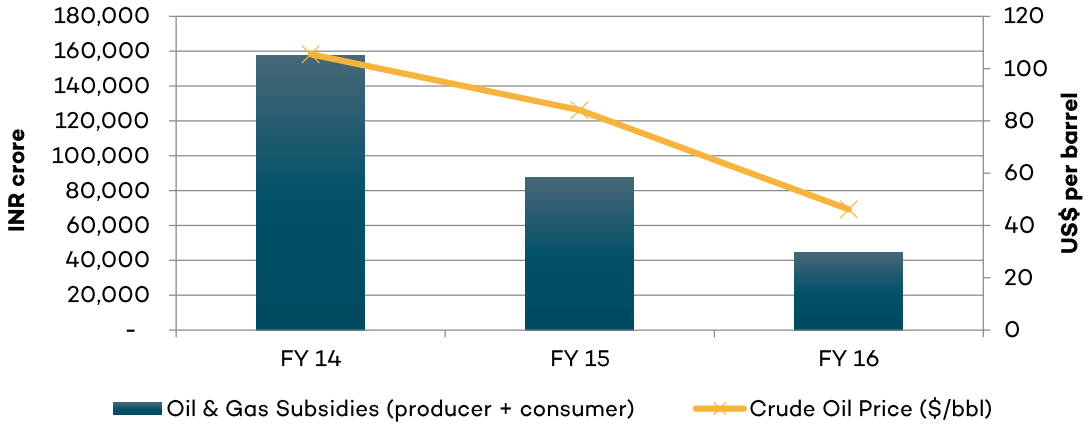

Figure 16. Oil and gas subsidies in India and the world oil price

Source: Author's calculations and PPAC, 2017a

Subsidies also have opportunity costs: the resources allocated to energy could be used to meet non-energy national objectives. From an efficiency perspective, the expense of any individual policy must therefore be judged against its objectives and effectiveness at achieving those, as well as effectiveness compared with alternative policy tools or the presence of any unintended negative consequences. In a review of international experience, fossil fuel subsidies have been found to crowd out funds for investment in social sectors such as health, education and labour (Plante, 2013).

A comparison of India's central government subsidies to all energy types and the budgetary expenditure across sectors is presented in Figure 17:

[19] The level of impacts across energy sectors, however, varied significantly by country, given different elasticity of energy demand and also the availability of alternative products (ADB, 2016).

- First, total central government subsidies, as estimated in this inventory, are presented, including on-budget subsidies (conferred through fiscal transfers) and off-budget subsidies (through measures such as tax exemptions).
- Second, the UDAY electricity bailout is presented. Although this is borne by state budgets, and it relates to a range of subsidies and other losses incurred over many years, it is shown here due to its significant value. These subsidies are not reported within the totals for energy subsidies because of possible double-counting: one of the main reasons that state electricity DSICOMs require a bailout is due to many years of providing subsidized electricity.
- Third, the graph presents a subset of energy subsidies by featuring key energy line items from the official government budget, covering the energy industry and minerals and petroleum subsidies.
- Finally, an estimate of on-budget expenditures in certain non-energy areas is provided for comparison.

In interpreting these figures, care should be taken to note that they cannot be subject to a simple and direct comparisons. The subsidy estimates are based on the total value of subsidies, including indirect spending, while expenditure in other areas is based on direct spending only. Nonetheless, the numbers provide some sense of scale for the volume of government support dedicated to energy subsidies, and how this compares to other uses.

Energy subsidies—including off-budget subsidies—are fairly large in comparison with other key areas of on-budget expenditure. In 2014, the value of all energy subsidies quantified in this inventory was more than the central government expenditure on defense (12.6 per cent) and non-energy subsidies (11.3 per cent), with the majority of the latter being made up of subsidies linked to food, fertilizer and interest. By 2016, partly due to reforms and partly due to falling world oil prices, the value of energy subsidies remained larger than central government expenditure on pensions (6.2 per cent) and transport and roads (4.7 per cent). In 2016, this value remained larger than reported central government expenditures on education (3.7 per cent), the police (3.1 per cent), labour and employment (2.4 per cent), health and family welfare (2.0 per cent) and science, technology and the environment (1.5 per cent).

Nonetheless, the GoI reduced energy subsidies between FY2014 to FY2016. As identified in this inventory, their on- and off-budget values decreased from just under 12 per cent of total central government expenditure in FY2014 to around 8.5 per cent in FY2017.

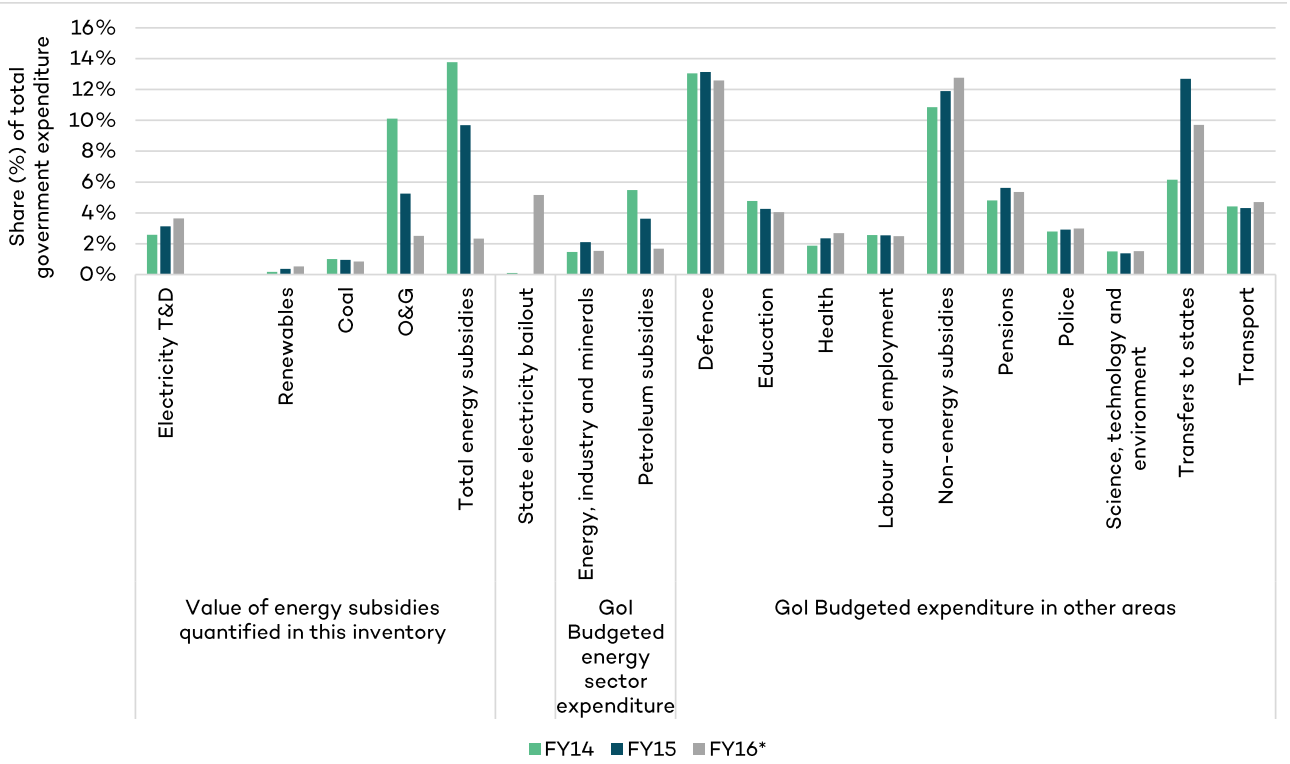

Figure 17. A comparison of on- and off-budget energy subsidies and certain categories of central government expenditure, FY2014–FY2017

Source: Author's calculations, based on data from Ministry of Finance (2016b) and estimates of budgetary expenditure on education, health and family welfare and rural development by the Centre for Budget and Governance Accountability (2017).

*Notes: (1) Estimates of expenditure on education, health and family welfare and rural development are drawn from Centre for Budget and Governance Accountability calculations. For other areas of expenditure, estimates are based on reported expenditure in the non-plan and plan sections of the budget, summing where necessary relevant items of expenditure reported under economic services, social services, central assistance for state plans and central assistance to Union Territories' plans. Some categories have been merged for easier presentation. Of expenditure categories not presented here, the largest omitted item is interest payments (25 per cent of planned expenditure in FY2017) and various sub-components of the budget for central assistance for state and Union Territories' plans that are not linked to the categories presented here. (2) * For FY2016, figures on budgetary expenditure are based on revised budget instead of actuals.*

Relative to the volume of central government expenditure, the value of subsidies to oil and gas products has fallen significantly, from a little over 10 per cent of all government expenditure in FY2014 to around 2.5 per cent in FY2017. The majority of this decline has been driven by falling consumer subsidies for petroleum products. From a fiscal perspective, this is a positive trend, because these products are a large source of fiscal uncertainty, and concrete steps have been taken towards removing them or making them more efficient. For example, diesel pricing was deregulated in 2014 and there are ongoing efforts to better target kerosene and LPG subsidy expenditure. Meanwhile, this trend is also a reflection of the volatile nature of these subsidies. A significant amount of subsidy savings was created by falling world oil prices since 2014—and an uptick in world oil prices could see these subsidies become more costly once again (see Figure 16).

The relative value of subsidies to electricity T&D grew by more than 60 per cent, having been worth 2.6 per cent of the total central government expenditure in FY2014 and reaching 3.6 per cent of the same in FY2016. The growth in the relative value of subsidies for renewable energy was even more significant, growing from 0.17 per cent of total central government expenditure in FY2014 and reaching 0.52 per cent in FY2016. An opposite trend was witnessed with respect to coal subsidies, which fell in value from 1.01 per cent of total central government expenditure in FY2014 to 0.84 per cent in FY2016, a decline of around 20 per cent. Initial data on FY2017 suggests that renewable subsidies have risen close to the average size of coal subsidies for the first time.

In addition to the central government subsidies recorded in this inventory, it is worth highlighting another large subset of subsidies—those intended to bail out the electricity sector, in particularly the UDAY scheme that began

in 2016—representing alone a transfer more than 5 per cent of total central government expenditure for both energy and non-energy sectors. It is helpful to see the ultimate high cost of these policies as a reminder of the ways in which subsidies can undermine electricity supply systems—and that the annual subsidy transfers are not currently high enough to be compensating for losses incurred in the sector.

6.2 Energy Subsidies and Social Welfare

Electricity, kerosene and LPG are subsidized in India to protect consumers and enable people with low-incomes to consume adequate energy (Sharma, 2013). Households with low levels of electricity consumption are cross-subsidized through the tariff structures of utilities and through state subsidies.

The overall welfare effects of energy subsidies can be assessed through an analysis of the effects of their removal. The prices paid by consumers would increase if subsidies were removed, causing an estimated 4 per cent reduction in real incomes (Anand et al., 2013).[20] How this affects individual households will vary with incomes and the availability of alternative energy sources. This section outlines the distributional effects of subsidies, access to modern energy services and the health impacts of subsidized energy consumption.

6.2.1 Distributional Effects

Most of the population living below the poverty line (BPL) live in rural areas and depend on traditional fuels, such as wood fuel and dung, for cooking and heating (Sharma, 2013). Consequently, they receive little or no benefit from subsidies allocated for kerosene and LPG consumption. Only 21 per cent of rural households regularly use LPG (NITI Ayog, 2017a).

In urban centres, 71 per cent of households use LPG (NITI Ayog, 2017a). However, a large proportion of the subsidy in urban areas is received by a small proportion of households, which tend to have higher incomes and consume more energy. Almost 40 per cent of the LPG subsidy nationally thus benefits only 7 per cent of the population (Sharma, 2013).

About a third of subsidized kerosene is not consumed by households (Jain & Ramji, 2016). In 2012, 40 per cent was sold on the black market (Sharma, 2013). Only half the kerosene supplied through the PDS reaches household consumers at the subsidized price (Jain & Ramji, 2016). A large share of the subsidy, therefore, has not achieved the benefit to social welfare that was intended. The demand for kerosene is falling as households gain access to electricity for lighting and gas for cooking. Kerosene subsidies are being phased out, with incremental increases in the retail price.

Residential consumers account for about a quarter of India's electricity. An estimated 87 per cent of electricity subsidy payments are received by households above the poverty line (Mayer, Banerjee, & Trimble, 2015). Consumer subsidies for electricity provided by state governments can be regressive. In Delhi, for example, 80 per cent of households qualify for a 50 per cent state subsidy. Proportionally, mid-level electricity consumers receive a higher subsidy than low consumers, who tend to be low-income households (Tongia, 2017).

6.2.2 Access to Modern Energy Services

One person in five has no access to electricity in their home (Energy Sector Management Assistance Program [ESMAP], 2017).[21] Those without access to electricity are predominantly in rural areas, where 30 per cent of the population lacks access. In urban areas, 98 per cent have electricity (ESMAP, 2017). The government aims to achieve universal access to electricity by 2022. Central government support for investment in rural electrification through DDUGJY amounted to USD 499 million in 2017.

[20] This analysis was based on prices in 2012.
[21] According to ESMAP (2017), 79.17 per cent of the total population had access to electricity in 2014.

Almost two thirds of Indian households—over 860 million people—depend on traditional fuels for cooking and heating. This places a high burden on the health of women and children, who spend more time indoors next to cookstoves and undertaking the work to collect fuel and cook food. The health impacts are very large (see Section 6.2.3). The government intends to launch a National Mission on Clean Cooking, with the aim to achieve universal access to clean cooking fuel coverage by 2022 (NITI Ayog, 2017a). This ambition would require providing clean cooking technology to approximately 36 million households every year, for the next five years.

The focus will be on access to LPG, and the government is aiming for 75 per cent LPG coverage by 2019. Towards this, the Ujjwala scheme aims to provide 50 million free LPG connections to low-income households by 2019 (GSI, 2016). However, the subsidy on the gas is being removed, which will affect the affordability of clean cooking for the poorest households.

6.2.3 Health Impacts

Every year fossil fuel combustion causes the premature deaths of an estimated 6.5 million people worldwide (Kirby, 2017). The production and consumption of energy are a major cause of urban air pollution. Ambient air pollution—also called outdoor air pollution—has multiple causes, for example, liquid transport fuels release toxic pollutants into urban environments, particularly when fuel quality and average engine efficiency is low and traffic is poorly managed. Coal power plants are another major contributor to ambient air pollution because coal is the world's most polluting fossil fuel (Landrigan et al., 2017), releasing sulfur oxide and nitrogen oxide emissions, suspended particulate matter, mercury, soot and fly ash (Shearer, Fofrich, & Davis, 2017). However, up to 30 per cent of India's outdoor air pollution is being driven by the country's bad indoor air quality (Lelieveld et al., 2015; Chafe et al., 2014).

Household air pollution—also called indoor air pollution—is caused by the release of harmful particulate matter when traditional fuels are used for cooking and heating. This pollution affects mainly the health of women and children, who typically spend more time at home and are responsible for meal preparation. The use of LPG for cooking reduces household air pollution and the physical labour of fuel collection, as well as greenhouse gas emissions. India's subsidies for LPG starter kits and cylinder refills are explicitly aiming to improve household air pollution in rural areas.

Air pollution is therefore among the largest drivers of premature deaths. There is a strong link between air pollution exposure and cardiovascular diseases, such as strokes and ischemic heart disease, as well as between air pollution and cancer. This is in addition to air pollution's role in the development of respiratory diseases, including acute respiratory infections and chronic obstructive pulmonary diseases (Health and Environment Alliance, 2017). Air pollution costs a nation on multiple levels: next to increasing the burden of disease, it has a direct effect on the economy from reduced productivity and early death. The cost of the health impacts of air pollution is estimated to be around 3 per cent of India's GDP (Zulqarnain Zulfi, 2016).

Reforming subsidies that encourage the inefficient use of polluting fossil fuels can help to reduce pollutants (Whitley & Van derBurg, 2015, p. 19). A recent study estimates that fossil fuel subsidy reform in combination with fuel taxation could help India prevent 65 per cent of premature deaths caused through air pollution, which in turn would bring down public expenditure on health and improve national productivity (Health and Environment Alliance, 2017). Ultimately, it would also contribute to preventing future catastrophic health impacts and costs from climate change.

Box 5. Energy Taxation

It is beyond the scope of this paper to address the role of energy taxation. Such taxation can, however, play a significant role in raising government revenue in developing countries, especially if such countries possess strong economic activity in the informal sector, as in India. India introduced the Clean Environment Cess to tax coal production and imports at a rate of INR 400 (or USD 6) per tonne, to signal shifts away from coal-intensive production.

A recent paper by Parry, Mylonas, & Vernon (2017) explores different pathways of energy taxation and their effects on socioeconomic and environmental outcomes. In the period 2017–2030, raising the Clean Environment Cess by INR 150 (or USD 2.25) per tonne per year would raise new tax revenues equivalent to 1 per cent of GDP, while also preventing over 270,000 air pollution deaths and reducing carobn dioxide emissions by 12 per cent in the same period. On top of this, net economic benefits, excluding the costs of introducing such a taxation measure, would increase GDP by an estimated 1 per cent. Introducing a broader carbon tax instead, which also taxes oil and gas products, would achieve more modest net economic benefits than raising the coal tax. It would however create 40 per cent more revenue compared with the coal tax.

The application of subsidies can also influence the effectiveness of taxation policy. Global evidence by the IEA suggests that incentives to pollute are USD 110 per tonne (IEA, 2013 in Whitley, 2013). Therefore, if the taxation rate is significantly lower than the rate of subsidization, such fiscal policy may not create the desired effect. (See also evidence on macroeconomic and microeconomic impacts of subsidies below.)

6.3 Energy Subsidies and the Environment

The production and consumption of energy is one of the main causes of environmental degradation across the world. Worldwide, air, water, soil and occupational pollution causes nine million deaths. Air pollution, water consumption and pollution, deforestation and land degradation are all caused, among other factors, by the production of energy, including coal mining and oil drilling. Pollution from the combustion of fuels adds to this environmental damage. India represents 50 per cent of all global deaths due to ambient air pollution, with record average annual concentrations of PM2.5—a deadly air pollutant.[22] The energy sector is responsible for about two thirds of global greenhouse gas emissions (IEA, 2016), and in 2010 used 583 billion cubic metres of fresh water (IEA, 2012). According to IMF analysis, the total cost of the environmental impacts of energy production and consumption globally exceeded USD 4 trillion in 2015 (Coady et al., 2015).

Energy subsidies encourage the consumption of energy, which can lead to its inefficient use and increase pollution. By lowering production costs, energy subsidies can also indirectly encourage additional use of natural resources, such as water, minerals and land. Fossil fuel subsidies may have increased global greenhouse gas emissions by more than 25 per cent, between 1980 and 2010 (Stefanski, 2014). According to Coady et al. (2015), "The environmental benefits from eliminating post-tax energy subsidies … The CO_2 reduction is more than 20 percent, which is very significant and would represent a major step towards the de-carbonization ultimately needed to stabilize the global climate system." The GSI estimates that removing all fossil fuel consumption subsidies in 11 countries by 2020 could result in an average greenhouse gas emissions reduction of around 4 per cent by 2020 and 3.6 per cent by 2025 (Merrill et al., 2014). In India, "the removal of all energy subsidies would lead to an estimated 105 million tonne reduction in power-sector CO_2 emissions, equivalent to about a third of current emissions" (United Nations Environment Programme, 2003).

Energy subsidies may also be introduced to achieve environmental objectives. In this inventory, this includes expenditure by the MoC for "environmental measures and subsidence control," which amounted to USD 80,000 in FY 2017 (see Tables 17 and 18).

In this section, we outline the principal environmental effects of energy production and consumption in India, relating these to energy subsidies when relevant. These effects are the emissions of greenhouse gases, particulate air pollution, water consumption[23] and pollution, and land degradation. Although coal accounts for less than 9 per cent of the total estimated subsidies included in this inventory, it accounts for 29 per cent of India's total

[22] According to newest *The Lancet* estimates, air pollution (both indoor and outdoor) is responsible for 1,809,053 deaths (Landrigan, et al., 2017)
[23] Water consumption is the quantity of extracted water that is not returned to the water system after use.

primary energy supply (2014, IEA, n.d.b). Indian coal has a low calorific value and a high ash content, making its environmental impacts disproportionate.

6.3.1 Greenhouse Gas Emissions

India is now the source of about 7 per cent of the world's greenhouse gas emissions (Olivier et al., 2016).[24] Energy production and consumption accounted for about 80 per cent of India's total greenhouse gas emissions in 2010, when emissions from land use, land use change and forestry are taken into account (Ministry of Environment, Forest and Climate Change, 2015). Excluding land use, land use change and forestry, energy accounted for about 71 per cent of total emissions. Energy emissions in 2010 totalled 1,510 million tonnes carbon dioxide equivalent (CO2e) (Ministry of Environment, Forest and Climate Change, 2015).[25]

As depicted in Figure 18, in 2010, more than half of India's energy-related emissions (54 per cent) were from electricity generation. Energy consumption by manufacturing and construction industries generated 11 per cent of energy emissions.

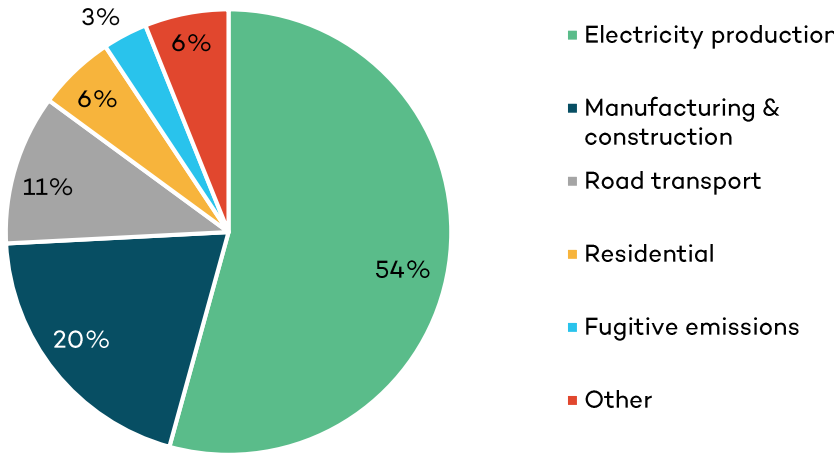

Figure 18. Sources of energy emissions in 2010

Source: Ministry of Environment, Forest and Climate Change, 2015

On average, across all power plants, 0.732 kg of carbon dioxide is emitted for each kWh of electricity (CEA, 2016). However, electricity from coal is significantly more carbon-intensive than electricity from other sources. Electricity from coal generates 0.98 kg CO_2 per kWh, compared with 0.3 kg CO_2 per kWh from gas (CEA, 2016), and zero emissions from solar and wind power. Coal-fired power plants generate about 78 per cent of the electricity produced (CEA, 2016) and are responsible for most of the emissions from the power sector.

The CEA expects the average emission factor for electricity to reduce to 0.522 kg/kWh by 2026/27, partly through the introduction of critical technology for coal-fired generation (CEA, 2016).

By 2030, India's NDC aims to reduce emissions intensity by 33–35 per cent, from 2005 levels (345.2 kg carbon dioxide per USD 1,000 GDP) (GoI, 2016b). This target is considered achievable, but depends on the performance of India's economy as well as physical reductions in emissions. India's emissions intensity has already started decreasing rapidly at a rate of 1 and 2 per cent in 2014 and 2015, respectively (Coady et al., 2015; Climate Action Tracker, 2016).

In recent analysis, the IMF has emphasized the extent to which fossil fuel subsidies entrenching market externalities are linked to climate change (Coady et al., 2015). It is estimated that eliminating post-tax fossil fuel subsidies would increase global economic welfare by 2.2 per cent of global GDP (Cusick, 2015).

[24] The NDC notes that, historically, India is responsible for 3 per cent of global emissions (GoI, 2016b).
[25] This included 1,441 million tonnes of carbon dioxide, 2.5 million tonnes of methane and about 0.5 million tonnes of nitrogen dioxide.

Ambient Air Pollution

Particulate matter (PM) concentrations often exceed the national air quality standards. In 2010, 140 out of 176 cities were found to exceed the PM2.5 limit set by the National Ambient Air Quality Standard (Gargava & Rajagopalan, 2015). More recently, a study of air pollution in 168 cities across 24 states found that none met the national air quality standard (Times of India, 2017). In Delhi, PM10 emissions were 4.5 times higher than the national standard and 13 times higher than the World Health Organization standard.

Power plants are a major source of PM air pollution, emitting over 110,000 tonnes a year (Cropper & Malik, 2012). They mitigate their particulate emissions by using electrostatic precipitators, which are a regulatory requirement, and by managing the ash content of the coal they use. In one estimate, India accounts for half of all global deaths due to ambient air pollution (1.8 million deaths in India in 2015) (Landrigan et al., 2017).

Water Consumption and Pollution

The production of energy requires water—for cooling in the case of thermal power plants and to drive turbines in the case of hydropower. In India, water is also used to wash coal, to improve its quality before transport and combustion. The consumption of energy enables water to be extracted and used by farmers, industry and household consumers. The main environmental impacts of this water–energy nexus in India are related to water for cooling thermal power plants, water use and pollution that results from the high ash content of Indian coal, and the use of pumped ground water for irrigation.

6.3.3.1 Electricity Generation

The average thermal power plant in India consumes about 3 cubic metres of water for every MWh generated (CEA, 2016). At this level of water consumption, the approximately 1 billion MWh generated by India's thermal power plants in 2014 would have consumed 3 billion cubic metres of water. However, older coal-fired plants consume about 5 cubic metres per MWh. New regulations, published in 2015 but taking effect at the beginning of 2017 require new plants to consume a maximum of 2.5 cubic metres per MWh (CEA, 2016).

One analysis estimated that, by 2050, electricity generation would require about 227 billion cubic metres of water, equivalent to 20 per cent of all the usable water in India (Mitra & Battacharya, 2012). This analysis assumed the continuation of current coal-fired generation technologies. Although new technologies are being introduced, the demand for water by coal-fired power plants will significantly increase pressure on water resources where they are located. Almost two thirds of existing coal-fired generation capacity is in areas where water is already scarce or stressed (Sauer, Klop, & Sumeet, 2010). Approximately 14 TWh electricity were lost in 2016 because of shutdowns caused by water shortages (Luo, 2017).

Gas-fired thermal power generation requires less than half the quantity of water, while solar and wind power require negligible amounts.

6.3.3.2 Coal Washing

Indian coal has high ash content compared with coal in other parts of the world, 35–50 per cent by weight (Cropper et al., 2012). The government has directed that only coal with less than 34 per cent ash content can be transported more than 1,000 km. Coal is therefore washed to improve its quality before transport.

Ash from power stations is stored in ponds and poses a hazard to surface water sources from runoff and to groundwater from percolation (Cropper et al., 2012). Discharges from power stations are required to be treated, and at some power plants, zero discharge to water is proposed (CEA, 2016).

6.3.3.3 Pumped Irrigation Water

The agriculture sector consumes about 20 per cent of India's electricity, but provides only 8 per cent of the revenue to utilities (IEA, 2015a). Subsidized electricity for farmers has a significant effect on the use of groundwater resources for irrigation. Low tariffs have resulted in over-exploitation of groundwater and shifted production to water-intensive crops (Badiani & Jessoe, n.d.). In several states, groundwater resources are in a critical condition, and the availability of water for future agricultural production is shrinking, with potential consequences for the livelihoods of millions of people.

6.3.4 Land Degradation

The environmental effects of energy production on land are felt mainly through coal mining and the disposal of waste from thermal power plants. Over 280,000 hectares were under coal mining in 2014, by one estimate. Of this, 27 per cent was designated forest land (Garg, n.d.). The use of forest land for coal mining is expected to increase, with consequent impacts on biodiversity, natural ecosystems and livelihoods dependent on forest resources. The loss of forest land also reduces carbon sequestration, increasing the overall impact of energy production on climate change.

For every tonne of coal mined, 1.92 cubic metres of overburden (waste) is removed. Put another way, 15 tonnes of waste is generated for each tonne of coal mined. Land is needed to store this waste during mining operations (Khanna, 2013).

The high ash content of Indian coal results in a large volume of waste from coal-fired power stations. In 2014/15, about 184 million tonnes of ash was generated (CEA, 2015). The land required for ash disposal is approximately 82,200 hectares a year, based on an estimated 0.6 hectare of land per MW installed capacity (Tiwari, Umesh, & Dewangan, 2016).[26]

Regulations (Ministry of Environment and Forests Notification of 3rd Nov 2009) require that all fly ash is reused, for example, in construction or brickmaking. However, almost two thirds of coal-fired power plants are not meeting this target (CEA, 2015). Ash ponds are often used to dispose of ash, which can lead to hazardous pollution of groundwater.

26 CEA (2016) estimates one acre (0.4 ha.) per MW installed capacity.

7.0 Conclusions

To meet the current and future energy demand, India needs to rapidly expand energy access and energy availability per capita. As part of its Nationally Determined Contribution (NDC) to the Paris Agreement, India has committed to providing 40 per cent non-fossil fuel electricity capacity (or 175 GW of renewables) by 2022 (GoI, 2015b). However, in order to meet the rising demand, the country has adopted an "all of the fuels (including fossil fuels)" approach towards this aim.

The GoI and state governments continue to subsidize fossil fuels significantly, to the detriment of low-cost and low-carbon options. Though the government has dramatically increased subsidies to renewables, this report finds that, in absolute terms, this support is much lower than that provided to coal, oil and gas collectively. With the aim to enhance transparency and dialogue on energy choices in India, the study focuses on the estimation of subsidies for electricity T&D, renewable energy, coal and oil and gas through a bottom-up approach.

For T&D,, the amount of subsidies provided by the central government has increased from INR 40,331 crore (USD 6.7 billion) in FY2014 to INR 64,896 crore (USD 9.9 billion) in FY2016. Further, in the State of Rajasthan, state-level subsidies have risen from INR 3,904 crore (USD 645 million) to INR 4,884 crore (USD 746 million) during the same period. The subsidies (both in all of India and Rajasthan) do not include the support provided by central and state governments under the UDAY program, intended to improve operational and financial performance of DISCOMs, which amounted to USD 14 billion and USD 11 billion in FY2016 and FY2017, respectively. Given the comprehensive key initiatives taken at both the central and state levels—such as setting up stringent targets for loss reduction for DISCOMS, support for the provision of low-cost financing and policies for the rationalization of electricity tariffs—it is expected that overall support to the electricity T&D sector will reduce as the result of phasing out several major subsidy schemes.

Similarly, in the renewables, a bottom-up approach suggests that total subsidies for the development of renewable energy projects has increased from INR 2607 crore (USD 431 million) to INR 9,311 crore (USD 1.4 billion) in the last three years. The installed capacity of renewable plants has also increased from 24 GW in FY2012 to 57 GW in FY2017. Further, in the State of Tamil Nadu, the government has increased subsidies from INR 94 crore (USD 16 million) in FY2014 to INR 287 crore (USD 44 million) in FY2016. Given the government's ambitious plans to increase renewable energy capacity to 175 GW by 2022, and keeping in view the need for additional investments for large-scale grid integration of such intermittent power, subsidies in the renewable energy sector are expected to increase in the short term.

Government support for coal is estimated to have remained around INR 15,000 crore (USD 2.5 billion) each year in the last three years. However, due to comprehensive measures put in place by the government, which includes the introduction of a GST regime, transparency in auctioning of coal linkages and increasing private sector participation in the sector, these subsidies are expected to fall in the future.

For oil and gas, the total estimated oil and gas subsidies have decreased from 157,678 crore (USD 26 billion) in FY2014 to INR 44,654 crore (USD 6.8 billion) in FY2016. For FY2018, the estimated subsidy stands at INR 30,972 crore (USD 4.6 billion), which is more than a 50 per cent reduction over the subsidy figure of FY2015. The lion's share of the savings over recent years are due to reforms to the diesel subsidy and falling world crude prices.

Energy subsidies are a cost to the central and state governments: directly, in the case of fiscal transfers, or indirectly, in the case of policies such as tax exemptions, credit guarantees or the provision of government goods and services at below-market costs. But energy subsidies have wide ramifications beyond government budgets, including on the markets, society and the environment.

- **Economic impacts**. Consumer subsidies artificially reduce the cost of energy to consumers, thus inflating demand, while producer subsidies reduce the costs of energy production, thus driving supply. Subsidies reduce the efficiency of resource allocation in the economy, and distort the playing field for different energy types. Whenever investment decisions rely on such subsidies, however, their removal can lead to a significant risk of stranded assets.
- **Social welfare impacts.** In India, it is estimated that more than two thirds of electricity subsidy payments benefit households above the poverty line. The majority of people living BPL rely on biomass (e.g., wood, dung), and hence receive little or no benefit from these subsidies. Given that overall almost two thirds of Indian households rely on traditional fuels for cooking and electricity, there is a burden on women and girls to collect fuel.
- **Impacts on energy access.** Subsidies to provide access to modern electricity are underway in India. The GoI, through schemes, like DDUGJY and the National Mission on Clean Cooking, aims to achieve universal access to electricity and clean cooking by 2022. The subsidy on gas is, however, being removed, with negative implications for affordability for low-income households.
- **Health and environmental impacts.** In India, energy production and consumption is a major cause of air pollution, particularly emissions from transport, coal-fired power plants and traditional cookstoves. Overall, air pollution is among the largest drivers of premature death, causing respiratory illnesses and cardiovascular diseases. The associated health costs are estimated at 3 per cent of India's GDP. One estimate has India accounting for half of all global deaths due to ambient air pollution (1.8 million deaths in India in 2015) (Landrigan et al., 2017). Recent estimates find that reforms to fossil fuel subsidies and fuel taxation could help India to prevent 65 per cent of the premature deaths caused by air pollution (Health and Environment Alliance, 2017). In particular, India's many LPG subsidies seek to expand access to clean cooking with positive impacts on health, while kerosene subsidies still lead to more indoor pollution and slow down the proliferation of healthier solar energy. Further, any increase in fossil fuel consumption and production due to subsidies leads to greater negative environmental impacts such as greenhouse gas emissions driving climate change, water pollution, and soil contamination and subsidence.

Recommendations

To inform their decisions, policy-makers and other stakeholders in India need a coherent and clear presentation of information on energy subsidies that highlights their costs and impacts, including potential distortion of the playing field for different energy types. This inventory makes the first attempt to bring together such information not just on fossil fuel subsidies, but also on subsidies to renewables as a cleaner and increasingly cheaper alternative. However, the inventory has revealed significant gaps in subsidy reporting. Many of the identified subsidies could not be quantified due to data limitations.

Based on the accomplished analysis, there are three recommendations that stand out:

1) The GoI can benefit from improved energy subsidy reporting by launching an inter-agency process of consultations and information sharing.
2) There is need for a comprehensive evaluation of the efficiency and impacts of different energy subsidies against their stated policy objectives. At present, fossil fuel subsidies may act as a barrier to the development of renewable energy—an impact that, in its turn, the government attempts to overcome with renewable energy subsidies. Further, some energy subsidies introduced to protect the poorest maybe not be delivering against this objective due to insufficient targeting. Energy subsidies also have intended and unintended impacts on the health of Indians, their energy access, and the environment and greenhouse gas emissions. Evaluation and rationalization of energy subsidies in India can help better allocate government support to those who are in need of it the most.

3) China and Indonesia, India's largest peers in Asia and fellow members of the G20, have both opted for self-reports and peer reviews of fossil fuel subsidies as a first step and practical tool to "phase out inefficient fossil fuel subsidies that encourage wasteful consumption, while providing targeted support for the poorest" according to the G20 Leaders' Statement (G20, 2009). Many other members of the G20 and Asia-Pacific Economic Cooperation have also resorted to peer reviews of fossil fuel subsidies, and many countries are expected to voluntarily report fossil fuel subsidies under the UN Sustainable Development Goals (SDGs). Volunteering for a self-report, a peer-review or an SDG reporting on fossil fuel subsidies can enable India to address its domestic policy-making needs with the help of international best practices.

India has accomplished significant improvements in energy access and development of cleaner energy in the past years. Government support at the central and state levels has played a crucial role in this progress—it is a powerful tool that should be used with care and prudence.

References

Anand, R., Coady, D., Mohommad, A., Thakoor, V., & Walsh J. (2013). *The fiscal and welfare impacts of reforming fuel subsidies in India*. IMF Working Paper WP/13/128. Washington: International Monetary Fund.

Arze del Granado, J., Coady, D., & Gillingham, R. (2010). The unequal benefits of fuel subsidies: A review of evidence from developing countries. *World Development, 40*(11), 2234–2248.

Asian Development Bank. (2016). *Fossil fuel subsidies in Asia: Trends, impacts, and reforms*. Integrative Report. Manila: ADB.

Badiani, R. & Jessoe, K. (n.d.). The impact of electricity subsidies on groundwater extraction and agricultural production. Retrieved from http://economics.ucdavis.edu/events/papers/Jessoe51.pdf

Bank Bazaar. (2017). Electricity duty: Tax and duty on electricity bills In India. Retrieved from https://www.bankbazaar.com/tax/electricity-duty.html

Beattie, A. (2015). Getting rid of fuel subsidies: "Beyond BRICS"'. Financial Times. Retrieved from https://www.ft.com/content/5cce9127-0e1e-32c9-8f12-d2d2ed182b90

Bhimani, C. (2013, January 12). *Oil and gas industry: Corporate tax issues*. Retrieved from https://www.wirc-icai.org/material/WIRC-Corporate-tax.pdf

BP. (2016). *Statistical review of world energy 2016*. Retrieved from https://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2016/bp-statistical-review-of-world-energy-2016-full-report.pdf

BP. (2017a, July 3). Country and regional insights: India. Retrieved from http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/country-and-regional-insights/india.html

BP. (2017b). *Statistical review of world energy 2017*. Retrieved from https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html

Bombay Chartered Accountant Society. (2015). *Taxation of non-residents*. Retrieved from https://www.bcasonline.org/Referencer2015-16/Taxation/Income%20Tax/taxation_of_non_residents.htmlBridge to India. (2016). India solar handbook 2016. Retrieved from http://www.bridgetoindia.com/wp-content/uploads/2016/05/BRIDGE-TO-INDIA_India-Solar-Handbook-2016.pdf

Bridge to India (2017). SAUBHAGYA scheme, old wine in new bottle. Retrieved from http://www.bridgetoindia.com/saubhagya-scheme-old-wine-new-bottle/

Bureau of Energy Efficiency. (2017). Home. Retrieved from https://www.beeindia.gov.in/

Business Standard. (2014). Tax benefit scheme restored for wind energy sector. Retrieved from http://www.business-standard.com/article/economy-policy/tax-benefit-scheme-restored-for-wind-energy-sector-114072501091_1.html

Business Standard. (2015). Govt to examine prospecs of coal regulator. Retrieved from http://www.business-standard.com/article/economy-policy/govt-will-deliver-on-promises-even-if-bills-not-passed-in-parliament-piyush-goyal-115121900525_1.html

Business Standard. (2016). Budget 2016: Wind sector to take a hit as accelorated depreciation tax benefit capped at 40%. Retrieved from http://www.business-standard.com/budget/article/budget-2016-wind-sector-to-take-a-hit-as-accelerated-depreciation-tax-benefit-capped-at-40-116022900591_1.html

Central Bureau of Excise and Customs (CBEC). (n.d.a). General Exemption No. 165, Exemption and effective rate of basic and additional duty for specified goods of Chs. 1to 99. Retrieved from http://www.cbec.gov.in/resources//htdocs-cbec/customs/cs-tariff2015-16/csgen-exmptn165.pdf;jsessionid=72D4FC22015D0D537E2DE0B20B7A9BDF

Central Bureau of Excise and Customs. (n.d.b). Integrated Goods and Service Tax. Retrieved from http://www.cbec.gov.in/resources//htdocs-cbec/gst/eflier-IGST-23062017.pdf;jsessionid=32295F4BDEA84EB90AD291B976EB9FD1

Central Bureau of Excise and Customs. (2012). *CBEC Notification: Notification 12/2012*. Retrieved from http://www.cbec.gov.in/resources//htdocs-cbec/customs/cs-act/notifications/notfns-2012/cs-tarr2012/cs12-2012.pdf

Central Bureau of Excise and Customs. (2017a). Tariff 2016–17. Retrieved from from http://www.cbec.gov.in/htdocs-cbec/customs/cst1617-300616/cst1617-3006-idx

Central Bureau of Excise and Customs. (2017b). *Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes*. Retrieved from http://www.cbec.gov.in/resources/htdocs-cbec/excise/cxt-2015-16/chap27.pdf

Central Electricity Authority. (CEA). (2015). CEA report on fly ash generation at coal/lignite based thermal power stations and its utilization in the country for the year 2014-15. Retrieved from http://www.cea.nic.in/reports/others/thermal/tcd/flyash_final_1415.pdf

Central Electricity Authority. (2016). *Draft National Electricity Plan*. Retrieved from http://www.cea.nic.in/reports/committee/nep/nep_dec.pdf

Central Electricity Authority. (2017a). *Energy Generation, Programme, and Plant Load Factor: An overview*. New Delhi: Central Electricity Authority.

Central Electricity Authority. (2017b). *Energywise: Performance status all india – Regionwise*. Retrieved from http://www.cea.nic.in/reports/monthly/generation/2015/March/actual/opm_02.pdf

Central Mine Planning & Design Institute Ltd. (2008). *Master Plan for dealing with fire, subsidence and rehabilitation in the Leasehold of BCCL*. Retrieved from http://www.bcclweb.in/PDFs/MPLANBCCL-2008.pdf

Central Mine Planning & Design Institute Ltd. (2016). *Annual Report*.

Central Pollution Control Board (n.d.). *Thermal Power Plants. Pollution Control Implementation Division*. Retrieved from http://www.cpcb.nic.in/divisionsofheadoffice/pci2/ThermalpowerPlants.pdf

Centre for Budget and Governance Accountability. (2017). Budget overview. Retrieved from http://unionbudget2017.cbgaindia.org/budget_overview/index.html

Centre for Science and Environment. (2017). *Using the National Clean Energy Fund to clean power plant*. New Delhi.

Chafe, Z. A., Brauer, M., Klimont, Z., Van Dingenen, R., Mehta, S.…Smith, K. R. (2014). Household cooking with solid fuels contributes to ambient PM2.5 air pollution and the burden of disease. *Environmental Health Perspectives, 122*(12).

Chhattisgarh Commercial Tax Department. (2017). Commodity VAT tax rate search. Retrieved from http://cgweb.nic.in/AnnualReturn/OtherServices/cmdtSearch.jsp?commodity=Coal&validity=YR14_15&button=Search

Clements, B., Coady, D., Fabrizio, S. Gupta, S. , Coleridge, A.,… Sdralevich, C. A. (2013). *Energy subsidy reform: Lessons and implications*. Washington, D.C.: International Monetary Fund.

Climate Action Tracker. (2016). India. Retrieved from http://climateactiontracker.org/countries/india/2016.html

Coady, D., Parry, I., Sears, L., & Shang, B. (2015). *How large are global energy subsidies?* IMF Working paper WP/15/105. Retrieved from https://www.imf.org/external/pubs/ft/wp/2015/wp15105.pdf

Coal Consumers' Association of India. (2012). New pricing of non coking coal based on GCV with effect from 00:00 hour of 1.1.2002. Retrieved from http://www.ccai.co.in/circular-policies/cil/05.pdf

Coal Controller's Organisation Kolkata, Ministry of Coal. (2016). *Provisional coal statistics, 2015–16*. Retrieved from http://www.coalcontroller.gov.in/writereaddata/files/Provisional%20Coal%20Statistics%202015-16.pdf

Coal India Limited. (CIL). (2014). *Annual report & accounts 2013-14*. Retrieved from https://www.coalindia.in/en-us/performance/physical.aspx

Coal India Limited. (2015). *Annual report & accounts 2014-15*. Retrieved fromhttps://www.coalindia.in/en-us/performance/physical.aspx

Coal India Limited .(2016a). *Annual report & accounts 2015-16*. Retrieved from https://www.coalindia.in/en-us/performance/physical.aspx

Coal India Limited. (2016b). Coal India Limited Corporate Presentation. Delhi.

Coal India Limited. (2016c). *Price notification*. Retrieved from https://www.coalindia.in/DesktopModules/DocumentList/documents/Revised_Prices_in_respect_of_non-coking_coal_effective_from_30.05.2016_30052016.pdf

Coal India Limited. (2017a). Coal reserves and resources of CIL. Retrieved from https://www.coalindia.in/en-us/performance/physical.aspx

Coal India Limited. (2017b). History. Retrieved from https://www.coalindia.in/en-us/company/history.aspx

Coal Mines Provident Fund Organisation (CMPFO). (2017a). Coal Mines Pension Scheme. Retrieved from http://www.cmpfo.gov.in/cmps.php

Coal Mines Provident Fund Organisation. (2017b). Coal Mines Provident Fund Scheme. Retrieved from http://www.cmpfo.gov.in/cmpf_scheme/cmpf_scheme.php

Coal Mines Provident Fund Organisation. (2017c). Coal Mines Provident Fund and Miscellaneous Provisions Act 1948. Retrieved from http://www.cmpfo.gov.in/cmpf_act.php

Comptroller and Auditor General of India. (2012a). *Allocation of coal blocks and augmentation of coal production*. New Delhi: Ministry of Coal.

Comptroller and Auditor General of India. (2012b). Performance audit of allocation of coal blocks and augmentation of coal production, Ministry of Coal. Retrieved from http://www.cag.gov.in/content/report-no-7-2012-13-%E2%80%93-performance-audit-allocation-coal-blocks-and-augmentation-coal

Cropper, M., Gamkhar, S., Malik, K., Limonov, A. & Partridge, I. (2012). *The health effects of coal electricity generation in India*. Discussion Paper. Washington, D.C.: Resources for the Future.

Cusick, D. (2015). Fossil fuel subsidies cost $5 trillion annually and worsen pollution. Scientific American. Retrieved from https://www.scientificamerican.com/article/fossil-fuel-subsidies-cost-5-trillion-annually-and-worsen-pollution/

Deloitte. (2014). *Oil and gas taxation in India, Deloitte tax and investment guide*. London: Deloitte.

Department of Agriculture. (2016). *Notes on demands for grants, 2016–2017*. Retrieved from http://indiabudget.nic.in/ub2016-17/eb/sbe1.pdf

Department of Agriculture. (2017). *Notes on demands for grants, 2017–2018*. Retrieved from http://www.indiabudget.nic.in/ub2017-18/eb/sbe1.pdf

Directorate General of Commercial Intelligence and Statistics. (2017). About DGCI&S. Retrieved from http://www.dgciskol.nic.in/index.asp

Directorate General of Hydrocarbons. (2017, March 6). *India's New Hydrocarbon Exploration and Licensing Policy: A prelude*. Retrieved from http://dghindia.gov.in/assets/downloads/58be45eab40a4Presentation_on_HELP_-_DG,_DGH_India_06.03_.17_.pdf

Directorate General of Mines and Safety. (2015). Development and Regulation Act, 1957. Retrieved from http://www.dgms.net/MMDR%20Act1957%20(as%20amended%20upto%2027.03.2015).pdf

Ernst & Young. (2016a). *Global oil and tax guide*. Ernst & Young.

Ernst & Young. (2016b). *India and BRICS: Oil and gas sector overview and areas of cooperation*. Petrotech 2016, 12th International Oil and Gas Conference and Exhibition, New Delhi. Retrieved from http://petrotech.in/documents/Knowledge%20Papers/Petrotech%20-%20India%20and%20BRICS.pdf

Economic Times. (2017a, March). Govt collect Rs. 21,129 crore as Clean Environment Cess in Apr-Jan. Retrieved from http://economictimes.indiatimes.com/industry/banking/finance/govt-collects-rs-21129-crore-as-clean-environment-cess-in-apr-jan/articleshow/57731975.cms

Economic Times. (2017b, August 3). We have targeted subsidy only for those who need kerosene: Dharmendra Pradhan, Oil Minister. Retrieved from http://economictimes.indiatimes.com/opinion/interviews/we-have-targeted-subsidy-only-for-those-who-need-kerosene-dharmendra-pradhan-oil-minister/articleshow/59899494.cms

Ellis, J. (2009). *The effects of fossil-fuel subsidy reform: A review of modelling and empirical studies*. Geneva/Winnipeg: GSI/IISD. Retrieved from http://www.iisd.org/gsi/sites/default/files/effects_ffs.pdf

Energy Sector Management Assistance Program (ESMAP). (2017). *The Global Tracking Framework 2017*. Washington, D.C.: World Bank.

Eximguru. (2017). *Exim Guru*. Retrieved from http://www.eximguru.com/excise-duty/default.aspx

EXIMKEY. (2012). *Notification*. Retrieved from http://www.eximkey.com/notification.php?intId=1386&Path=/Sec/Excise/nc/NotTariffNonTariff/NotificationsIssuedInTheYear2012/Tariff/NTF__NO__12-2012-CE_DT__17-03-2012.htm

G20 (2009). *G20 Leaders Statement: The Pittsburgh Summit*. Retrieved from http://www.g20.utoronto.ca/2009/2009communique0925.html

Ganesan, K., Choudhury, P., Palakshappa, R., Jain, R. & Raje, S. (2014). *Assessing green industrial policy: The India experience*. Retrieved from http://www.iisd.org/gsi/sites/default/files/rens_gip_india.pdf

Garg, R. K. (n.d.). *Impact of coal mining on climate change & different forest types in India*. Retrieved from http://www.teriuniversity.ac.in/mct/pdf/new/environment/IGNFA.pdf

Garg, V. & Bossong, K. (2015). *G20 subsidies to oil gas and coal production: India*. Retrieved from https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9959.pdf

Gargava, P. & Rajagopalan, V. (2015, June). Source appointment studies in six Indian cities—drawing broad references for urban PM10 reductions. *Air Quality, Atmosphere & Health, 9* (5), 471–481. Retrieved from https://www.researchgate.net/publication/280598202_Source_apportionment_studies_in_six_Indian_cities-drawing_broad_inferences_for_urban_PM10_reductions

Gerasimchuk, E., Bassi, A., Dominguez Ordonez, C., Doukas, A., Merrill, L., & Whitley, S. (2017). *Zombie energy: Climate benefits of ending subsidies to fossil fuel production*. Retrieved from http://www.iisd.org/sites/default/files/publications/zombie-energy-climate-benefits-ending-subsidies-fossil-fuel-production.pdf

Gerasimchuk, I., Wooders, P., Merrill, L., Sanchez, L. & Liston, L. (2017). *A guidebook to reviews of fossil fuels subsidies: From self-reports to peer learning*. Retrieved from http://www.iisd.org/library/guidebook-reviews-fossil-fuel-subsidies

Global Subsidies Initiative. (2010). Defining fossil-fuel subsidies for the G-20: Which approach is best? Retrieved from http://www.iisd.org/library/defining-fossil-fuel-subsidies-g-20-which-approach-best

Global Subsidies Initiative. (2016, September). *Briefing Note: India Energy Subsidy*. Winnipeg, MB: IISD.

Government of Chattisgarh. (2017). Rate of tax. Commercial Tax Department. Retrieved from http://comtax.cg.nic.in/pages/tax_rates.htm

Government of India (GoI). (n.d.). Seventh Schedule. *Constitution of India*. Retrieved from http://lawmin.nic.in/olwing/coi/coi-english/Const.Pock%202Pg.Rom8Fsss(35).pdf

Government of India. (1934). Petroleum Act. Retrieved from http://aptel.gov.in/pdf/PETROLEUM%20ACT.pdf

Government of India. (1948). The Oil Fields (Regulation and Development) Act 1948. Retrieved from http://ppac.org.in/WriteReadData/userfiles/file/THEOILFIELDS(REGULATIONANDDEVELOPMENT)ACT1948.pdf

Government of India. (1957). The Coal Bearing Areas Acquisition and Development Act, 1957. Retrieved from http://www.coalcontroller.gov.in/writereaddata/files/ActsRule/CBA_Act1957.pdf

Government of India. (1959). The Petroleum and Natural Gas Rules, 1959. Retrieved from http://petroleum.nic.in/sites/default/files/circulars-notifications65.pdf

Government of India. (1962). The Petroleum and Mineral Pipelines (Acquisition of Right of User Inland) Act. Retrieved from https://www.ndrdgh.gov.in/NDR/pdf/Petroleum-Pipeline-Act-1962.pdf

Government of India. (1974). Oil Industry Development Board, Ministry of Petroleum and Natural Gas, Government of India. Retrieved from http://www.oidb.gov.in/

Government of India. (2006). Petroleum and Natural Gas Regulatory Board Act, 2005. Retrieved from http://lawmin.nic.in/ld/P-ACT/2006/The%20Petroleum%20and%20Natural%20Gas%20Regulatory%20Board%20Act,%202006.pdf

Government of India. (2008). *Employee's Pension Scheme*. Retrieved from http://www.epfindia.com/site_docs/PDFs/Downloads_PDFs/EPS95_update102008.pdf

Government of India. (2012a, March 17). Notification No. 12 /2012-Central Excise. Retrieved from https://www.seair.co.in/dData/82/41011.pdf

Government of India. (2012b). Office memorandum for scheme for financial restructuring of state distribution companies. New Delhi.

Government of India. (2014, July 10). Department of Revenue, Tax Research Unit, Ministry of Finance, Government of India. D.O.F.No.334/15/2014-TRU. Retrieved from http://indiabudget.nic.in/ub2014-15/cen/JSTRUI10072014DO.pdf

Government of India. (2015a). New Exploration and Licensing Policy. Retrieved from http://petroleum.nic.in/sites/default/files/2exp.policy.NELP2015.pdf

Government of India. (2015b) *India's Intended Nationally Determined Contribution*. Retrieved from http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf.

Government of India. (2016a). Hydrocarbon Exploration and Licensing Policy. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=137638

Government of India. (2016b). *India's Intended Nationally Determined Contribution: Working towards climate justice*. Retrieved from http://www4.unfccc.int/ndcregistry/Pages/Party.aspx?party=IND

Government of India. (2016c, January 28). National Tariff Policy 2016. REGD. NO. D.L.-33004/99. Retrieved from http://www.kseboa.org/downloads/Government%20Orders/tariff_policy-resolution_dated_28012016.pdf

Government of India. (2016d, September 8). *The Constitution (One Hundred and First Amendment)*. Retrieved from http://lawmin.nic.in/ld/The%20Constitution%20(One%20Hundred%20and%20First%20Amendment)%20Act,%202016.pdf

Government of India. (2017a). *India New Hydrocarbon Exploration and Licensing Policy: A prelude*. Retrieved from http://dghindia.gov.in/assets/downloads/58be45eab40a4Presentation_on_HELP_-_DG,_DGH_India_06.03_.17_.pdf

Government of India. (2017b). *Key features of Budget 2017-18*. Retrieved from http://indiabudget.nic.in/ub2017-18/bh/bh1.pdf

Government of Tamil Nadu. (2014). *Prohibition and Excise 2014-15*. Policy Note, Energy Department, Minister for Electricity. Retrieved from http://cms.tn.gov.in/sites/default/files/documents/energy_e_pn_2014_15_1.pdf

Government of Tamil Nadu. (2015). *Prohibition and Excise 2015-16*. Policy Note, Energy Department, Ministry of Electricity.

Government of Tamil Nadu. (2016). *Prohibition and Excise 2016-17*. Policy Note, Energy Department, Minister for Electricity. Retrieved from http://cms.tn.gov.in/sites/default/files/documents/energy_e_pn_2016_17.pdf

Granoff, I., Hogarth, J. R., Wykes, S., & Doig, A. (2016). *Beyond coal: Scaling up clean energy to fight global poverty*. London: ODI. Retrieved from https://www.odi.org/sites/odi.org.uk/files/resource-documents/10964.pdf

Health and Environment Alliance. (2017). *Hidden price tags: How ending fossil fuel subsidies would benefit our health*. Retrieved from http://env-health.org/IMG/pdf/healthandenvironmentalliance_hidden_price_tags_report.pdf

Income Tax India. (1998). Finance (No. 2) Act, 1998. Retrieved from http://incometaxindia.gov.in/Communications/Circular/Others/910110000000001042/it98amdt.htm

IncomeTaxManagement.com. (n.d.). Tax Holiday – Deduction [Section-80IA]: (Deductions in Respect of Proftos and gains from Insutrial Undertakings or Enterprises Engages in Infrastructure Development).) Retrieved from http://incometaxmanagement.com/Pages/Taxation-System/Tax-Holiday-Deduction-1.html

Independent Energy Producers Association. (n.d.). *Wheeling*. Retrieved from http://www.iepa.com/wheeling.asp

India Brand Equity Foundation. (2017). *Oil and gas*. New Delhi: India Brand Equity Foundation. Retrieved from https://www.ibef.org/download/Oil-and-Gas-June-2017.pdf

India Budget. (2011). *Central excise*. Retrieved from http://indiabudget.nic.in/ub2011-12/cen/cexexplanatory.pdf

Indian Renewable Energy Development Agency (IREDA). (2013). *Operational guidelines for implementation of ("Extension of the scheme for continuation of Generation Based Incentive for Grid Connected Wind Power Projects" dt. 04.09.2013) by IREDA*. Retrieved from http://www.ireda.gov.in/writereaddata/OPERATIONAL_GUIDELINES%20for%20Wind%20GBI%20Extension%20Scheme%20(2012-2017)(1).pdf

Indian Renewable Energy Agency. (2016). *IREDA's Financing Norms and Schemes*. Retrieved from http://www.ireda.gov.in/writereaddata/FNS-June-2016(1)(1).pdf

Indian Renewable Energy Development Agency. (2017). Wind GBI/AD. Retrieved from http://www.ireda.gov.in/forms/contentpage.aspx?lid=744

Institute for Health Metrics and Evaluation. (n.d.). India. Retrieved from http://www.healthdata.org/india

International Energy Agency (IEA). (n.d.a). Energy subsidies. Retrieved from https://www.iea.org/statistics/resources/energysubsidies/

International Energy Agency. (n.d.b). Statistics. Retrieved from https://www.iea.org/statistics/

International Energy Agency. (2012). *Understanding energy challenges in India*. Retrieved from https://www.iea.org/publications/freepublications/publication/India_study_FINAL_WEB.pdf

International Energy Agency. (2014). IEA statistics. Retrieved from http://www.iea.org/statistics/statisticssearch/report/?product=Indicators&country=INDIA

International Energy Agency. (2015a). *India energy outlook*. Retrieved from https://www.iea.org/publications/freepublications/publication/IndiaEnergyOutlook_WEO2015.pdf

International Energy Agency. (2015b). *World energy outlook 2015: Fossil Fuel Subsidies Database*. Retrieved from http://www.worldenergyoutlook.org/resources/energysubsidies/fossilfuelsubsidydatabase/

International Energy Agency. (2016). *World energy outlook 2016*. Retrieved from http://www.worldenergyoutlook.org/resources/energydevelopment/energyaccessdatabase/

International Energy Agency. (2017). Energy subsidies. Retrieved from https://www.iea.org/statistics/resources/energysubsidies/

International Monetary Fund (IMF). (n.d.). IMF primary commodities prices. Retrieved from http://www.imf.org/external/np/res/commod/index.aspx

International Monetary Fund. (2015a). Country-level energy subsidy estimates – IMF. Retrieved from www.imf.org/external/np/fad/subsidies/data/codata.xlsx

International Monetary Fund. (2015b). IMF Survey: Counting the cost of energy subsidies. Retrieved from http://www.imf.org/en/News/Articles/2015/09/28/04/53/sonew070215a

International Monetary Fund. (2017). *World economic outlook*. Washington, D.C.: International Monetary Fund.

International Renewable Energy Agency (IRENA). (2017). *REMAP: Renewable energy prospects for India*. Retrieved from http://www.irena.org/DocumentDownloads/Publications/IRENA_REmap_India_paper_2017.pdf

Jain, A. & Ramji, A. (2016, April). *Reforming kerosene subsidies in India: Towards better alternatives*. Retrieved from https://www.iisd.org/sites/default/files/publications/reforming-kerosene-subsidies-india.pdf

Joshi, M. (2016, June 4). Half of world's 20 most polluted cities in India, Delhi in 11th position. Retrieved from http://www.hindustantimes.com/delhi-news/four-out-of-top-five-polluted-cities-are-in-india-delhi-not-among-them/story-Gn2htcLbESB3BpeYJ4mY8K.html

Khanna, A. A. (2013). *Governance in coal mining: Issues and challenges*. The Energy and Resources Institute.

Kirby, A. (2017, July 31). Fossil fuel subsidies are dwarfed by health cost. Retrieved from https://climatenewsnetwork.net/22809-2/

Landrigan, P. J., Fuller, R., Acosta, N. J. R., Adeyi, O. Arnold, R. …Haines, A. (2017). The *Lancet* Commission on pollution and health. Retrieved from http://dx.doi.org/10.1016/S0140-6736(17)32345-0

Lelieveld J., Evans, J. S., Fnais, M., Giannadaki, D. & Pozzer, A. (2015, September). The contribution of outdoor air pollution sources to premature mortality on a global scale. *Nature, 252*, 367–371.

Lex Warrior. (2012, August 7). Understanding the tax regime governming the Indian oil industry. Retrieved from http://lex-warrier.in/2012/08/understanding-the-tax-regime-governing-the-indian-oil-industry/

Lok Sabha. (2017). *Lok Sabha*. Retrieved from http://www.loksabha.nic.in/Members/QResult16.aspx?qref=51688

Lok Sabha Secretariat. (2017, March). *Demand for grants 2017–18, Eighteenth Report*. Retrieved from http://164.100.47.193/lsscommittee/Petroleum%20&%20Natural%20Gas/16_Petroleum_And_Natural_Gas_18.pdf

Luo, T. (2017, July 26). Droughts and blackouts: How water shortages cost India enough energy to power Sri Lanka. Retrieved from http://www.wri.org/blog/2017/07/droughts-and-blackouts-how-water-shortages-cost-india-enough-energy-power-sri-lanka

Malik, A.. (2017). SC raps govt panels' method of allocating coal mining rights. Retrieved from http://www.livemint.com/Politics/tx0vdjVQ5LefPq8vOR716O/SC-raps-govt-panels-method-of-allocating-coal-mining-rights.html

Mayer, K., Banerjee, S. & Trimble, C. (2015). *Elite capture: Residential tariff subsidies in India*. Washington, D.C.: The World Bank.

Merrill, L., Harris, M., Casier, L. & Bassi, A. M. (2014). *Fossil-fuel subsidies and climate change: Options for policy-makers within their Intended Nationally Determined Contributions*. Geneva/Winnipeg: GSI/IISD.

Ministry of Coal (MoC). (2007). *Annual report*. Retrieved from http://www.coal.nic.in/annrep0607.pdf

Ministry of Coal. (2013). *Demand No. 10. Demand for grants*. Retrieved from https://coal.nic.in/sites/upload_files/coal/files/coalupload/dg1314.pdf

Ministry of Coal. (2014a). *Demand No. 10. Demand for grants*. Retrieved from https://coal.nic.in/sites/upload_files/coal/files/coalupload/dg1415.pdf

Ministry of Coal. (2014b). *Outcome Budget 2013–14*. Retrieved from https://coal.nic.in/content/outcome-budget-2013-14

Ministry of Coal. (2015a). *Demand No. 10. Demand for grants*. Retrieved from https://coal.nic.in/sites/upload_files/coal/files/coalupload/dg1516.pdf

Ministry of Coal. (2015b). *Outcome Budget 2014–15*. Retrieved from https://coal.nic.in/content/outcome-budget-2014-15

Ministry of Coal. (2015c). *Seventh Report, Standing Committee on Coal And Steel (2014–2015). Demand for grants 2015–2016*. Retrieved from http://164.100.47.193/lsscommittee/Coal%20&%20Steel/16_Coal_And_Steel_7.pdf

Ministry of Coal. (2016a). *Demand No. 10. Demand for grants*. Retrieved from https://coal.nic.in/sites/upload_files/coal/files/coalupload/dg1617.pdf

Ministry of Coal. (2016b). *Outcome Budget 2015–2016*. Retrieved from https://coal.nic.in/content/outcome-budget-2015-16

Ministry of Coal. (2016c). *Provisional coal statistics*. Retrieved from http://www.coalcontroller.gov.in/writereaddata/files/Provisional%20Coal%20Statistics%202015-16.pdf

Ministry of Coal. (2017a). Auctioning of coal blocks. Retrieved from http://pib.nic.in/newsite/printrelease.aspx?relid=160021

Ministry of Coal. (2017ba). *Detailed demand for grants 2017–18*. Retrieved from https://coal.nic.in/sites/upload_files/coal/files/coalupload/dg1718.pdf

Ministry of Coal. (2017cb). *Outcome Budget 2016–2017*. Retrieved from https://coal.nic.in/content/outcome-budget-2016-17

Ministry of Coal. (2017dc). *Renewable energy for rural applications*. Retrieved from http://coal.nic.in/sites/upload_files/coal/files/curentnotices/220517.pdf

Ministry of Commerce & Industry. (2017). Department of Commerce. Retrieved from http://commerce.gov.in/EIDB.aspx

Ministry of Environment, Forest and Climate Change, (2014). Notification G.S.R. 02(E), dated January 02, 2014 in respect of Use of washed, blended or beneficiated coal in Thermal Power Plants –reg. Retrieved from http://cpcb.nic.in/upload/Latest/Latest_88_Notification_0422014.pdf

Ministry of Environment, Forest and Climate Change. (2015). *India: First biennial update report to the United Nations Framework Convention on Climate Change*. Government of India.

Ministry of Finance (MoF). (2005). Central Board of Excise and Customs. Retrieved from http://www.cbec.gov.in/resources//htdocs-cbec/cx-manual.pdf

Ministry of Finance. (2006). *Budget 2006-2007. Speech of P Chidambaram*. Retrieved from http://indiabudget.nic.in/ub2006-07/bs/speecha.htm

Ministry of Finance. (2011). *Notification No. 1/2011-Central Excise*. Retrieved from http://indiabudget.nic.in/ub2011-12/cen/ce0111.pdf

Ministry of Finance. (2012). *Explanatory notes, Customs*. Retrieved from http://indiabudget.nic.in/ub2012-13/cen/cusexplanatory.pdf

Ministry of Finance. (2016a, June 30). *Central Board of Exice and Customs*. Retrieved from http://www.cbec.gov.in/htdocs-cbec/excise/cxt-2016-17-new/cxt-1617-june16-idx

Ministry of Finance. (2016b). *Expenditure Budget Vol. 1, 2016-2017*. New Delhi: Ministry of Finance. Retrieved from http://indiabudget.nic.in/ub2016-17/eb/vol1.pdf

Ministry of Finance. (2017a). *Economic Survey 2016-17*. Retrieved from http://indiabudget.nic.in/es2016-17/echapter.pdf

Ministry of Finance. (2017b). *Loan ledger*. Retrieved from http://aaad.gov.in/LoanLedg.HTM

Ministry of Finance. (2017c). *Ministry of Finance Notification no. 5/2017*. Retrieved from http://www.cbec.gov.in/resources/htdocs-cbec/customs/cs-act/notifications/notfns-2017/cs-tarr2017/cs05-2017.pdf

Ministry of Finance. (2017d). *Demand No. 72. Notes on demand for grants*. Retrieved from http://indiabudget.gov.in/ub2017-18/eb/sbe72.pdf

Ministry of Finance. (2017e, February 1). *Tax Research Unit, Department of Revenue, Ministry of Finance. D.O.F.No.334/7/2017-TRU*. Retrieved from http://indiabudget.nic.in/ub2017-18/cen/dojstru1.pdf

Ministry of Heavy Industries and Public Enterprises. (2013). *Vision 2022 document for Indian Electrical Equipment Industry*. Retrieved from http://ieema.org/wp-content/uploads/2015/05/LFE_Mission_Plan_2012_2022.pdf

Ministry of Law and Justice. (2013). Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013. Retrieved from http://indiacode.nic.in/acts-in-pdf/302013.pdf

Ministry of New and Renewable Energy (MNRE). (2010). *Policy guidelines of research, design, development, demonstration & manufacture of new & renewable energy*. Retrieved from http://www.mnre.gov.in/file-manager/rd-scheme/om-rnd18102010.pdf

Ministry of New and Renewable Energy. (2012). *Capital subsidy Scheme for providing basic lighting needs through solar charging stations (with Lanterns) to be implemented in 100 villages in each of 60 LWE affected districts by the respective State Renewable Energy Development Agencies*. Retrieved http://mnre.gov.in/file-manager/offgrid-solar-schemes/solar_charging_station_scheme_jnnsm.pdf

Ministry of New and Renewable Energy. (2013a). *Final Guidelines for Selection of 750 MW Grid Connected Solar Power Projects Under Batch-I, Phase-II of JNNSM*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/final-VGF_750MW_Guidelines_for-grid-solar-power-projects.pdf

Ministry of New and Renewable Energy. (2013b). *MNRE Guidelines F.No. 23/1/2012-SWES*. Retrieved from http://mnre.gov.in/file-manager/offgrid-wind-scheme/wind-hybrid-system.pdf

Ministry of New and Renewable Energy. (2014a). *Administrative Approval for Year 2014-15 and remaining period of 12th Plan. NO. 14(03)2014-SHP*. Retrieved from http://mnre.gov.in/file-manager/grid-small-hydro/SHP-Scheme.pdf

Ministry of New and Renewable Energy. (2014b). *Guidelines for continuation of "Biomass Gasifier Programme from 11th Plan to 12th Plan Period", F.No. 202/5/2012-BM*.

Ministry of New and Renewable Energy. (2014c). *Guidelines for implementation of wind resource assessment in uncovered/ new areas under NCEF scheme and subsequent development*. Retrieved from http://ireeed.gov.in/policyfiles/300-Guidelines_for_implementation_of_500_nos%20_of_Wind_Monitoring_Stations_at_100_m_level_under_NCEF_Scheme.pdf

Ministry of New and Renewable Energy. (2014d). *Implementation of National Biogas and Manure Management Programme (NBMmP) during 12th Five Year Plan*. Retrieved from http://mnre.gov.in/file-manager/dec-biogas/biogasscheme.pdf

Ministry of New and Renewable Energy. (2014e). *Installation of 10,000 nos. of solar photovoltaic water pumping systems for irrigation purpose implemented through National Bank for Agriculture and Rural Development (NABARD) throughout the country*. Retrieved from http://mnre.gov.in/file-manager/offgrid-solar-schemes/scheme-SPV-water-pumps-NABARD.pdf

Ministry of New and Renewable Energy. (2014f). *Jawaharlal Nehru National Solar Mission: Guidelines for off-grid and decentralized solar applications – Minimal technical requirements/standards*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/Off-Grid-&-Decentralized-Solar-Thermal-Application-Scheme.pdf

Ministry of New and Renewable Energy. (2014g). *Pilot-cum-Demonstration Projects for Development of Grid Connected Solar PV Power Plants on Canal Banks and canal Tops Scheme*. Retrieved from http://www.mnre.gov.in/file-manager/grid-solar/Administrative-Approval-reg-Pilot-cum-Demonstration-Project-for-Canal-Bank-Canal-Top-Solar-PV-Projects%20.pdf

Ministry of New and Renewable Energy. (2014h). *Promotion of Grid Interactive Biomass Power and Bagasse Cogeneration in Suagr Mills" during 12th Plan Period. NO. 13/10/2013-BM*. Retrieved from http://biomasspower.gov.in/document/centeral-policy/scheme-Biomass%20cogenertaion.pdf

Ministry of New and Renewable Energy. (2014i). *Scheme for Development of Solar Parks and Ultra Mega Solar Power Projects in the country commencing from 2014-15 and onwards (i.e. from the year 2014 – 15 to 2018 – 19)*. Retrieved from http://mnre.gov.in/file-manager/grid-solar/Scheme-for%20development-of-Solar-Park-&-Ultra-Mega-Solar-Power-Project-2014-2019.pdf

Ministry of New and Renewable Energy. (2015a). *Continuation of Biogas Power (off-grid) Programme for decentralized power generation applications and thermal applications during 2015-16 and the remaining period of 12th Five Year Plan – Administrative approval, F.No. 25-2/2013-BE*. Retrieved from http://mnre.gov.in/file-manager/offgrid-biogas/biogaspower-2015-16.pdf

Ministry of New and Renewable Energy. (2015b). *Guidelines for Implementation of scheme for setting up of 2000 MW Grid-Connected Solar PV Power Projects with Viability Gap Funding (VGF) under Batch-III of Phase-II of the JNNSM*. Retrieved from http://mnre.gov.in/file-manager/grid-solar/Scheme-2000MW-Grid-Connected-SPV-with-VGF-under-JNNSM.pdf

Ministry of New and Renewable Energy. (2015c). *Implementation of Scheme for setting up of 1000 MW of Grid-Connected Solar PV Power Projects by Central Public Sector Undertakings (CPSUs) and Government of India Organizations under various Central/State schemes/Self-use/ 3rd party sale/ Merchant sale with Viability Gap Funding under Bath V Phase IIcof JNNSM*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/Scheme-1000MW-grid-connected-SPV-batch_V-phase_II-JNNSM.pdf

Ministry of New and Renewable Energy. (2015d). National Biogas & Manure Management Programme. Retrieved from http://web.iitd.ac.in/~vkvijay/National%20Biogas%20and%20Manure%20Management%20%20Programme_Mr.%20G.%20L.%20Meena,%20MNRE.pdf

Ministry of New and Renewable Energy. (2015e). *Scheme for setting up over 300 MW of Grid-Connected & Off-grid Solar PV Power Projects by Defence Establishments under Ministry of Defence and Para Military Forces (under MHA) with Viability Gap Funding (VGF) under Phase-II/III of JNNSM during 2014-15*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/administrative-approval-on-Defence-300MW.pdf

Ministry of New and Renewable Energy. (2016a). *Expenditure as on 31.03.2016*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/Expenditure-and-Outstanding-UCs_2015_16.pdf

Ministry of New and Renewable Energy. (2016b). *Implementation of scheme for setting up of over 5000 MW Grid-Connected Solar PV Power Projects with Viability Gap Funding under Batch-IV of Phase-II of the JNNSM*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/Scheme-for-over-5000MW-Grid-Connected-SPV-Power-Projects-with-VGF-under-JNNSM.pdf

Ministry of New and Renewable Energy. (2016c). *NIWE annual report 2015-16*. Retrieved from http://niwe.res.in/assets/Docu/annual_report/Annual_Report_2015_2016_English.pdf

Ministry of New and Renewable Energy. (2016d). *Additions/Modifications the administrative sanction order 23/01/2012-SWES dated 04.9.2013 for the continuation of the scheme on "Small wind energy and hybrid systems (SWES) reg*. Retrieved from http://mnre.gov.in/file-manager/offgrid-wind-scheme/modifications-in-SWES-scheme.pdf

Ministry of New and Renewable Energy. (2016e). *MNRE guidelines on implementation of National Biogas and Manure Management Programme (NSMMP) during the FY 2016-17 for 12th FYP Addendum*.

Ministry of New and Renewable Energy. (2016f). Rs 142 crore allocated to for National Biogas and Manure Management Programme Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=148110

Ministry of New and Renewable Energy. (2017a). *Annual report 2016-17*. Retrieved from http://mnre.gov.in/file-manager/annual-report/2016-2017/EN/pdf/8.pdf

Ministry of New and Renewable Energy. (2017b). *Biomass Knowledge Portal*. Retrieved from http://biomasspower.gov.in/policy-grid-connected.php

Ministry of New and Renewable Energy. (2017c). *Frequently asked question*. Retrieved from http://mnre.gov.in/file-manager/UserFiles/faq_SHP.pdf

Ministry of New and Renewable Energy. (2017d). *Guidelines for establishment of Akshay Urja Shops*. Retrieved from http://mnre.gov.in/file-manager/aditya-solar-shops-scheme/aditya_solar_shops_programme.pdf

Ministry of New and Renewable Energy. (2017e). Renewable energy for rural applications. *Annual report 2016-17*. Retrieved from http://mnre.gov.in/file-manager/annual-report/2016-2017/EN/pdf/6.pdf

Ministry of New and Renewable Energy. (2017f). Wind Power Programme. *Ministry of New & Renewable Energy*. Retrieved from http://mnre.gov.in/schemes/grid-connected/solar-thermal-2/

Ministry of Power (MoP). (2003). The Electricity Act, 2003.

Ministry of Petroleum and Natural Gas (MoPNG). (2003, January 28). *Notification: Freight Subsidy for Far Flung Areas Scheme*. Retrieved from http://ppac.org.in/WriteReadData/userfiles/file/PS_5_FreightSubsidyScheme2002.pdf

Ministry of Petroleum and Natural Gas. (2009, August 6). Rajiv Gandhi Gramin Lpg Vitrak (RGGLV). Retrieved from http://www.petroleum.nic.in/sites/default/files/RGGLV%20letter%20dated%2006.08.2009_0.pdf

Ministry of Petroleum and Natural Gas. (2014). *Demand No. 75, Notes on demand for grants*. Retrieved from http://indiabudget.nic.in/budget2014-2015(I)/ub2014-15/eb/sbe75.pdf

Ministry of Power. (2005). *Office Memorandum of Rajiv Gandhi Grameen Vidyutikaran Yojna Scheme of Rural Electricity Infrastructure and Household Electrification.*

Ministry of Power. (2008). *Office Memorandum for Continuation of RGGVY in XI plan*.

Ministry of Power. (2012a). *Guidelines for Operationalisation of National Electricity Fund (Interest subsidy) Scheme*.

Ministry of Power. (2012b). *Office memorandum for Scheme for Financial Restructuring of State Distribution Companies*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/Financial_restructuring_of_State_Distribution_Companies_discoms_Oct2012.pdf

Ministry of Power. (2012c). 4. *Office Memorandum on 'National Electricity Fund (Interest Subsidy) Scheme to subsidize interest rate on loans to be disbursed by Financial Institutions (PFC, REC and other financial institutions) for projects of distribution sector.'*

Ministry of Power. (2013). *Office memorandum for continuation of RGGVY in XII and XIII plan*.

Ministry of Power. (2014a). *DDUGJY*.

Ministry of Power. (2014b). Office Order No. 29/9/2010-R&R (Vol-II). Retrieved from https://psdfindia.in/wp-content/uploads/2016/06/MoP_Communication.pdf

Ministry of Power. (2014c). *Outcome Budget of Ministry of Power 2013–14*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/OUTCOME_BUDGET_2013-14.pdf

Ministry of Power. (2015a). *Notes for demand for grant 2015-16*. Retrieved from http://indiabudget.nic.in/budget2015-2016/ub2015-16/eb/sbe77.pdf

Ministry of Power. (2015b). *Office Memorandum of UDAY (Ujwal Discom Assurance Yojana) Scheme for Operational and Financial Turnaround of Power Distribution Companies (DISCOMs)*.

Ministry of Power. (2015c). *Outcome Budget of Ministry of Power 2014–15*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/OUTCOME_BUDGET_2014-15.pdf

Ministry of Power. (2015d). *Statement of expenditure*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/summary_of_monthly_account_Mar_2015.pdf

Ministry of Power. (2016a). India to receive Euro 1 billion soft loan for 'green energy corridors' from Germany. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=155455

Ministry of Power. (2016b). *Demand no. 68. Notes for demand for grant 2016-17*. Retrieved from http://indiabudget.nic.in/budget2016-2017/ub2016-17/eb/sbe68.pdf

Ministry of Power. (2016c). *Outcome Budget of Ministry of Power 2015–16*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/OUTCOME_BUDGET_2015-16.pdf

Ministry of Power. (2016d). *Policy Note, Energy Department, Ministry of Electricity, Prohibition and Excise 2014-15, 2015-16, 2016-17*.

Ministry of Power. (2016e). *Statement of expenditure*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/summary_of_monthly_account_Mar_2016.pdf

Ministry of Power. (2016f). *Waiver of inter-state transmission charges and losses on transmission of the electricity generated from solar & wind sources of energy*. Retrieved from http://powermin.nic.in/sites/default/files/webform/notices/waiver_of_inter_state_transmission_charges_and_losses.pdf

Ministry of Power. (2017a). *Notes on demands for grants 2017-18*. Retrieved from http://indiabudget.nic.in/ub2017-18/eb/sbe74.pdf

Ministry of Power. (2017b). Power Sector at a Glance ALL INDIA. Retrieved rom http://powermin.nic.in/en/content/power-sector-glance-all-india

Ministry of Power. (2017c). *Report on green energy corridor transmission projects*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/OUTCOME_BUDGET_2016_17.pdf

Ministry of Power. (2017d, May 15). *Growth in transmission sector*. Retrieved from http://powermin.nic.in/sites/default/files/uploads/Growth_in_Transmission_sector_Eng.pdf

Ministry of Power. (2017d). Uday. Retrieved from https://www.uday.gov.in/news-events.php

Ministry of Power & Integrated Power Development Scheme. (2017). All India Summary for IPDS and IT Phase - II. Retrieved from http://www.ipds.gov.in/Login_Page/IPDS_Grant_Summary.aspx

Ministry of Railways. (1989). Railway Act 1989.

Ministry of Statistics and Programme Implementation. (2017). *Energy statistics 2017*. Delhi: Ministry of Statistics and Programme Implementation.

Mitra, B.K. & Bhattacharya, A. (2012). *Long term electricity scenario and water use: A case study on India*. IGES Policy Brief: 20. Hayama: Institute for Global Environmental Strategies.

Moudgal, S. (2017, April 22). Free stove, gas connection under Anila Bhagya. Retrieved from http://timesofindia.indiatimes.com/city/bengaluru/state-brushes-ujjwala-aside-to-give-free-stove-gas-connection-under-anila-bhagya/articleshow/58305931.cms

MyLPG.in. (n.d.). CSR scheme for release of connection to BPL families. Retrieved from http://mylpg.in/docs/CSR_Scheme_for_release_of_connection_to_BPL.pdf

National Institute of Wind Energy. (2017). Estimation of installable wind power potential at 80 m level in India. Retrieved from http://niwe.res.in/department_wra_est.php

National Smart Grid Mission NSGM. (2017). National Smart Grid Mission. Retrieved from www.nsgm.gov.in/

National Stock Exchange (NSE). (2017). Corporate bonds listed on exchange. Retrieved from https://www.nseindia.com/products/content/debt/corp_bonds/cbm_corp_bonds.htm

Nishith Desai Associates. (2016). *Oil and natural gas*. Retrieved from http://www.nishithdesai.com/information/areas-of-service/industry/oil-natural-gas.html

NITI Aayog. (2015). *Report of the Expert Group on 175 GW RE by 2022*.

NITI Aayog. (2017a). *Draft National Energy Policy*. Version as on 26 June 2017. New Delhi: Government of India.

NITI Aayog. (2017b). *IESS2047*. Retrieved from http://iess2047.gov.in/assets/onepage/Nuclear%20Power.pdf

Oil and Natural Gas Corporation Limited. (2016, July 5). *Exemption from payment of customs duties on import of specified goods for petroleum operations under nominated blocks (irrespective of date of issue/renewal of PEL/ML), Pre-NELP, NELP, MFP and CBM blocks*. Circular No. 30/2016-cum-IMMM Amendment No. 15/2016-cum-BLAmendment no. 01/95 &3/35. Retrieved from http://www.ongcindia.com/wps/wcm/connect/d95aacbd-439d-41ea-a3be-5c96f7629bc6/30_2016.pdf?MOD=AJPERES

Oil Industry Development Board. (n.d.). Oil Industry Development Board, Ministry of Oetroleum and Natural Gas, Government of India. Retrieved from http://www.oidb.gov.in/

Olivier J.G.J., Janssens-Maenhout G., Muntean M., & Peters J.A.H.W. (2016). *Trends in global CO2 emissions: 2016 report*. The Hague: PBL Netherlands Environmental Assessment Agency; Ispra: European Commission, Joint Research Centre.

OneIndia. (2017, August 1). LPG subsidy to be rationalised not cut: Pradhan. Retrieved from http://www.oneindia.com/india/lpg-subsidy-won-t-be-cut-only-be-rationalised-dharmendra-pradhan-2511983.html

Organisation for Economic Co-operation and Development (OECD). (n.d.). Fossil fuel support: IND. Retrieved from http://stats.oecd.org/Index.aspx?DataSetCode=FFS_IND

Organisation for Economic Co-operation and Development. (2014, March 27). *India: Inventory of estimated budgetary support and tax expenditure on fossil fuels*. Retrieved from http://www.oecd.org/site/tadffss/IND_27MAR2014.pdf

Organisation for Economic Co-operation and Development. (2015a). OECD Fossil Fuel Support Database. Retrieved from http://stats.oecd.org/Index.aspx?DataSetCode=FFS_IND

Organisation for Economic Co-operation and Development (2015b). *OECD companion to the Inventory of Support Measures for Fossil Fuels 2015*. Retrieved from http://www.oecd.org/environment/oecd-companion-to-the-inventory-of-support-measures-for-fossil-fuels-2015-9789264239616-en.htm

Parry, I., Mylonas, V. & Vernon, N. (2017). *Reforming energy policy in India: Assessing the options*. IMF Working Paper WP/17/103. Washington, D.C.: International Monetary Fund.

Petroleum Planning & Analysis Cell (PPAC). (n.d.a). *Import/export*. Retrieved from http://ppac.org.in/content/212_1_ImportExport.aspx

Petroleum Planning & Analysis Cell. (n.d.b). *Price buildup of sensitive products*. Retrieved from http://ppac.org.in/WriteReadData/userfiles/file/PP_9_PriceBuildupSensitive_Products.pdf

Petroleum Planning & Analysis Cell. (n.d.c). *Fiscal subsidy on PDS kerosene and domestic LPG* (under Subsidy Scheme, 2002). Retrieved from http://ppac.org.in/WriteReadData/userfiles/file/PS_1_Fiscal%20Subsidy.xls

Petroleum Planning & Analysis Cell. (n.d.d). Subsidy. Retrieved from http://ppac.org.in/content/150_1_Subsidy.aspx

Petroleum Planning & Analysis Cell. (2017a). Prices. Retrieved from http://ppac.org.in/content/149_1_PricesPetroleum.aspx

Petroleum Planning & Analysis Cell. (2017b, April). *Ready Reckoner: Snapshot of oil and gas data*. Retrieved from http://ppac.org.in/WriteReadData/Reports/20170520063829827019SnapshotofIndia%27sOilGasData_April2017.pdf

Petroleum Planning & Analysis Cell. (2017c). *Ready Reckoner: Oil industry information at a glance*. New Delhi: Petroleum Planning and Analysis Cell,Ministry of Petroleum and Natural Gas. Retrieved from http://ppac.org.in/WriteReadData/Reports/201706301015077775859ReadyReckoner,June2017.pdf

Planning Commission, GoI. IEP. (2005). *Draft report of the Expert Committee on Integrated Energy Policy*. Retrieved from http://planningcommission.nic.in/reports/genrep/intengpol.pdf

Planning Commission. (2006). *Integrated energy policy*. New Delhi: Planning Commission.

Plante, M. (2013, March). *The long-run macroeconomic impacts of fuel subsidies*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.435.4872&rep=rep1&type=pdf

PM Jan Dhan Yojana. (2017). KARNATAKA. Retrieved from https://www.sarkariyojna.co.in/anila-bhagya-free-lpg-scheme-bpl-families-karnataka/

Power Finance Corporation (PFC). (2016). *The performance of state power utilities for the years 2012-13 to 2014-15*.

Power Finance Corporation (2017). *Report on the performance of state power utilities form the years 2013–14 to 2015–16*. Retrieved from http://www.pfcindia.com/Default/ViewFile/?id=1505210724491_Report%20on%20Performance%20of%20State%20Power%20Utilities%20for%20the%20years%202013-14%20to%202015-16.pdf&path=Page

Power Finance Corporation. (2016). *The perfromance of state power utilities for the years 2012-13 to 2014-15*.

Power Grid Corporation of India Limited. (2014). *Annual report of PGCIL for FY 14*.

Power Grid Corporation of India Limited. (2015). *Annual report of PGCIL for FY 15*.

Power Grid Corporation of India Limited. (2016). *Annual report of PGCIL for FY 16*

Press Information Bureau (PIB). (2014a, October 18). P*olicy framework for relaxations, extensions and clarifications at the development and production stage under psc regime for early monetization of hydrocarbon discoveries*. Retrieved from http://pib.nic.in/newsite/mbErel.aspx?relid=110695

Press Information Bureau. (2014b, October 18). *Revision of domestic gas prices*. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=110696

Press Information Bureau. (2015a). *Commodity-wise freight revenue earnings of railways goes up by 12.67 per cent during the fiscal 2014–15*. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=118312

Press Information Bureau. (2015b, September 17). *Ex-post facto approval to additional employment of 50 days over and above 100 days per household under Mahatma Gandhi National Rural Employment Act (MGNREGA) in areas hit by drought or natural calamities*. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=126943

Press Information Bureau. (2015c, September 14). *Steps taken by the central government for relief to farmers in view of deficit monsoon*. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=126888

Press Information Bureau. (2016a, March 9). *DBT Scheme for Kerosene*. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=137552

Press Information Bureau. (2016b, March 10). *Major policy initiatives to give a boost to petroleum and hydrocarbon sector*. Retrieved from http://pib.nic.in/newsite/printrelease.aspx?relid=137661

Press Information Bureau. (2017c, February 1). *Petroleum Minister welcomes the Budget 2017–18 proposals to boost Oil and Gas Sector*. Retrieved from http://pib.nic.in/newsite/PrintRelease.aspx?relid=157876

Press Trust of India. (2017, June 13). *GST to have negative impact on oil and gas industry: Report*. Retrieved from http://economictimes.indiatimes.com/industry/energy/oil-gas/gst-to-have-negative-impact-on-oil-and-gas-industry-report/articleshow/59130947.cms

NDTV PROFIT. (2016). Railway revises freight charges for coal transporation. Retrieved from http://profit.ndtv.com/news/commodities/article-railways-revises-freight-charges-for-coal-transportation-1449154

Raikar, N. V. (2016, April–May). Key highlights: Indian wind industry analytical scorecard (FY 2015–16). *Indian Wind Power, 2*(1).

Rajasthan Electricity Regulatory Commission (RERC). (2013). Latest. Retrieved from http://rerc.rajasthan.gov.in/

Rajasthan Electricity Regulatory Commission. (2014). *Rajasthan Electricity Regulatory Commission (Terms and Conditions for Determination of Tariff) Regulations, 2014*.

Rajasthan Electricity Regulatory Commission. (2015a). *Determination of Annual Revenue Requirement & Retail Supply Tariff of Discoms along with true-up of ARR for FY 2012-13 and Apporval of Investment Plan for FY 2014-15*. Petition No. RERC 456/14, 457/14, 458/14, 442/14, 444/14 & 447/14. Retrieved from http://rerc.rajasthan.gov.in/TariffOrders/Order203.pdf

Rajasthan Electricity Regulatory Commission. (2015b). *Investment Plan of Rajasthan Rajya Vidyut Prasaran Nigam Limited for FY 2015-16 and ARR and determination of tariff for FY 2015-16 for recovery of Transmission and SLDC Charges and True up of ARR for FY 2013-14 of Rajasthan Rajya Vidyut Prasaran Nigam*. Petition No.RERC 488/14 and 499/14. Retrieved from http://rerc.rajasthan.gov.in/TariffOrders/Order222.pdf

Rajasthan Electricity Regulatory Commission. (2016). *Annual Revenue Requirement (ARR) & Retail Supply Tariff of Discoms 2016 and approval of true-up of ARR for FY 2013-14 & Investment Plan for FY 2015-16*. Petition No. RERC 552/15, 553/15, 554/15. Retrieved from http://rerc.rajasthan.gov.in/TariffOrders/Order250.pdf

Reserve Bank of India. (2017). Reference rates archive. Retrieved from https://www.rbi.org.in/scripts/referenceratearchive.aspx

Saikia, S. P. (2015, August 6). Narendra Modi govt halts Rajiv Gandhi Gramin LPG Vitaran scheme. Retrieved from http://www.financialexpress.com/economy/rural-lpg-scheme-halted/114458/

Saraswat, S. (2012, August 7). Understanding the tax regime governing the Indian Oil Industry. *The Lex Warrier: Online Law Journal*.

Sarker, T. (2016, June 15). Climate change or not, power-starved India just can't help burning more coal. Retrieved from https://qz.com/707432/climate-change-or-not-power-starved-india-just-cant-help-burning-more-coal/

Sarkari Yojana. (2017). Anila Bhagya Free LPG scheme for BPL families in Karnataka. Retrieved from https://www.sarkariyojna.co.in/anila-bhagya-free-lpg-scheme-bpl-families-karnataka/

sarkariniti. (2017). Anila Bhagya. Retrieved from https://sarkariniti.com/anila-bhagya-scheme-karnataka/

Sauer, A., Klop, P. & Sumeet, A. (2010). *Over heating: Financial risks from water constraints on power generation in Asia*. World Resources Institute.

Securities and Exchange Board of India (SEBI). (2013). *Draft Red Herring Prospectus*. Retrieved from http://www.sebi.gov.in/sebi_data/attachdocs/1372055999819.pdf

Shakti Sustainable Energy Foundation. (2013). *Enabling low-cost financing for renewable energy in India*. Retrieved from http://shaktifoundation.in/wp-content/uploads/2014/02/RE-Financing-Final-report.pdf

Sharma, S. (2013). Implications of cash transfers of subsidies in the energy sector in India. In Kimura, S., H. Phoumin and B. Jacobs (Eds.), *Energy market integration in East Asia: Renewable energy and its deployment into the power system*, (pp.267–290). ERIA Research Project Report 2012-26. Jakarta: ERIA.

Shearer, C., Fofrich, R., & Davis, S. J. (2017, April). Future CO2 emissions and electricity generation from proposed coal-fired power plants in India. *Earth's Future, 5*, 408–416.

Shyam, J. V. (2016, July 13). Oil companies get nod to increase kerosene price by 25 paise every month till April 2017. *Economic Times*. Retrieved from https://economictimes.indiatimes.com/industry/energy/oil-gas/oil-companies-get-nod-to-increase-kerosene-price-by-25-paise-every-month-till-april-2017/articleshow/53182201.cms

Soni, A., & Chatterjee, A. (2016). *Governance of the petroleum and natural gas sector in India: A status note*. New Delhi: TERI. Retrieved from http://www.teriin.org/projects/nfa/pdf/working-paper-15-Governance-of-the-petroleum-and-natural-gas-sector-in-india-a-status-note.pdf

Srivastava, D., K. & Kavi Kumar, K. S. (n.d.). *Environment and fiscal reforms in India*. Retrieved from https://us.sagepub.com/en-us/nam/environment-and-fiscal-reforms-in-india/book244473#description

Standing Committee on Petroleum & Natural Gas. (2017, March). *Demands for grants (2017–18)*. Retrieved from http://164.100.47.193/lsscommittee/Petroleum%20&%20Natural%20Gas/16_Petroleum_And_Natural_Gas_18.pdf

Steenblik, R. (n.d.). *A subsidy primer*. Geneva/Winnipeg: GSI/IISD. Retrieved from https://www.iisd.org/gsi/sites/default/files/primer.pdf

Stefanski, R. (2014, April 4). *Dirty little secrets: Inferring fossil-fuel subsidies from patterns in emission intensities*. Retrieved from https://www.oxcarre.ox.ac.uk/files/OxCarreRP2014134(1).pdf

Tamil Naidu Energy Development Agency. (2017). CM's Solar Powered Green House Scheme. Retrieved from http://teda.in/programes/cms-solar-powered-green-house-scheme/

Tamil Naidu Electricity Regulatory Commission (TNERC). (2016a). *TNERC Tariff order for solar projects*. Retrieved from http://tnerc.tn.nic.in/orders/Tariff%20Order%202009/2016/Solar%202016/Solar%20Order%20-%202%20of%202016.pdf

Tamil Naidu Electricity Regulatory Commission. (2016b). *TNERC Tariff order for wind projects*. Retrieved from http://tnerc.tn.nic.in/orders/Tariff%20Order%202009/2016/Wind/Wind%20-%203%20of%202016.pdf

Tamil Naidu Electricity Regulatory Commission. (2017). *Tamil Naidu Electricity Regulatory Commission*. Retrieved from http://www.tnerc.gov.in/

Tax Research Unit. (2016, February 29). *Central Bureau of Excise and Customs, D.O.F.No.334/8/2016-TRU*. Retrieved from http://www.cbec.gov.in/resources//htdocs-cbec/ub1617/do-ltr-jstru1-revised.pdf;jsessionid=54347DD788CC5101D81AFBDA6D3E96AB

Team Energy Infrapost. (2016, March 10). *DBTK—All you need to know about govt's direct benefit scheme for kerosene*. Retrieved from https://energyinfrapost.com/dbtk-all-you-need-to-know-avout-govts-direct-benefit-scheme-for-kerosene/

The Telegraph India. (2016, August). Rail tweaks oil tarrif. Retrieved from https://www.telegraphindia.com/1160824/jsp/business/story_104056.jsp

The Hindu. Special Correspondent. (2017 July 28). *Mukhyamantri Anila Bhagya scheme launch by Aug. 15.* Retrieved from http://www.thehindu.com/news/cities/Mangalore/mukhyamantri-anila-bhagya-scheme-launch-by-aug-15/article19373759.ece

Times of India. (2017, January 11). Air pollution causes 1.2 million deaths in India annually: Delhi most polluted: Greenpeace report. Retrieved from https://timesofindia.indiatimes.com/india/air-pollution-causes-12-lakh-deaths-in-india-annually-delhi-most-polluted-greenpeace-report/articleshow/56478622.cms

Tiwari, M., Umesh, S. & Dewangan, K. (2016) Fly ash utilization: A brief review in Indian context. *International Research Journal of Engineering and Technology, 3*(4), 949–956.

Tongia, R. (2017). *Delhi's household electricity subsidies: High and inefficient*. Brookings India IMPACT Series No. 042017b.

UDAY. (2017). Uday. Retrieved from https://www.uday.gov.in/mou_signed.php

Ujjwala, P. (2016). PM Ujjwala Yojana. Retrieved from http://www.pmujjwalayojana.com/about.html&gws_rd=cr&ei=8HqiWZOWG5LMwAKJ1a-oAQ

United Nations Department of Economic and Social Affairs (UN DESA), Population Division (2015). *World Urbanization Prospects: The 2014 Revision: Population of Urban Agglomerations with 300,000 Inhabitants or More in 2014.* Retrieved from http://esa.un.org/unpd/wup

United Nations Development Programme India. (2017). Market development and promotion of solar concentrations based process heat applications in India. Retrieved from http://www.in.undp.org/content/india/en/home/operations/projects/environment_and_energy/market_developmentandpromotionofsolarconcentratorsbasedprocesshe.html

United Nations Environment Programme. (2003). *Energy subsidies: Lessons learned in assessing their impact and designing policy reforms*. Geneva: UNEP ETB.

United Nations Framework Convention on Climate Change. (2015). *Paris Agreement*. Bonn. Retrieved from http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf

U.S. Department of Treasury. (2009). *Leaders' statement. The Pittsburgh Summit.* September 24–25, 2009. Retrieved from https://www.treasury.gov/resource-center/international/g7-g20/Documents/pittsburgh_summit_leaders_statement_250909.pdf

Van Den Akker, J. & Aggarwal, D. (2015, March). *Mid-term review of the UNDP/GEF project: Market development and promotion of solar concentrations based process heat applications in India* (PIMS 4284; GEF 4134). Retrieved from https://info.undp.org/docs/pdc/Documents/IND/00061446-India%20CSH%20-%20evaluation%20report-00077828.pdf

Whitley, S. (2013). *At cross purposes: Subsidies and climate compatible investment*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.739.5957&rep=rep1&type=pdf

Whitley, S., & Van derBurg, L. (2015). *Fossil fuel subsidy reform: From rhetoric to reality*. ODI, New Climate Economy. London: New Climate Economy.

World Bank Group. (2010). *Subsidies in the energy sector: An overview*. Washington DC: World Bank Group Retrieved from http://indianexpress.com/article/india/india-news-india/g20-summit-india-oppose-china-corrupt-persons-information-research-centre-fossil-fuel-subsidies-united-states-3009043/).

World Bank. (2016). India's poverty profile. Retrieved from http://www.worldbank.org/en/news/infographic/2016/05/27/india-s-poverty-profile

World Bank. (2017a). *Country profile: India*. Retrieved from http://data.worldbank.org/country/india

World Bank. (2017b). GDP Ranking, PPP-based. Retrieved from http://data.worldbank.org/data-catalog/GDP-PPP-based-table

World Bank. (2017c) World Development Indicators. Retrieved from http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators

World Trade Organization. (1994). *Agreement on Subsidies and Countervailing Measures*, *General Agreement on Tariffs and Trade (GATT)*. Retrieved from https://www.wto.org/english/docs_e/legal_e/24-scm.pdf

Zulqarnain Zulfi, M. (2016, December 10). Health cost of air pollution in India assessed at 3 per cent of its GDP. Retrieved from https://energy.economictimes.indiatimes.com/news/oil-and-gas/health-cost-of-air-pollution-in-india-assessed-at-3-per-cent-of-its-gdp/55904895

ANNEX A. INVENTORY OF ENERGY SUBSIDIES

A1. Electricity Transmission & Distribution (T&D)

A1.1. Central government support to T&D

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Grids (electrification investments by distribution companies to support rural electrification)			
Subsidy Name	**T&D.1** Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The broad objective of this scheme is to enhance energy access by electrifying unelectrified villages and strengthening the related sub-transmission and distribution infrastructure.			
End Recipient(s) of Subsidy	Distribution companies (DISCOMs)			
Time Period	2005–2014 (RGGVY, see below), later merged with DDUGJY 2014–2022			
Background	The central government launched Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY) in 2005 for achieving the national common minimum program goal of providing access to electricity to all households. Funds were provided for electrification of unelectrified villages, intensive electrification of electrified villages, issuing new connections to poor households and strengthening of related sub-T&D infrastructure. The scheme merged with DDUGJY in December 2014. Under DDUGJY, additional components of segregation of agriculture feeders from non-agriculture feeders, metering of distribution transformers/feeders/consumers, bridging the missing links of the National Optical Fibre Network (NOFN) and creation of a data hub at the Rural Electrification Corporation were also introduced. Under this scheme, the central government provides grants of up to 90 per cent of the project costs (60 per cent for states other than special category states, which can increase up to 75 per cent if targets are achieved and 85 per cent for special category states, which can increase up to 90 per cent if targets are achieved). The targets defined for states include: (a) timely completion of the scheme as per laid down milestones, (b) reduction in Aggregate Technical & Commercial (AT&C) losses as per trajectory finalized by the Ministry of Power (MOP), and (c) upfront release of admissible revenue subsidies by state government based on metered consumption.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 2593.89 crore	INR 2413.97 crore	INR 4500.00 crore	INR 3350.00 crore
	USD 428.74 million	USD 394.76 million	USD 687.44 million	USD 499.3 million

Information Sources	1. Note: For FY2014, FY2015 and FY2016, actual figures are presented and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2014a) 3. (MoP, 2005) 4. (MoP, 2008) 5. (MoP, 2013) 6. (MoP, 2015d) 7. (MoP, 2016e) 8. (MoP, 2014c, 2015c, 2016c) (MoP, 2017a)

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Grids (investment in networks and metering by distribution companies)			
Subsidy Name	**T&D.2** Integrated Power Development Scheme (IPDS)			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The objectives of scheme are: a.) strengthening of sub-T&D networks in the urban areas; b.) metering of distribution transformers/feeders/consumers in the urban area; and c.) information technology (IT) enablement of distribution sector and strengthening of distribution network			
End Recipient(s) of Subsidy	DISCOMs			
Time Period	2007–12 (Restructured Accelerated Power Development and Reform Programme [R-APDRP]) 2012–17 (R-APDRP and then name was changed in Dec 2014 to IPDS), 2017–22 (IPDS)			
Background	The central government provides financial support to state-level DISCOMs for strengthening of sub-T&D networks; metering of distribution transformers/feeders/consumers and IT enablement of distribution sector. The scheme was earlier known as APDRP, later was renamed Restructured (R-)APDRP and now is merged with IPDS (in 2014).			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 575 crore	INR 1261.04 crore	INR 1001.6 crore	INR 4524 crore
	USD 95.04 million	USD 206.22 million	USD 153 million	USD 674.3 million
	Since actual amount released annually was not available, planned expenditure for R-APDRP/IPDS has been provided. As per the information available on the IPDS website, total amount released until May 2017 (last date when website was updated) is INR 2649.44 crore (USD 395 million).			
Information Sources	1. (MoP, 2014c, 2015c, 2016c) 2. (MoP-IPDS, 2017) 3. (MOP, 2017a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Credit support → Government loans and loan guarantees**			
Stimulated Activity	Production and consumption → Grids (investment in transmission infrastructure projects by the Power Grid Corp)			
Subsidy Name	**T&D.3** Subsidized loans from multilateral organizations			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	-			
Policy Objective(s) of Subsidy	Lower input costs to power transmission utilities by providing low-cost loans from multilateral/bilateral organizations			
End Recipient(s) of Subsidy	Power Grid Corporation of India Limited (POWERGRID)			
Time Period	-			
Background	Multilateral organizations have provided loans to POWERGRID at subsidized rates for implementation of transmission projects. Loans from the World Bank, Asian Development Bank, Japan International Cooperation Agency and Kreditanstalt fur Wiederaufbau (KfW) Bank have been provided for global sourcing of equipment for certain highly viable open case projects. Though the government has provided guarantees on the same, this is in line with the policy these multilateral organizations allow for providing such loans. Also, POWERGRID has given counter-guarantees to the Government of India for these loans. These loans have been provided by multilateral/bilateral organizations at interest rates lower than the rates offered by commercial banks in India. A comparison of the interest rates per annum at which various organizations offered loans to POWERGRID vis-à-vis the State Bank of India's (SBI) prime lending rate (PLR) clearly shows that POWERGRID received the loans at lower interest rates and thus the differential in the rates on the loan amounts would comprise the subsidy.			
Amount of Subsidy Conferred[1]	FY2014	FY2015	FY2016	FY2017
	INR 977 crore	INR 1602 crore	INR 1500 crore	not available
	USD 161 million	USD 262 million	USD 229 million	not available
Information Sources	1. Note: Coupon rates of corporate bonds issued by POWERGRID have been considered as benchmark rates. The subsidy amount has been estimated by subtracting actual interest paid on the loans from multilateral banks from the interest amount which would have been paid at the coupon rates. 2. (National Stock Exchange, 2017) 3. (MoF, 2017b) 4. (Power Grid Corporation of India Limited, 2014, 2015, 2016)			

[1] Due to lack of complete data on preferential loans to various T&D utilities, the subsidy to POWERGRID is calculated for illustrative purpose only and not included in totals.

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Earmarks**
Stimulated Activity	Production and consumption → Grids (investment and management of networks for maintaining grid stability, grid security, strategic transmission lines, etc.)
Subsidy Name	**T&D.4** Power System Development Fund (PSDF)
Jurisdiction	Central government
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.
Policy Objective(s) of Subsidy	The objective of this scheme is operationalization of the PSDF and utilization of funds deposited therein for funding transmission sector projects of strategic importance.
End Recipient(s) of Subsidy	Government-owned transmission companies (TRANSCOs)
Time Period	2014 onwards
Background	The following charges are settled as per the regulatory norms between those who pay and those who need to receive. After final settlement takes place, there are surplus amounts that are credited to the PSDF. **a) Unscheduled Interchange charges:** The interstate transmission of electricity involves regulation of the grid in accordance with the specifications contained in the Grid Code. The Central Electricity Regulatory Commission has formulated a commercial mechanism by which those who breach the discipline are required to pay what is referred to as "Unscheduled Interchange charges." **b) Congestion charges:** Regulation of interstate transmission also involves management of congestion in the system. In order to relieve congestion in interstate transmission systems in real time, a congestion charge is also applied as a commercial measure. **c) Market Splitting Congestion Amount:** Congestion also affects operation of the power exchanges. This is regulated by way of a framework of market splitting where the market is split because of the congestion in transmission. Thus, the congestion amounts arise from the difference in market prices of different regions as a consequence of market splitting. **d) Reactive Compensation for failure to maintain voltage:** Maintenance of power voltages is also an important element of regulating interstate transmission. In order to ensure maintenance of voltage stability within the specified range (97–103 per cent of the nominal voltage), commercial measures by way of reactive energy charges are levied on utilities as per the Indian Electricity Grid Code, and the charges are payable/receivable by the regional entities depending on their reactive power drawal/return affecting the voltage at the metering points. The fund is proposed to be utilized for following purposes: 1) Creating necessary transmission systems of strategic importance based on operational feedback by load despatch centres for relieving congestion in inter-state transmission systems and the intra-state system that are incidental to them.

<table>
<tr><td></td><td colspan="4">2) Installation of shunt capacitors, series compensators and other reactive energy generators for improvement of voltage profile in the grid.
3) Installation of standard and special protection schemes, pilot and demonstrative projects, and for setting right the discrepancies identified in the protection audits on a regional basis.
4) Renovation and modernization of transmission and distribution (T&D) systems for relieving congestion.
5) Any other scheme/project in furtherance of the above objectives, such as conducting technical studies and capacity building, etc.</td></tr>
<tr><td rowspan="3">Amount of Subsidy Conferred</td><td>FY2014</td><td>FY2015</td><td>FY2016</td><td>FY2017</td></tr>
<tr><td>Not in Place</td><td>INR 1.00 crore</td><td>INR 1150.7 crore</td><td>INR 619.3 crore</td></tr>
<tr><td>Not in Place</td><td>USD 0.16 million</td><td>USD 175.8 million</td><td>USD 92.3 million</td></tr>
<tr><td>Information Sources</td><td colspan="4">1. Note: Since information on actual expenditure was not available in the public domain, budget outlay has been considered.
2. (MoP, 2015d)
3. (MoP, 2016e)
4. (MoP, 2014b)
5. (MoP, 2014c, 2015c, 2016c)
6. (MOP, 2017a)</td></tr>
</table>

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending (target spending through budget)**			
Stimulated Activity	Production and consumption → Grids (investment in transmission infrastructure in the northeastern states, excluding Arunachal Pradesh and Sikkim)			
Subsidy Name	**T&D.5** Fund for Power System Improvement in North Eastern States excluding Arunachal Pradesh and Sikkim			
Jurisdiction	Central Government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The objective of this program is to develop electricity transmission infrastructure in the northeastern states.			
End Recipient(s) of Subsidy	Power Grid Corporation of India Limited (POWERGRID)			
Time Period	2014–2018			
Background	As the intra-state T&D systems in the northeastern states have remained very weak, the Central Electricity Authority developed a comprehensive scheme for the northeast region in consultation with POWERGRID and state governments concerned. The project identified specific requirements for strengthening the electricity transmission network in the area to evacuate power and ensure uninterrupted power supply to the consumers. The program is being implemented through POWERGRID in association with six northeast states for four years (FY2015 to FY2018). After commissioning, the projects will be owned and maintained by the state governments.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	Not in Place	INR 150.00 crore	INR 247.30 crore	INR 78.00 crore
	Not in Place	USD 24.53 million	USD 37.8 million	USD 11.6 million
Information Sources	1. **Note:** For FY2014, FY2015 and FY2016 actual figures are presented and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (MoP, 2017a) 6. (MoP, 2016b) 7. (MoP, 2015a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending (target spending through budget)**
Stimulated Activity	Production and consumption → Grids (investment in transmission infrastructure in the states of Arunachal Pradesh and Sikkim)
Subsidy Name	**T&D.6** Fund for Strengthening of Transmission Systems in the States of Arunachal Pradesh and Sikkim
Jurisdiction	Central government
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.
Policy Objective(s) of Subsidy	The objective of this program is to develop electricity transmission infrastructure in the states of Arunachal Pradesh and Sikkim.
End Recipient(s) of Subsidy	Power Grid Corporation of India Limited
Time Period	2014–2018
Background	When this program was initiated, only five out of 20 districts of Arunachal Pradesh were connected to transmission network at 132/220 KV. The 33 KV system is the backbone of the power distribution system in the state. Due to low population density spread over its geographical area of 84,000 km^2, power demand in Arunachal Pradesh is scattered over large distances. Hence it is necessary to provide 132 KV connectivity in the state for proper voltage management and lower distribution losses. Similarly, the distribution system in Sikkim mainly relies on a 66 KV network, which needs to be strengthened substantially. In view of this, this program proposes to take up projects for strengthening intra-state T&D systems of the two states through 31 new 132 KV substations, 14 substations of 66/11 KV, 2,035 km of transmission lines (132 & 220 KV) and 2,204 km of transmission lines (33 & 66 KV). The project is designed to build additional infrastructure required for strengthening the electricity transmission network in the area.

Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	Not in Place	INR 100.00 crore	INR 150.00 crore	INR 255.30 crore
	Not in Place	USD 16.35 million	USD 22.9 million	USD 38 million

Information Sources	1. **Note:** For FY2014, FY2015 and FY2016, actual figures are presented and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (MoP, 2017a) 6. (MoP, 2016b) 7. (MoP, 2015a)

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending (target spending through budget)**			
Stimulated Activity	Consumption → Energy efficiency programs for industry and business, agriculture, household (energy efficiency, demand-side Response)			
Subsidy Name	**T&D.7** Fund for Energy efficiency and energy conservation activities implemented through Bureau of Energy Efficiency (BEE)			
Jurisdiction	Central government/state governments			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The broad objective is to enhance energy efficiency in the country, aiming below India's Intended Nationally Determined Contribution targets under the international Paris Agreement on climate change. BEE implements various energy-efficiency schemes in the country including Standard & Label (S&L) program, Perform Achieve Trade (PAT) scheme, Small & Medium-Sized Enterprises (SMEs) Cluster Program, etc.			
End Recipient(s) of Subsidy	BEE			
Time Period	Continuous support			
Background	The BEE is an extended arm of the Government of India that was set up in 2002 under the provisions of the Energy Conservation Act, 2001. It is mainly responsible for assisting the ministry in developing policies and strategies, with a self-regulation and market principles thrusts, within the overall framework of the Energy Conservation Act, 2001. Funds are provided to BEE for undertaking the following activities for energy conservation and energy efficiency: a) Creating awareness about energy conservation through print, electronic and other media for general public b) Organizing energy conservation awards and a painting competition on energy conservation c) Implementing the National Mission for Enhanced Energy Efficiency d) Implementing various energy-efficiency initiatives in the areas of lighting, buildings, standards & labelling of appliances, demand-side management programs in agriculture and municipalities, implementation of the Perform, Achieve and Trade program, etc. e) Capacity-building of state-designated agencies and DISCOMs			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 82.00 crore	INR 41.00 crore	INR 91.8 crore	INR 111.3 crore
	USD 13.50 million	USD 6.70 million	USD 14 million	USD 16.6 million

Information Sources	1. **Note:** For FY2014, FY2015 and FY2016, actual figures are presented and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (BEE, 2017) 6. (MoP, 2017a) 7. (MoP, 2016b) 8. (MoP, 2015a)

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Research and development support**			
Stimulated Activity	Production and consumption → Cross-cutting research and training activities			
Subsidy Name	**T&D.8** Research and training support by Ministry of Power (MoP)			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To provide research and training for employees working in power sector			
End Recipient(s) of Subsidy	Power sector as a whole			
Time Period	Revised annually			
Background	The central government provides financial support to Central Power Research Institute and National Power Training Institute for building infrastructure for training and research in the power sector.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 28 crore	INR 95.00 crore	INR 67.00 crore	INR 106.20 crore
	USD 4.63 million	USD 15.54 million	USD 10.24 million	USD 15.80 million
Information Sources	1. **Note:** For FY2014, FY2015 and FY2016, actual figures are presented, and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (MoP, 2017a) 6. (MoP, 2016b) 7. (MoP, 2015a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Credit support → Subsidized credit to domestic infrastructure.**			
Stimulated Activity	Production and consumption → Grids (financial support to distribution companies for projects such as reconductoring of lines, load bifurcation, load balancing, aupervisory control and data acquisition, geographic information systems mapping, remote metering of distribution transformers, IT applications related to distribution management, high-voltage distribution system schemes for an increase in high-tension/low tension ratio, etc.)			
Subsidy Name	**T&D.9** National Electricity Fund (NEF) (Interest subsidy) Scheme			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The objective of this scheme is to mitigate the funding gap and expedite the reform process, particularly in the distribution sector, which requires huge capital investment.			
End Recipient(s) of Subsidy	DISCOMs			
Time Period	The tenure of loans for any eligible project under the NEF (Interest Subsidy) scheme is for a maximum period of 13 years (i.e., interest subsidy can be extended up to 2025–6 and 2026–27 for projects sanctioned during 2012–13 and 2013–14 respectively).			
Background	Under the NEF scheme, interest subsidy is provided on loans taken by private and public DISCOMs for non-RGGVY and non- R-APDRP projects. The preconditions for eligibility are linked to reform measures taken by the states and the amount of interest subsidy is linked to the progress achieved in reform-linked parameters. For financial assistance from the NEF (Interest Subsidy) Scheme, states have been categorized as "special category and focused states" and "states other than special category and focused states." Each DISCOM eligible for subsidy on interest is assigned marks based on certain parameters, like the establishment of Electricity Regulatory Commissions, preparation of a business plan, track record of timely filing of tariff petitions, etc. Based on the consolidated score achieved on these parameters, the utilities are categorized and are eligible for subsidy in interest rates from 3–5 per cent in states other than "special category and focused states" and 5–7 per cent in "special Category and focused states."			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	0	INR 1.00 crore	INR 7.00 crore	INR 9.00 crore
	0	USD 0.16 million	USD 1.06 million	USD 1.3 million
Information Sources	1. **Note:** For FY2014, FY2015 and FY2016, actual figures are presented, and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (MoP, 2012c) 6. (MoP, 2012a) 7. (MoP, 2017a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Earmarks**			
Stimulated Activity	Production and consumption → Grids (project investment, consumer engagement to support the implementation of smart grid projects in the electricity distribution sector) Implementation of smart grid projects in the electricity distribution sector			
Subsidy Name	**T&D.10** National Smart Grid Mission			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The broad objective of this mission is to improve the financial of power of the T&D sector in the country by enabling use of IT infrastructure.			
End Recipient(s) of Subsidy	DISCOMs			
Time Period	2015–17			
Background	A Smart Grid Vision and Roadmap for India was launched by the MoP in August 2013, which also envisaged the launch of a National Smart Grid Mission having its own resources, authority, functional and financial autonomy to plan and monitor implementation of the policies and programs prescribed in the roadmap. It is an institutional mechanism for planning, monitoring and implementation of policies and programs related to smart grid activities. The ministry has earmarked a fund of INR 338 crore (~USD 62 million) to capital works to be undertaken by the mission. The activities to be carried out under this mission are as follows: a) Development of smart girds in smart cities (pilot projects) b) Development of micro grids c) Training and capacity building d) Consumer engagement			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	Not in Place	Not in Place	INR 1.32 crore	INR 10.00 crore
	Not in Place	Not in Place	USD 0.20 million	USD 1.5 million
Information Sources	1. **Note:** For FY2014, FY2015 and FY2016, actual figures are presented, and since information on actual expenditure was not available in the public domain budget outlay has been considered for FY2017. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (National Smart Grid Mission, 2017) 6. (MoP, 2017a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Credit support**			
Stimulated Activity	Production and consumption → Grids (investment by transmission utilities)			
Subsidy Name	**T&D.11** Green energy corridor projects			
Jurisdiction	Central and state government			
Legislation/ Endorsing Organization	Budgetary support provided by the central and state governments			
Policy Objective(s) of Subsidy	The broad objective of this scheme is to maximize renewable energy generation and integration with the main grid without compromising on the security and stability of the power system.			
End Recipient(s) of Subsidy	Central and state transmission utilities			
Time Period	2017 onwards			
Background	Under the Green Energy Corridors program, the Intra-State Transmission System is being implemented by respective State Transmission Utilities and the Inter-State Transmission System is being implemented by POWERGRID. As per the framework of cooperation between the Government of India and the Government of Germany, KfW Germany will provide a soft loan of around EUR 1 billion. Expected year of completion of the project was 2017, which was later extended to 2018. Intra-state transmission schemes under Green Energy Corridors are to be funded as 20 per cent equity by the state government, a 40 per cent grant from National Clean Energy Fund (NCEF) and 40 per cent soft loan, whereas, the inter-state transmission schemes are to be funded as 30 per cent equity by POWERGRID and 70 per cent as soft loan.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	Not in Place	Not in Place	Not in Place	Not in Place
	Not in Place	Not in Place	Not in Place	Not in Place
Information Sources	1. Note: No funds have been released so far 2. (MoP, 2016a) 3. (MoP, 2014c, 2015c, 2016c) 4. (MoP, 2017c)			

<table>
<tr><td>Subsidy Mechanism</td><td colspan="4">Government revenue foregone → Exemptions from special taxes</td></tr>
<tr><td>Stimulated Activity</td><td colspan="4">Production and consumption → Grids (equipment purchased by utilities for transmission and distribution infrastructure)</td></tr>
<tr><td>Subsidy Name</td><td colspan="4">T&D.12 Custom duty rebates on transmission and distribution equipment</td></tr>
<tr><td>Jurisdiction</td><td colspan="4">Central government</td></tr>
<tr><td>Legislation/ Endorsing Organization</td><td colspan="4">Custom tariff Act, 1975</td></tr>
<tr><td>Policy Objective(s) of Subsidy</td><td colspan="4">Lower input costs to power T&D utilities by way of reduction in customs duty on imported equipment</td></tr>
<tr><td>End Recipient(s) of Subsidy</td><td colspan="4">T&D utilities</td></tr>
<tr><td>Time Period</td><td colspan="4">Revised annually</td></tr>
<tr><td>Background</td><td colspan="4">There are various types of equipment used in power T&D, including transformers, energy meters, capacitors, conductors, switchgears and control gears. Some of this equipment attracts concessional basic customs (import) duty rate ranging from 0 to 7.5 per cent as against the normal rate of 10 per cent. These are covered under Chapter 85 of Customs Tariff.

Equipment-wise, custom duty rates for some of the key equipment used in T&D are provided below:
• Transformers = 10 per cent
• Insulators = 10 per cent
• Capacitors = 0 per cent
• Conductors and cables = 10 per cent
• Switchgears and control gears = 7.5 per cent</td></tr>
<tr><td rowspan="2">Amount of Subsidy Conferred</td><td>FY2014</td><td>FY2015</td><td>FY2016</td><td>FY2017</td></tr>
<tr><td>not calculated</td><td>not calculated</td><td>not calculated</td><td>not calculated</td></tr>
<tr><td colspan="4">Actual subsidy in the form of government revenue foregone due to lower custom duty has not been quantified because:
• Basic custom duty on most of the equipment (excluding capacitors, switchgears and control gears) is equal to the maximum value.
• Specific data on amount of imported capacitors, switchgears and control gears used by power T&D utilities is not available in the public domain.</td></tr>
<tr><td>Information Sources</td><td colspan="4">1. (Central Bureau of Excise and Customs, 2017a)
2. (Ministry of Heavy Industries and Public Enterprises, 2013)
3. (Directorate General of Commercial Intelligence and Statistics, 2017)</td></tr>
</table>

Subsidy Mechanism	**Government revenue foregone → Exemptions from excise duties/special taxes**			
Stimulated Activity	Production → Grids (equipment purchased by utilities for transmission and distribution infrastructure)			
Subsidy Name	**T&D.13** Excise duty rebates on transmission and distribution equipment			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Central Excise Tariff Act, 1985			
Policy Objective(s) of Subsidy	Lower input costs to power transmission and distribution utilities by way of reduction in excise duty on key equipment			
End Recipient(s) of Subsidy	Transmission and distribution utilities			
Time Period	Revised annually			
Background	There are various types of equipment used in T&D, including transformers, energy meters, capacitors, conductors, switchgears and control gears. As per the Chapter 85 of Central Excise Tariff, excise duty on key equipment used in power transmission and distribution sector like power T&D transformers, insulators, capacitors, conductors and cables, switchgears and control gears is 12.5 per cent, which is the maximum excise duty levied on electrical machinery and equipment.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	not applicable	not applicable	not applicable	not applicable
Information Sources	1. (Ministry of Heavy Industries and Public Enterprises, 2013) 2. (MoF, 2016a) 3. (MoF, 2005) 4. (Eximguru, 2017)			

Subsidy Mechanism	**Income or price support → Market price support and regulation**			
Stimulated Activity	Consumption → Agriculture and households (consumer tariff support)			
Subsidy Name	**T&D.14** Under-recovery of costs by distribution utilities for keeping below-market prices for certain categories of consumers			
Jurisdiction	Various state governments			
Legislation/ Endorsing Organization	The Electricity Act, 2003			
Policy Objective(s) of Subsidy	Compensation of DISCOMs for losses incurred by keeping below cost-recovery levels for some consumer categories			
End Recipient(s) of Subsidy	DISCOMs			
Time Period	Yearly support provided by state governments			
Background	The state governments have been providing direct support to the electric distribution utilities. The objective of this support is to keep electricity tariffs low for some consumer categories like agriculture and small domestic consumers. These subsidies are provided in cash or by way of allowing the utilities to keep the amount payable to the government, for example electricity duty.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY 17
	INR 37,052 crore	INR 47,965 crore	INR 57,680 crore	not available
	US D 6,124.7 million	US D 7,844.2 million	US D 8,811.3 million	not available
Information Sources	1. (PFC, 2016) 2. (PFC, 2017) 3. (MoP, 2016b)			

Electricity Sector Bailout (Central and State Government Support)

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Agency appropriations and contracts**
Stimulated Activity	Production and consumption → Grids (financial support to distribution companies)
Subsidy Name	**T&D.15** Financial Restructuring of State Distribution Companies (DISCOMS) scheme.
Jurisdiction	Central government
Legislation/ Endorsing Organization	Budgetary support provided by the central and state governments.
Policy Objective(s) of Subsidy	The broad objective of this scheme was to improve the financial health of state-owned electricity distribution companies.
End Recipient(s) of Subsidy	DISCOMs
Time Period	The scheme was open for DISCOMs until December 31, 2012. The benefit of this scheme would have accrued for five years (until 2017)
Background	Combined losses of DISCOMs in India stood at INR 1.9 lakh crore (~USD 35 billion) in 2011/12. The objective of this scheme was to enable the state government and DISCOMs to carve out a strategy for the financial turnaround of DISCOMs. The salient features of the scheme are as follows: a) 50 per cent of the outstanding short-term liabilities (upto 31.03.12) to be taken over by the state governments. This shall be first converted into bonds to be issued by DISCOMs to participating lenders, duly backed by the state governments' guarantee. b) State governments take over liability from DISCOMs in the next 2–5 years by way of special securities and repayment; interest paid by state governments until the date of takeover. c) Restructuring the balance 50 per cent short-term loan by rescheduling loans and providing a moratorium on the principal and the best possible terms for this restructuring to ensure the viability of this effort. d) The restructuring/reschedulement of the loan is to be accompanied by concrete and measurable action by the DISCOMs/states to improve the operational performance of the distribution utilities. e) The central government will provide incentive by way of a grant equal to the value of the additional energy saved by way of accelerated AT&C loss reduction beyond the loss trajectory specified under R-APDRP. Additionally, it will also provide capital reimbursement support of 25 per cent of principal repayment by the state governments on the liability taken over by the state governments under the scheme. The responsibilities of the state government/DISCOMs were to reduce AT&C losses by 3 per cent every year, reduce the gap between the average revenue requirement and the average revenue realized by 25 per cent every year, submit an actionable financial restricting plan, etc.

Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 1500 crore	INR 400 crore	INR 0 crore	INR 0 crore
	USD 247.93 million	USD 65.41 million	USD 0 million	USD 0 million
Information Sources	1. **Note:** In absence of relevant data on the amount of debt actually taken over by state governments and terms of restructuring remaining debt, the actual subsidy cannot be estimated. Figures above show the budget outlay by the Ministry of Power. 2. (MoP, 2015d) 3. (MoP, 2016e) 4. (MoP, 2014c, 2015c, 2016c) 5. (GoI, 2012b) 6. (MoP, 2016a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Agency appropriations and contracts**
Stimulated Activity	Production and consumption → Grids (bailout package by the government as financial support by the state government to distribution companies)
Subsidy Name	**T&D.16** Ujwal Discom Assurance Yojana (UDAY)
Jurisdiction	Central government
Legislation/ Endorsing Organization	Budgetary support provided by the central and state governments.
Policy Objective(s) of Subsidy	The broad objective of this scheme is to improve operational and financial performance of state-owned electricity distribution companies.
End Recipient(s) of Subsidy	Distribution companies (DISCOMs)
Time Period	2015–18
Background	Keeping in view the progress of the Financial Restructuring of State Distribution Companies (DISCOMs) scheme, the central government launched a revised scheme: UDAY. Some of the key provisions of this scheme are illustrated below: a) Under this scheme, the state government is allowed to take over 75 per cent of DISCOM debt as on September 30, 2015 over two years—50 per cent of DISCOM debt shall be taken over in 2015/16 and 25 per cent in 2016/17. b) States can issue non-statutory liquidity ratio, including bonds in the market or directly to the respective banks/financial institutions holding the DISCOM debt to the appropriate extent. Proceeds realized from issue of the bonds are to be entirely transferred to the DISCOMs c) Banks/financial institutions shall not levy any prepayment charge on the DISCOM debt. d) DISCOM debts will be taken over in the priority of debt already due, followed by debt with highest cost. e) The transfer to the DISCOM by the state government in 2015/16 and 2016/17 will be treated as a grant. In case the state is not able to absorb the interest burden of the entire grant immediately, the transfer of grant can be spread over three years (i.e., 25 per cent in each of three years, 2015/16, 2016/17 and 2017/18, with the remaining transfer through state loan to DISCOM). f) In exceptional cases, where a DISCOM requires equity support, not more than 25 per cent of this grant may be given as equity. g) Participating states may get additional/priority funding through central government ongoing schemes if they meet the operational milestones outlined in this scheme. h) Central government will support the participating state in securing low-cost power from the National Thermal Power Corporation (NTPC) and other Central Public Sector Undertakings (CPSUs). i) States not meeting operational milestones will be liable to forfeit their claim on IPDS & DDUGJY grants.

	In addition, the central government has defined clear targets related to loss reduction, implementation of energy-efficiency programs, filling of tariff petitions, meeting renewable purchase obligations, etc.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	Not in Place	Not in Place	INR 92113 crore	INR 78689 crores
	Not in Place	Not in Place	USD 14072 million	USD 11729 million
Information Sources	1. Note: Subsidies estimated by considering amount of debt proposed to be taken over by various states that have signed the Memorandum of Undertsanding for UDAY scheme. 2. (MoP, 2015a) 3. (MoP, 2017d) 4. (UDAY, 2017)			

A1.2. State Government Support to T&D in Rajasthan

<table>
<tr><td>Subsidy Mechanism</td><td colspan="4">Direct and indirect transfer of funds and liabilities → Credit support → Government loans and loan guarantees</td></tr>
<tr><td>Stimulated Activity</td><td colspan="4">Production and consumption → Grids (financial re-structuring of distribution companies)</td></tr>
<tr><td>Subsidy Name</td><td colspan="4">T&D.17 Low-cost loan from multilateral agencies/bilateral agencies</td></tr>
<tr><td>Jurisdiction</td><td colspan="4">Rajasthan state</td></tr>
<tr><td>Legislation/ Endorsing Organization</td><td colspan="4">The Electricity Act, 2003</td></tr>
<tr><td>Policy Objective(s) of Subsidy</td><td colspan="4">Lower input costs to power distribution utilities by way of provision of subsidy for interest on long-term and short-term loans</td></tr>
<tr><td>End Recipient(s) of Subsidy</td><td colspan="4">DISCOMs</td></tr>
<tr><td>Time Period</td><td colspan="4">Starting FY2015</td></tr>
<tr><td>Background</td><td colspan="4">The DISCOMs in Rajasthan have substantially increased borrowing, especially short-term borrowing, to fund the rising revenue deficit. This is primarily due to the huge gap between revenue realized and the average cost of electricity supply. The electricity tariffs were also revised after a gap of 7 years in FY2012, whereas the last revision was in FY2004.

Keeping this in view, the state government implemented the Financial Restructuring Program under which it committed to providing an interest subsidy for 50 per cent of the short-term borrowing of DISCOMs until FY2012. Under this scheme, the state government issued special securities to the lenders resulting in the restructuring of debt (due to the high credit rating of the state government vis-à-vis DISCOMs). The first instalment of this interest subsidy was released in FY2015. Apart from this, the state government has been providing interest subsidies on some loans.

Interest subsidies by state governments are provided in the Annual Revenue Requirement petition filed by respective DISCOMs.</td></tr>
<tr><td rowspan="3">Amount of Subsidy Conferred[2]</td><td>FY2014</td><td>FY2015</td><td>FY2016</td><td>FY2017</td></tr>
<tr><td>INR 14 crore</td><td>INR 1501 crore</td><td>INR 1293 crore</td><td rowspan="2">Not estimated (Tariff order for DISCOMs was not published till the time of report preparation)</td></tr>
<tr><td>USD 0.23 million</td><td>USD 24 million</td><td>USD 19 million</td></tr>
<tr><td>Information Sources</td><td colspan="4">4. (Rajasthan Electricity Regulatory Commission , 2015a)
5. (Rajasthan Electricity Regulatory Commission , 2016)
6. (Rajasthan Electricity Regulatory Commission , 2013)
7. (MoP, 2012b)
8. (Rajasthan Electricity Regulatory Commission , 2014)</td></tr>
</table>

[2] Due to lack of complete data on preferential loans, subsidies to Rajasthan DISCOMs are calculated for illustrative purpose only and not included in totals.

<table>
<tr><td>Subsidy Mechanism</td><td colspan="4">Government revenue foregone → Exemptions from special duties/taxes</td></tr>
<tr><td>Stimulated Activity</td><td colspan="4">Consumption → Agriculture, industry and business (special duties for consumers)</td></tr>
<tr><td>Subsidy Name</td><td colspan="4">T&D.18 Electricity duty rebates for some consumer categories</td></tr>
<tr><td>Jurisdiction</td><td colspan="4">Rajasthan state</td></tr>
<tr><td>Legislation/ Endorsing Organization</td><td colspan="4">The Rajasthan Electricity (Duty) Act 1962</td></tr>
<tr><td>Policy Objective(s) of Subsidy</td><td colspan="4">Lower input costs to power distribution utilities by way of reduction in electricity duty</td></tr>
<tr><td>End Recipient(s) of Subsidy</td><td colspan="4">Electricity consumers</td></tr>
<tr><td>Time Period</td><td colspan="4">Revised periodically</td></tr>
<tr><td>Background</td><td colspan="4">As per the provisions of the Rajasthan Electricity (Duty) Act 1962, the state government has levied electricity duty for sale of electricity within the state. This duty is collected by distribution utilities on behalf of the state government from electricity consumers. The duty applicable for domestic, commercial and industrial consumers is INR 0.40/kWh; however, duty applicable for agriculture consumers is INR 0.04/kWh (for metered consumption) and 5 per cent of flat rate for unmetered consumption. This is primarily to keep the electricity tariff for agriculture consumers on the lower side.

In addition to this, some of large industrial consumers like cement plants, small and medium enterprises, etc., also take advantage of benefits from lower electricity duty.

For quantification, the subsidies for agriculture have been estimated. However, subsidies for specific industrial consumers (who enjoy the benefit of lower excise duty) cannot be estimated, as the electricity consumption of these industrial consumers is not available in the public domain.</td></tr>
<tr><td rowspan="3">Amount of Subsidy Conferred</td><td>FY2014</td><td>FY2015</td><td>FY2016</td><td>FY2017</td></tr>
<tr><td>INR 506.91 crore</td><td>INR 761.19 crore</td><td>INR 649.43 crore</td><td rowspan="2">Not estimated (Tariff order not published till the time of report preparation)</td></tr>
<tr><td>USD 83.79 million</td><td>USD 124.48 million</td><td>USD 99.21 million</td></tr>
<tr><td>Information Sources</td><td colspan="4">1. Note: The subsidy (in terms of revenue foregone) for agriculture consumers has been estimated separately for metered and unmetered connections using the following approach.

a. Metered connections: The subsidy amount has been estimated by subtracting electricity duty payable by consumers (at rate of INR 0.04 per kWh) and electricity duty, which would have been paid at the rate of INR 0.40 per kWh (electricity duty rate for other consumer categories).

b. Unmetered connections: The subsidy amount has been estimated by subtracting electricity duty payable by consumers (at the rate</td></tr>
</table>

	of 5 per cent of fixed charges) and electricity duty, which would have been paid at the rate of INR 0.40 per kWh. c. Figures approved by the state electricity regulatory commission for electricity consumption and connected load for agriculture consumers have been considered for estimations. 2. (Bank Bazaar, 2017) 3. (Rajasthan Electricity Regulatory Commission , 2015a) 4. (Rajasthan Electricity Regulatory Commission , 2016) 5. (Rajasthan Electricity Regulatory Commission , 2013)

<table>
<tr><td>Subsidy Mechanism</td><td colspan="4">Direct and indirect transfer of funds and liabilities → Government ownership of energy-related enterprises on terms better than the market</td></tr>
<tr><td>Stimulated Activity</td><td colspan="4">Production and consumption → Grids (financial support for distribution companies)</td></tr>
<tr><td>Subsidy Name</td><td colspan="4">T&D.19 Unclaimed return on equity (ROE)</td></tr>
<tr><td>Jurisdiction</td><td colspan="4">Rajasthan state</td></tr>
<tr><td>Legislation/ Endorsing Organization</td><td colspan="4">The Electricity Act, 2003 and Rajasthan Electricity Regulatory Commission (Terms & Conditions for Determination of Tariff) Regulations, 2014</td></tr>
<tr><td>Policy Objective(s) of Subsidy</td><td colspan="4">Lower input costs to power distribution utilities by way of not claiming return on equity</td></tr>
<tr><td>End Recipient(s) of Subsidy</td><td colspan="4">Directly –DISCOMS; indirectly – Electricity consumers</td></tr>
<tr><td>Time Period</td><td colspan="4">Revised periodically</td></tr>
<tr><td>Background</td><td colspan="4">As per the provisions of the Electricity Act, 2003 and Rajasthan Electricity Regulatory Commission (Terms & Conditions for Determination of Tariff) Regulations, 2014, transmission utilities are allowed to receive a return on equity of 15.5 per cent and distribution utilities are allowed for return on equity of 16 per cent. However state-owned distribution utilities do not claim any return on equity (as per the directions of state government). Similarly, the state-owned transmission utility claims return on equity of 12 per cent, which is 3.5 per cent less than that allowed by the regulatory commission.

Hence, it can be concluded that government-owned enterprises are providing electricity transmission and distribution services on terms better than the market.</td></tr>
<tr><td rowspan="3">Amount of Subsidy Conferred</td><td>FY2014</td><td>FY2015</td><td>FY2016</td><td>FY2017</td></tr>
<tr><td>INR 1,827 crore</td><td>INR 2,189 crore</td><td>INR 2,465 crore</td><td rowspan="2">Not estimated (Tariff order for DISCOMs was not published till the time of report preparation)</td></tr>
<tr><td>USD 302 million</td><td>USD 358 million</td><td>USD 377 million</td></tr>
<tr><td>Information Sources</td><td colspan="4">1. Note: ROE estimated by using average equity (average of equity at the beginning of FY and at the end of FY) in a FY.
2. (Rajasthan Electricity Regulatory Commissio, 2015b)
3. (Rajasthan Electricity Regulatory Commission , 2015a)
4. (Rajasthan Electricity Regulatory Commission , 2016)
5. (Rajasthan Electricity Regulatory Commission , 2013)
6. (PFC, 2016)
7. (Rajasthan Electricity Regulatory Commission , 2014)</td></tr>
</table>

Subsidy Mechanism	**Income or price support → Market price support and regulation**			
Stimulated Activity	Consumption → Agriculture/households (compensation for low consumer tariffs)			
Subsidy Name	**T&D.20** Under-recovery of costs by Rajasthan distribution utilities for keeping below-market prices for certain categories of consumers			
Jurisdiction	Rajasthan state			
Legislation/ Endorsing Organization	The Electricity Act, 2003			
Policy Objective(s) of Subsidy	Objective is to reduce electricity tariffs for some consumer categories			
End Recipient(s) of Subsidy	Directly – distribution companies (DISCOMS); indirectly – electricity consumers			
Time Period	Revised periodically			
Background	The state government has been providing direct support to the electric distribution utilities of Rajasthan. The objective of this support is to keep electricity tariffs low for some consumer categories, mainly agriculture consumers, small domestic consumers and below poverty line (BPL) consumers. These subsidies are provided in cash or by way of allowing the utilities to keep the amount payable to the government, for example an electricity duty.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 1570 crore	INR 3180 crore	INR 1770	Not estimated (Tariff order not published till the time of report preparation)
	USD 260 million	USD 520 million	USD 270 million	
Information Sources	1. (Rajasthan Electricity Regulatory Commission , 2015a) 2. (Rajasthan Electricity Regulatory Commission , 2016) 3. (Rajasthan Electricity Regulatory Commission , 2013) 4. (MoP, 2003)			

A2. Coal

A2.1. Central Government Support to Coal

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Environmental costs→ Responsibility for closure and post-closure risks**
Stimulated Activity	Production → Development, extraction and preparation of coal
Subsidy Name	**C.1** Non-Incurrence of Costs for Coal Washing due to non-compliance of Mandate related to Coal Washing/Beneficiation
Jurisdiction	Central government
Legislation/Endorsing Organization	Ministry of Environment, Forests and Climate Change (MoFCC): Gazette Notification (G.S.R. 02(E) dated January 2, 2014)
Policy Objective(s) of Subsidy	The broad objective is to ensure coal beneficiation by the government to reduce the volume of coal transported long distances and to reduce environmental pollution.
End Recipient(s) of Subsidy	Coal producers
Time Period	2002 onwards
Background	In India, the Central Pollution Control Board issues emission regulations for highly polluting industries, including power plants. Particulate emissions are affected indirectly by coal washing requirements and directly by emission limits. Beginning in 2002 the use of coal with ash content exceeding 34 per cent was prohibited in any thermal power plant located more than 1,000 km from the pithead, or in urban or sensitive or critically polluted areas. In June 2016, the regulation was revised for power plants with a capacity of 100 MW or above, located 500 to 749 km from coal mine pitheads mandated to use raw/beneficiated coal with less than 34 per cent ash content. India's coal reserves are primarily low-quality coal reserves with high ash and moisture content. The grade of non-coking coal is dependent on the heat value and primarily most of India's coal is between Grades D and F. In addition, run-of-mine coal, on average, has ash content between 36-45 per cent, and burning coal of higher ash content produces higher emissions of carbon dioxide, sulphur and other particulate matter, all of which contribute to air pollution, which makes coal washing increasingly important. The coal washing process is highly capital-intensive and the high costs associated with it make the proposition unviable both for Coal India Limited (CIL) and the power generators. Washed coal is sold by CIL at the import parity price, and since power generators cannot recover their costs by passing them on to the consumers, the generators usually do not use washed coal for power generation. Also, even if they raise the price for using washed coal, then despatch of their plant as per merit order stacking will be an issue, thereby reducing plant load factor and thus fixed cost recovery. Thus, the power generators in India have refrained from coal washing at the cost of polluting the environment. Even though there is a cap on ash content in thermal coal, the average ash and moisture content of coal used is still well above 40 per cent. Thus, non-compliance of the mandate related to coal washing/beneficiation is a subsidy.

Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	995	1,043	1,064	1,103
(in USD million)	164.5	170.7	162.5	164.4
Information Sources	1. (Ministry of Environment, Forest and Climate Change, 2014) 2. (Central Pollution Control Board, n.d.) 3. (MOC, 2016c)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Direct Spending**				
Stimulated Activity	Production → Cross-cutting through the value chain				
Subsidy Name	**C.2** Conservation and Safety in Coal Mines and Development of Transport Infrastructure under Coal Conservation and Development Advisory Committee (CCDA)				
Jurisdiction	Central government				
Legislation/Endorsing Organization	Coal Mines (Conservation and Development) Act, 1974				
Policy Objective(s) of Subsidy	The broad objective is to ensure environmental conservation and development of infrastructure in areas affected by coal mining.				
End Recipient(s) of Subsidy	Coal producer				
Time Period	Yearly support				
Background	A specific duty known as the stowing excise duty is levied on raw coal (INR 10 per tonne) dispatched from collieries. The net proceeds from the stowing excise duty is disbursed to the owners, agents or the managers for execution of stowing and other safety operations in coal mines or development of transportation infrastructure. It has been proposed in the Coal Mines (Conservation & Development) Amendment Act, 2011, to increase maximum excise duty from INR 10 to INR 50 per tonne of coal.				
Amount of Subsidy Conferred	**Scheme**	**FY2014**	**FY2015**	**FY2016**	**FY2017***
(in INR crore)	Development of Transportation Infrastructure in Coalfield Areas	76.06	75.00	75.00	175
	Conservation and Safety in Coal Mines	185.00	185.00	170.00	175.44
(in USD million)	Development of Transportation Infrastructure in Coalfield Areas	12.57	12.27	11.46	26.1
	Conservation and Safety in Coal Mines	30.58	30.25	26	26.1
Information Sources	1. Note: For FY2014, FY2015 and FY2016, actual figures are presented, and since information on actual expenditures was not available in the public domain budget, outlay has been considered for FY2017 2. (MoC, 2013, 2014a, 2015a, 2016a, 2017b) 3. (MoC, 2014b, 2015b, 2016b,2017c) 4. (MoC, 2015c) 5. (Srivastava & Kavi Kumar, n.d.) 6. (MoP, 2016b)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Direct Spending → Earmarks**
Stimulated Activity	Production → Exploration, access and appraisal of new coal reserves
Subsidy Name	Expenditures by Ministry of Coal on exploration activities in coal sector: **C.3** Detailed exploration in non-CIL blocks **C.4** Regional (Promotional) exploration of coal and lignite
Jurisdiction	Central government
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.
Policy Objective(s) of Subsidy	The objective of this support is identification and assessment of additional resources of coal and lignite; facilitation of data for exploration findings and preparation of feasibility studies in mining projects.
End Recipient(s) of Subsidy	Coal producers
Time Period	Yearly support
Background	Budget support is provided for the following: Regional (Promotional) exploration of coal and lignite: Regional exploration involves preliminary mapping and quality assessment of potential areas for identification of coal/lignite fields. Geological Survey of India, Mineral Exploration Corporation Limited, state governments and the Central Mine Planning and Design Institute Limited carry out regional exploration under this scheme. Other activities under the scheme are: • Identification of additional resources of coal and lignite for inclusion in the National Inventory • Preparation of the web-enabled Integrated Coal and Lignite Resources Information System (ICRIS/ILRIS) • Assessment of coalbed methane (CBM) resources C3: Detailed Exploration in non-CIL blocks: After the identification of resources in regional exploration, detailed exploration/drilling are carried out in these coal blocks under this scheme. It involves detailed drilling for obtaining data for proving the indicated resources. This is being used for preparation of geological reports leading to feasibility studies and project reports. CMPDI is the nodal agency for implementing scheme in non-CIL blocks. C4: Exploration in North-Eastern Region & Sikkim: Some portion of budget under this program is allocated for accomplishing the government mandate for development of the northeastern region. Exploration in tribal areas: 1. Some portion of the budget under this program is allocated for accomplishment of government mandate of development in tribal areas.

Amount of Subsidy Conferred ***(Budget Outlay)**	**Scheme**	**FY2014**	**FY2015**	**FY2016**	**FY2017***
(In INR crore)	Regional (Promotional) Exploration of Coal and Lignite	64.01	58.82	105.05	50
	Detailed Exploration in non-CIL Blocks	184.50	135.71	151.20	89.50
(In USD million)	Regional (Promotional) Exploration of Coal and Lignite	10.58	9.62	16.05	7.45
	Detailed Exploration in non-CIL Blocks	30.5	22.19	23.10	13.34
Information Sources	1. (MoC, 2013, 2014a, 2015a, 2016a, 2017a) 2. (MOC, 2014b, 2015b, 2016b, 2017b) 3. (Coal India Limited, 2016a) 4. (Central Mine Planning & Design Institute Ltd, 2016) 5. (MoP, 2017a)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Insurance and indemnification→ Government insurance/indemnification**
Stimulated Activity	Production → Employment benefits in coal mining
Subsidy Name	**C.5** Coal Mines Pension Scheme (CMPS-98)
Jurisdiction	Central government
Legislation/ Endorsing Organization	Coal Mines and Provident Fund and Miscellaneous Provisions Act, 1948
Policy Objective(s) of Subsidy	To provide social security to all employees/their family members working in the coal mines across the country in the form of a contributory provident fund and pension delivery system with best competitive returns on the contributions of these employees.
End Recipient(s) of Subsidy	Coal sector employees
Time Period	Coal Mines Provident Fund Scheme (CPFS), started in 1948 Coal Mines Deposit Linked Pension Scheme (CMDLPS), started in 1976 Coal Mines Pension Scheme (CMPS), started in 1998
Background	The Coal Mines and Provident Fund Organisation was established under the Coal Mines and Provident Fund and Miscellaneous Provisions Act, 1948, and is responsible for administering CPFS, CMDLPS and CMPS. There are six classes of benefits under CMPS 1998: 1. Monthly pension 2. Disablement pension 3. Monthly widow/widower pension 4. Children pension 5. Orphan pension 6. Ex-gratia payment (a lump-sum amount in case of death of employee while in service) The central government contributes in the following manner: *1.* For CMPS 1998: An amount equivalent to 1-2/3 per cent of the salary of the employee (subject to maximum salary of INR 1,600 per month) from the appointed day. *2.* For CMDLIS 1976: An amount equal to 50 per cent of the contribution made by the employers. *3.* Under CMPFS 1948: An amount equivalent to 10 per cent of their salary is contributed by the employee, and an equivalent amount is paid by employers. An interest rate of 12 per cent per annum is allowed on the closing balance of the previous year. Financial support for pension and insurance schemes are not limited to public sector undertakings (PSUs). However, all eligible employees of the coal industry (public or private sector) are covered under the schemes. It is important to note that coal is one of the few sectors where separate provident fund legislation exists for the employees. Although few sectors other than coal do receive similar financial governmental support for social security, typically the organized sector in India is within the purview of the Employees Provident Fund organization.

Amount of Subsidy Conferred ***(Budget Outlay)**	**FY2014**	**FY2015**	**FY2016**	**FY2017***
(In INR crore)	22.00	22.25	22.35	21.00
(In USD million)	3.64	3.64	3.41	3.1
Information Sources	1. Note: For FY2014, FY2015 and FY2016actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2017. 2. (MoC, 2013, 2014a, 2015a, 2016a, 2017a) 3. (MoC, 2014b, 2015b, 2016b,2017b) 4. (Coal Mines Provident Fund Organisation (CMPFO), 2017c) 5. (GoI, 2008); 6. (CMPFO, 2017b) 7. (CMPFO, 2017a) 8. (MoP, 2017a)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Direct Spending→ Research and development support**			
Stimulated Activity	Production → Research supporting the development and extraction of coal			
Subsidy Name	**C.6** Expenditures by Ministry of Coal on Research and Development (R&D) Programs in the Coal Sector			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The objective of this program is to support technology development and its successful transfer for commercial application.			
End Recipient(s) of Subsidy	Coal producers			
Time Period	Research projects under Science & Technology grant of Ministry of Coal initiated in 1975 and budget outlay for development of northeastern region initiated in 1996.			
Background	The research and development (R&D) activity in the coal sector is administered through an apex body, namely the Standing Scientific Research Committee (SSRC). The main function of the SSRC is to plan and oversee implementations of research projects under the following thematic areas: 1. Improvement in production 2. Productivity and safety in coal mines 3. Coal beneficiation and utilization 4. Protection of environment and ecology Members of the SSRC include the Secretary, MoC (as chairman of the SSRC); Chairman, CIL; Chairman and Managing Director of Central Mine Planning and Design Institute Limited (CMPDI),[3] Singareni Collieries Company Limited and Neyveli Lignite Corporation Limited (NLC); Directors of the Council of Scientific and Industrial Research[4] laboratories; representatives of the Department of Science & Technology; representatives of Niti Aayog, among others. Separate budgetary support is provided for R&D activities in the northeastern region.			
Amount of Subsidy Conferred ***(Budget Outlay)**	**FY2014**	**FY2015**	**FY2016**	**FY2017***
(In INR crore)	11.65	17.95	18.00	10.00
(in USD million)	1.93	2.94	2.75	1.49

[3] CMPDI is a subsidiary of CIL responsible for consultancy and support for mineral exploration, mining, infrastructure engineering, environmental management and management systems, especially to the mineral, mining and allied sectors, both within and outside the coal industry and the country.
[4] The Council of Scientific and Industrial Research was established in 1942 for strategizing and executing scientific and technological activities in wide variety of S&T domains.

Information Sources	1. Note: For FY2014, FY2015 and FY 2016 actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2017 2. (MoC, 2013, 2014a, 2015a, 2016a, 2017a) 3. (MoC, 2014b, 2015b, 2016b, 2017b) 4. (CIL, 2016a) 5. (Central Mine Planning & Design Institute Ltd, 2016) 6. (MoP, 2017a)

Subsidy Mechanism	**Government revenue foregone→ Credit Support→ Government loans and loan guarantees**			
Stimulated Activity	Production → Cross-cutting through the value chain			
Subsidy Name	**C.7** Government guarantees for loans from multilateral banks			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Depends on the project			
Policy Objective(s) of Subsidy	Subsidized financing on capital costs of projects for development of domestic infrastructure.			
End Recipient(s) of Subsidy	CIL and its subsidiaries			
Time Period	Depends on the project			
Background	Multilateral organizations have provided loans to CIL at subsidized rates for development of domestic infrastructure and procurement of equipment as compared to loans provided by other domestic agencies. Moreover, the government has provided irrevocable and unconditional guarantees in relation to all payment obligations. Repayment schedule of these loans: **Export Development Corporation Canada**: Repayment to be made semi-annually on January 31 and on July 15 starting from 2004 and ending in 2044 **Liebherr France S.A. France**: Repayment is in 40 semi-annually instalments starting from June 1999 to December 2030 **For other domestic agencies:** Repayment of instalments is made semi-annually @12 per cent per annum.			
Amount of Subsidy Conferred[5]	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	10.70	10.93	11.02	not available
(in million USD)	1.75	1.67	1.64	not available
Information Sources	1. (CIL, 2014, 2015, 2016a) 2. (Securities and Exhcange Board of India, 2013)			

[5] Due to lack of complete information on preferential loans to CIL and its subsidiaries, the values have not been included in totals

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Environmental costs→ Responsibility for closure and post-closure risks**			
Stimulated Activity	Production → Environmental and social rehabilitation following the decommissioning of coal mines			
Subsidy Name	**C.8** Expenditures by Ministry of Coal for environmental conservation: Environmental Measures and Subsidence Control			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	Financial support for improving the environmental conditions in the old mined out areas (abandoned, waterlogged) of the Jharia and Raniganj coalfields by addressing fire and subsidence problems and rehabilitation of persons residing in these locations			
End Recipient(s) of Subsidy	CIL			
Time Period	Yearly support being provided from 2000 onwards			
Background	Unplanned and unsystematic coal mining activities in Jharia and Raniganj coalfields, spread over decades, has led to severe environment concerns in these areas. Even though some areas have been declared unsafe by the Directorate General of Mines Safety, these regions are still populated due to its commercial importance. A master plan has been prepared by Central Mine Planning and Design Institute Limited (CMPDI) for subsidence control of unstable inhabited sites, rehabilitation of people, diversion of rail/road and dealing with surface fire. Financial support is provided by the central government to CIL and additional funds (if required) are also made available for implementation of master plan. The responsibility for implementation has been entrusted with Asansol Durgapur Development Authority for Raniganj fields and Jharia Rehabilitation & Development Authority for Jharia fields.			
Amount of Subsidy Conferred *(Budget Outlay)	**FY2014***	**FY2015***	**FY2016***	**FY2017***
(in INR crore)	1	0.45	0.50	0.50
(in million USD)	0.17	0.07	0.08	0.07
Information Sources	1. Note: For FY2014, FY2015 andFY2016 actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2017 2. (MoC, 2013, 2014a, 2015a, 2016a, 2017a) 3. (MoC, 2014b, 2015b, 2016b, 2017b) 4. (MoC, 2015c) 5. (CMPDI, 2008)			

Subsidy Mechanism	**Government revenue foregone→ Credit Support→ Government loans and loan guarantees**			
Stimulated Activity	Production and consumption → Power plants			
Subsidy Name	**C.9** Low interest rate loans for power plants			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Electricity Act, 2003 empowering central government to make National Tariff Policy			
Policy Objective(s) of Subsidy	To promote more electricity generation in the sector in order to reduce the power deficit in the country.			
End Recipient(s) of Subsidy	Thermal coal power plants			
Time Period	Depends on the project			
Background	Under the National Tariff Policy 2006 (revised in 2016), capital costs of power plant projects should be financed using a debt equity ratio of 70:30. Promoters are also free to have a higher quantity of equity investments. The equity in excess of this norm should be treated as loans advanced at the weighted average rate of interest and for a weighted average tenor of the long-term debt component of the project after ascertaining the reasonableness of the interest rates and taking into account the effect of debt restructuring done, if any. In India, some of the power generating stations have been given loans at the base rate, which is currently 9.3 per cent instead of the SBI PLR rate of 14.05 per cent. Large companies like NTPC have been raising debts from Indian banks and financial institutions. The loan facility has been extended to NTPC and other generators at the base rate of the bank, which is the minimum rate at which a bank can lend. However, this is attributable more to the size of the company and credit size, which reduces the risk of the lender. For the plants that have obtained loans at the base rate from banks, the difference in the base rate and the market rate would qualify as a subsidy amount. However, in the absence of more detailed information on effective interest rates at the plant level, quantifying the subsidy is difficult.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
	not calculated	not calculated	not calculated	not calculated
Information Sources	1. (GoI, 2016c) 2. (State Bank of India, n.d.)			

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from special taxes**			
Stimulated Activity	Consumption			
Subsidy Name	**C.10** Concessional Custom Duty Rates on import of Coal			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Provisions of the Custom Tariff Act, 1975			
Policy Objective(s) of Subsidy	To reduce cost of coal as raw material in manufacturing sector			
End Recipient(s) of Subsidy	Coal-consuming sectors			
Time Period	Revised periodically			
Background	Coal imports in India attract concessional rates on basic customs duty. The basic custom duty is frequently adjusted. In FY2015, it was set for all types of coal at 2.5 per cent.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	7,991	7,839	6,452	6,688
(in USD million)	1,321	1,282	986	997
Information Sources	1. (Ministry of Commerce & Industry, 2017) 2. (CBEC, 2017b)			

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from special taxes**			
Stimulated Activity	Consumption			
Subsidy Name	**C.11** Concessional Excise Duty Rates on Coal Production			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Sub-section (1) of section 5A of the Central Excise Act 1944			
Policy Objective(s) of Subsidy	To reduce the cost of coal as raw material			
End Recipient(s) of Subsidy	Coal-consuming sectors			
Time Period	Revised periodically			
Background	Coal is subject to concessional excise duty rates of 6 per cent as compared to 15 per cent peak rates on other similar commodities.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	6,215	6,526	6,886	not available
(in USD million)	1,027	1,067	1,052	not available
Information Sources	1. (India Budget, 2011) 2. (CBEC, 2017b) 3. (MoF, 2011)			

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from special taxes**			
Stimulated Activity	Production → Development and extraction of coal (equipment)			
Subsidy Name	**C.12** Concessional Duty Rebates on Coal Mining Equipment			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Section 157 of the Customs Act, 1962 **Executive Order:** S. No. 506 of notification No. 12/2012-Customs dated 17.03.2012			
Policy Objective(s) of Subsidy	To facilitate initial setting up or expansion of a unit for coal projects.			
End Recipient(s) of Subsidy	All coal mining companies			
Time Period	From 2012 onwards			
Background	Machinery/equipment imported for coal mining projects attracts full exemption on basic customs duty from 2012/13 onwards as compared to 10 per cent basic customs duty on similar category products covered under chapter 98 section 157 of the Customs Act, 1962.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	45.97	59.09	35.10	not available
(in million USD)	7.60	9.66	5.36	not available
Information Sources	1. (Coal India Limited, 2014, 2015, 2016a) 2. (CBEC, 2012)			

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from special taxes**			
Stimulated Activity	Production and consumption → Power plants			
Subsidy Name	**C.13** Income Tax exemption for the generation of power			
Jurisdiction	Central Government			
Legislation/Endorsing Organization	Section 80 IA of the Income Tax Act			
Policy Objective(s) of Subsidy	To encourage entry of private players in generation of electricity			
End Recipient(s) of Subsidy	Developers of power projects			
Time Period	From 1993 onwards for all India			
Background	The government provides an incentive of a tax holiday (exemption) equal to 100 per cent of taxable profits for the first 10 years of operation to power-generating companies that began to generate power after April 1, 1993. The scheme was extended in 2014 and later discontinued from March 31, 2017.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	Not calculated	Not calculated	Not calculated	Not calculated
	Cannot be quantified			
Information Sources	1. (IncomeTaxManagement.com, n.d.)			

Subsidy Mechanism	**Provision of goods or services below market value→ Government-provided goods or services→ Government-provided goods or services at below-market rates**			
Stimulated Activity	Production and consumption → Transportation of coal by rail and promotion of coal as fuel			
Subsidy Name	**C.14** Concessional Rates: Railway Freight for Long Distance Coal Transportation			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Railway Act 1989. Chapter VI deals with Fixation of Rates			
Policy Objective(s) of Subsidy	To lower the cost of coal			
End Recipient(s) of Subsidy	Coal-consuming sectors			
Time Period	From 1989 onwards			
Background	Indian Railways is a state-owned enterprise having monopoly over the railway sector with minimal private participation. This gives the Ministry of Railways jurisdiction to set up freight rates for different commodities. Transportation tariffs for coal had been kept low until August 2016. However, rationalization of coal tariffs has been accomplished by changing the distance slabs. The freight rates were raised by 8–14 per cent for transporting coal between 200 km and 700 km and were lowered by 4–13 per cent for distances above 700 km. Freight rates for distances up to 200 km were unchanged.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
	not calculated	not calculated	not calculated	not calculated
	This subsidy cannot be quantified. As per media reports citing a spokesperson from Ministry of Railway, the concessional rates in long-distance coal transportation is causing losses of INR 700 crore (~USD 105 million) annually to Indian Railways.			
Information Sources	1. (NDTV PROFIT, 2016) 2. (Ministry of Railways, 1989) 3. (Lok Sabha, 2017)			

Subsidy Mechanism	**Provision of goods and services below market value→ Government-owned energy mineral→ Process for mineral leasing**			
Stimulated Activity	Production → Exploration, access and appraisal (allocation of mining blocks)			
Subsidy Name	**C.15** Government Revenue Foregone from captive coal allocation through Memorandums of Understanding route rather than competitive bidding route			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Coal Mines (Special Provision) Act, 2015 Mines and Minerals (Development and Regulation) Act, 1957 amended in 2015			
Policy Objective(s) of Subsidy	Underlying subsidy due to lack of effective mechanism for allocating government-owned resources			
End Recipient(s) of Subsidy	Captive coal mining companies			
Time Period	From 1957 onwards			
Background	Government guidelines mandate that allocation of captive coal blocks must be through competitive bidding process. However, they were allocated through Memorandums of Understanding during the period 2004–2009.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
	not calculated	not calculated	not calculated	not calculated
	Cannot be quantified. However, the Comptroller and Auditor General of India, the government auditor, in *Performance Audit of Allocation of Coal Blocks Report* (2012) mentioned that the allocation of coal blocks between 2005 and 2009 might have resulted in benefits to the tune of INR 1.86 lakh crore (~ USD 31 billion dollars) to private companies.			
Information Sources	1 (Comptroller and Auditor General of India, 2012b) 2. (Directorate General of Mines and Safety, 2015) 3. (MoC, 2016c) 4. (Malik, 2017)			

Subsidy Mechanism	**Provision of goods or services below market value→ Government-owned natural resources or land→ Access to government-owned natural resources land**			
Stimulated Activity	Production → Exploration, access and appraisal (access to land)			
Subsidy Name	**C.16** Compensation for Land Acquired for Coal Mining Purposes			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Coal Bearing Areas (Acquisition & Development) Act 1957 (CBA (A&D) Act 1957) and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013			
Policy Objective(s) of Subsidy	Undue preference to public sector companies over government-owned resources and land			
End Recipient(s) of Subsidy	Public sector companies			
Time Period	Since 1957			
Background	Private and public lands are acquired under the provisions of either the CBA (A&D) Act 1957 or the Land Acquisition Act 1894 (and various amendments with latest amendment in 2013) and, in certain cases, by direct purchase also. In all cases, the landowners are fully compensated for the cost of the land and homestead acquired by the coal companies. The value of land is determined on the basis of prevailing legal norms. Though the government acts as a facilitator in land acquisition under the acts, the monetary compensation has to be paid by the coal producers (whether PSUs or private players)—the government does not provide any financial assistance. However, under the CBA (A&D) Act 1957, while the government-owned company may pay compensation to the previous owners, there is no competitive process to allocate the land to other potential miners who might be willing to pay more for access to the mining rights. This could give rise to subsidies in some cases; however, it is difficult to quantify. With regards to acquisition of forest land, there are three kinds of compensation to be provided: 1. Acquiring land equal to an area double that of the acquired forest land, which is given to the forest department 2. Compensation for the cost of afforestation of the land provided 3. Payment to the forest department based on the net present value of the economic value of the produce/vegetation growing on the forest land. However, it is difficult to assess if the prescribed compensation rates are appropriate or are being complied with.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
	not calculated	not calculated	not calculated	not calculated
	Cannot be quantified.			
Information Sources	1. (GoI, 1957) 2. (Ministry of Law and Justice, 2013)			

Subsidy Mechanism	**Income or price support→ Market price support and regulation→ Regulatory loopholes**			
Stimulated Activity	Production → Cross-cutting through the value chain (oligopoly pricing)			
Subsidy Name	**C.17** Lack of regulator in coal sector			
Jurisdiction	Central government			
Legislation/Endorsing Organization	The central government is empowered by virtue of Article 246(1) of the Constitution and Entries 54 and 55 of List I (Union List) of the Seventh Schedule to legislate on "regulation of mines and mineral development."			
Policy Objective(s) of Subsidy	To monitor the supply and pricing of coal and land rehabilitation for coal mining areas in India			
End Recipient(s) of Subsidy	Public sector companies			
Time Period				
Background	Approximately 90 per cent of the coal market in India is dominated by public sector companies. There is significant intervention from these public sector companies with regards to coal distribution and pricing. Although the Ministry of Coal maintains close proximity with these public sector companies and influences sellers' ability to set coal prices in domestic markets, there is no mechanism in the coal sector to set efficiency norms and transparency in price setting. These arbitrary practices are biased towards public sector companies and also hinder level playing field and competition in sectors. The *Integrated Energy Policy Report on Coal Reforms* by the MoC also suggests the establishment of a regulator in the coal sector to approve coal price revisions, allocate coal, monitor e-auctions, regulate trading margins, create a competitive coal market and plan the coal sector in a scientific manner. With this background, the Coal Regulatory Authority Bill was introduced in the Lok Sabha in 2013. The bill lapsed with the dissolution of the Lok Sabha in 2014. The proposal for re-introducing the same is under consideration for interministerial consultations.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
	not applicable	not applicable	not applicable	not applicable
	Cannot be quantified.			
Information Sources	1. (Planning Commission, GoI, 2005) 2. (Business Standard, 2015)			

Subsidy Mechanism	**Income or price support→ Market price support and regulation→ Regulatory loopholes**			
Stimulated Activity	Consumption			
Subsidy Name	**C.18** Pricing Mechanism for Coal			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Coal Pricing Policy in India			
Policy Objective(s) of Subsidy	To lower coal prices			
End Recipient(s) of Subsidy	CIL and its subsidiaries			
Time Period	N/A			
Background	The pricing of coal was based on useful heat value until December 2011; from January 2012 the pricing mechanism changed to gross calorific value. Coal pricing at present is fixed by the MoC in consultation with CIL and Singareni Collieries Company Limited. As no other company was allowed in the field, coal pricing used to be entirely dependent on the price notified by government. The price of coal was largely based on a cost-plus approach. There is no indexation with international coal prices. However, recently, the central government has passed various policies for coal linkages to be based on either auction of linkages or through power purchase agreement-based competitive bidding of tariff. These are appreciable steps to keep prices market-determined.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	not calculated	not calculated	not calculated	not calculated
Information Sources	1. Coal Consumers' Association of India (2012)			

A2.2. State Government Support to Coal for the State of Chhattisgarh

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from special taxes**			
Stimulated Activity	Consumption			
Subsidy Name	**C.19** Lower value-added tax (VAT) rates on sale of coal in state of Chhattisgarh			
Jurisdiction	Chhattisgarh state			
Legislation/Endorsing Organization	The Chhattisgarh Value Added Sales Tax Act, 2003			
Policy Objective(s) of Subsidy	To reduce cost of coal as raw material			
End Recipient(s) of Subsidy	Coal-consuming sectors			
Time Period	N/A			
Background	VAT is a kind of tax levied on sale of goods and services. Enforcement and collection of VAT comes under the purview of state governments, and they determine the rates of VAT applicable on different commodities. Sale of coal in Chhattisgarh attracts concessional rates of 5 per cent as compared to 25 per cent peak rates in other similar commodities.			
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**
(in INR crore)	1.1	1.4	1.5	2.3
(in USD million)	0.2	0.2	0.2	0.3
Information Sources	1. (Chhattisgarh Commercial Tax Department, 2017) 2. (Government of Chattisgarh, 2017) 3. (CIL, 2016c)			

A3. Oil and Gas

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities** → **Earmarks:** Special disbursements targeted at the sector				
Stimulated Activity	Consumption →Transport and logistics support in remote areas. Consumption could be stimulated to the extent the reduced cost in this value chain segment is reflected in the final prices				
Subsidy Name	Freight Subsidy Scheme: • **OG.1** Domestic LPG freight subsidy • **OG.2** PDS Kerosene freight subsidy				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Petroleum and Natural Gas under notification No. P-20029/18/2001-PP, dated 28 January 2003				
Policy Objective(s) of Subsidy	To reduce the cost of transportation of PDS kerosene and domestic LPG				
End Recipient(s) of Subsidy	Downstream oil marketing companies				
Time Period	From 2002 to 2015				
Background	This subsidy was provided by the federal government to the downstream oil marketing companies to compensate for additional costs of transporting domestic LPG and PDS kerosene to remote areas in the country. These regions include the northeastern states (except some districts in Assam), Sikkim, Jammu and Kashmir (some districts excluded), Andaman and Nicobar Islands and Lakshadweep. The subsidy covers part of the freight cost up to the wholesale dealer (for PDS kerosene) or the distribution outlet (for domestic LPG). However, the subsidy scheme was discontinued in April 1, 2015.				
Amount of Subsidy Conferred: Domestic LPG	FY2014	FY2015	FY2016*	FY2017*	FY2018*
	INR 16 crore	INR 17 crore	N/A	N/A	N/A
	USD 3 million	USD 3 million	N/A	N.A	N/A
Amount of Subsidy Conferred: PDS kerosene	INR 5 crore	INR 17 crore	N/A	N/A	N/A
	USD 1 million	USD 1 milion	N/A	N/A	N/A
	*No payments were made after 2015 as per the latest available statistics				
Information Sources	1) (MoPNG, 2003) 2) (PPAC, n.d.c)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities** → **Earmarks:** Special disbursements targeted at the sector				
Stimulated Activity	Consumption → Consumption of liquefied petroleum gas (LPG)				
Subsidy Name	**OG.3** Fiscal Subsidy on Domestic LPG				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Petroleum and Natural Gas (MoPNG) under notification No. P-20029/18/2001-PP, dated 28 January 2003				
Policy Objective(s) of Subsidy	To improve affordability of domestic LPG				
End Recipient(s) of Subsidy	The subsidy is provided to the oil marketing companies in order to make it affordable for consumers to access LPG.				
Time Period	From 2002 to 2015				
Background	Since 2002, the Government of India has provided a per-unit subsidy on the price of domestic LPG. The subsidy is financed through the national budget and has been fixed at a specified flat rate basis for each LPG bottling plant based on the difference between the cost price and the retail price. Both the cost price* and issue price* were supposed to be revised by the companies based on the changes in corresponding prices in the international market. However, this mechanism could not be implemented by the companies because of the sharp rise in LPG prices in international markets since 2004. The subsidy scheme was discontinued with effect from April 1, 2015. *The details cost price and depot/issue price are explained in price build-up provided in information sources below.				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016*	FY2017*	FY2018*
	INR 14 crore	INR 2,272 crore	N/A	N/A	N/A
	USD 315 million	USD 372 million	N/A	N/A	N/A
	*No payments were made after FY2015 as per the latest available statistics				
Information Sources	1. (PPAC, n.d.d) 2. (PPAC, n.d.c)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Earmarks:** Special disbursements targeted at the sector				
Stimulated Activity	Consumption → Consumption of kerosene				
Subsidy Name	**OG4. Fiscal Subsidy on PDS Kerosene**				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Petroleum and Natural Gas under notification No. P-20029/18/2001-PP, dated January 28, 2003				
Policy Objective(s) of Subsidy	To increase affordability of Public Distribution System (PDS) kerosene				
End Recipient(s) of Subsidy	The subsidy is provided to the oil marketing companies in order to make it affordable for consumers to access kerosene.				
Time Period	From 2002 to 2015				
Background	This subsidy on PDS kerosene is effective from April 1, 2002. The subsidy is paid from the federal budget and was fixed at a specified flat rate for each depot based on the difference between the cost price (based on import parity) and the issue price or prices charged to dealers by oil marketing companies (also called depot price) per unit before taxes (now GST) and dealers' commission.* In accordance with the scheme, both the cost price and issue price were supposed to be revised by the companies based on the changes in corresponding prices in the international market. However, the revision did not happen in line with the movement of international oil prices because of intermittent oil price spikes. The scheme was discontinued in April 2015. *The details cost price and depot/issue price are explained in price build-up provided in information sources below				
Amount of Subsidy Conferred	FY2013	FY2014	FY2015	FY2016	FY2017
	INR 741 crore	INR676 crore	N/A	N/A	N/A
	USD 145 million	USD 112 million	N/A	N/A	N/A
	*No payments were made in FY2015 as per the latest available statistics				
Information Sources	1. (PPAC, n.d.d) 2. (PPAC, n.d.c)				

Subsidy Mechanism	**Direct or Indirect Transfer of Funds and Liabilities→ Direct Spending- Earmarks**				
Stimulated Activity	Consumption →Consumption of LPG				
Subsidy Name	Direct Benefit Transfer for LPG/ Pratyaksha Hastaantarit Laabh (PAHAL): • **OG.5** Subsidy on domestic LPG • **OG.7** Permanent cash advance for LPG consumers • **OG.8** Project management subsidy for districts				
Jurisdiction	Federal				
Legislation/Endorsing Organization	MoPNG				
Policy Objective(s) of Subsidy	To provide subsidy directly to the consumer by transferring the subsidy amount to individual bank accounts of targeted and intended beneficiaries instead of lowering the market prices				
End Recipient(s) of Subsidy	Targeted and eligible consumers of LPG				
Time Period	From June 1, 2013 onwards				
Background	Direct Benefit Transfer for LPG Consumer (DBTL) Scheme, 2013 was launched with effect from June 1, 2013. The objective of the scheme was to provide a capped number of subsidized cylinders to domestic LPG consumers and transfer the subsidy amount directly to their bank account. The other key elements besides DBT were: 1) a one-time permanent cash advance that was provided to every existing or new transfer compliant consumer; 2) allocation of expenditures on project management for the districts where DBTL is implemented to be paid back to oil marketing companies subject to certain specific ceilings. The scheme was launched in a phased manner in various districts all over India. By January 2014, the DBTL scheme, was launched in 291 districts. However, the scheme was suspended from March to November 2014. A modified DBTL scheme was re-launched effective November 15, 2014 in 54 districts of India. This was extended to all districts in the country on January 1, 2015 with a few exceptions: oil marketing subsidies could exclude some districts/parts of districts or distributors from the scheme for reasons like connectivity issues, etc. The basic objectives, principles and features of the modified scheme, however, remained the same with a few improvements and changes.				
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**	**FY2018 (budget estimate)**
Subsidy on DBTL	INR 3,869 crore	INR 3,979 crore	INR 16,056 crore	INR 12,133 crore	INR 13,097 crore

	USD 640 million	USD 649 million	USD 2,453 million	USD 1,808 million	USD 1,984 million
One-time permanent cash advance	INR 1,234 crore	N/A	INR 5,755 crore	N/A	N/A
	USD 210 million	N/A	USD 863 million	N/A	N/A
Project management expenditure	INR 43.15 crore	N/A	INR 200 crore	N/A	N/A
	USD 7 million	N/A	USD 20 million	N/A	N/A
Information Sources	1. (PPAC, n.d.d) 2. (MoF, 2017d),				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities** → **Earmarks:** Special disbursements targeted at the sector
Stimulated Activity	Consumption → Household use of LPG
Subsidy Name	**OG.6** Rajiv Gandhi Gramin LPG Vitaran Yojana
Jurisdiction	Support provided by the federal government (state government provides consumer subsidy in some cases)
Legislation/Endorsing Organization	Ministry of Petroleum and Natural Gas under notification No. No.P-20020/22/2009-Mkt.dated 6 August 2009
Policy Objective(s) of Subsidy	An allocation was made by the central government to the state-owned oil marketing companies for increasing their LPG distribution infrastructure and to start small-size LPG distributor agencies
End Recipient(s) of Subsidy	State-owned oil marketing companies
Time Period	Since 2009
Background	The government initiated the Rajiv Gandhi LPG Vitaran Yojana (RGGLVY) to increase access to LPG in rural areas by increasing the number of distributorships in these areas. The scheme was kept on hold in 2015 to bring about changes in the guidelines for a selection of rural LPG dealers. Meanwhile, the Modi government had rolled out one-time financial assistance to the BPL category for new LPG connections under RGGLVY. Under this scheme, one-time financial assistance is granted to the BPL cardholder for the release of a new LPG connection. Under this scheme, the cost of the security deposit and pressure regulator (nearly INR 1,600) is met from the funds of the public sector oil marketing companies created for this purpose by contributions from the corporate social responsibility funds of six major oil firms.
Amount of Subsidy Conferred	The last allocation made in the federal budget was INR 1 crore in FY2014, and no allocation has been made thereafter
Information Sources	1. (MoPNG, 2014) 2. (MoPNG, 2009) 3. (Saikia, 2015) 4. (Organisation for Economic Cooperation and Development [OECD], 2014)

Subsidy Mechanism	**Direct or Indirect Transfer of Funds and Liabilities→Direct Spending-Earmarks**				
Stimulated Activity	Consumption → Household use of kerosene				
Subsidy Name	Direct Benefit Transfer on Kerosene: • **OG.9** DBTK • **OG. 10** Cash Incentive for kerosene distribution reforms • **OG. 11** Assistance to States/Union Territories (Uts) for establishment of Institutional mechanism for direct transfer of subsidy in cash for PDS Kerosene beneficiaries				
Jurisdiction	Federal				
Legislation/Endorsing Organization	MoPNG				
Policy Objective(s) of Subsidy	To provide subsidy directly to the consumer by transferring the subsidy amount to individual bank account instead of lowering the market prices				
End Recipient(s) of Subsidy	Eligible households for the scheme				
Time Period	From 2016 onwards				
Background	The MoPNG announced implementation of the DBT in kerosene, in effect starting April 1, 2016 in 33 districts spread across nine states, namely: Chhattisgarh, Haryana, Himachal Pradesh, Jharkhand, Madhya Pradesh, Maharashtra, Punjab, Rajasthan and Gujarat. As a part of the scheme, the consumer will pay the market price of kerosene at the time of purchase. The amount of subsidy is then directly transferred to the bank account of the beneficiary. In order to avoid any inconvenience to the beneficiary because the initial purchase is through payment of a non-subsidized price, an initial amount of the subsidy is credited to all eligible beneficiaries. As a part of this scheme, DBT-implementing states are provided cash incentives for kerosene distribution reforms, and assistance is also provided to states and UTs to establish an institutional mechanism for direct transfer of subsidy for PDS kerosene beneficiaries.				
Amount of Subsidy Conferred (RE = revised estimate BE = budget estimate)	FY2014	FY2015	FY2016	FY2017	FY2018
Subsidy on DBTK	N/A	N/A	N/A	INR 0.01 crore	INR 150 crore (BE)
	N/A	N/A	N/A	USD 0.002 million	USD 23 million (BE)
Cash Incentive for Kerosene Distribution Reforms	N/A	N/A	N/A	INR 81 crore (RE)	INR 107 crore (BE)

	N/A	N/A	N/A	USD 12 million(RE)	USD 16 million (BE)
Assistance to States/UTs for establishment of Institutional mechanism for direct transfer of subsidy in cash for PDS Kerosene beneficiaries	N/A	N/A	N/A	INR 2 crore (RE)	INR 5 crore (BE)
	N/A	N/A	N/A	USD 0.3 million (RE)	USD 0.76 million (BE)
Information Sources	1. (PIB, 2016a) 2. (MoF, 2017d) 3. (PPAC, n.d.d)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities** → **Earmarks:** Special disbursements targeted at the sector				
Stimulated Activity	Consumption →Consumption of natural gas				
Subsidy Name	**OG.12** Natural Gas Subsidy Scheme for Northeastern States				
Jurisdiction	Northeastern states				
Legislation/Endorsing Organization	MoPNG				
Policy Objective(s) of Subsidy	To subsidize natural gas for select consumers				
End Recipient(s) of Subsidy	Participating companies, namely Oil India Limited and ONGC Limited				
Time Period	From 2002 to present				
Background	This scheme was formulated for administering subsidies related to the sale of natural gas in the northeastern region of India. To increase the affordability of natural gas for consumers in the energy-scarce northeastern region of India, the central government had pegged the price of natural gas to USD 2.52 per mBtu (60 per cent of the APM price of USD 4.2 per mBtu). To compensate the oil companies for selling gas at lower prices in the northeastern region and the higher transportation charges involved in the same, the central government provides an annual subsidy to participating companies. The participating companies currently under the scheme are Oil India Ltd and ONGC Ltd. Customers to whom gas is sold are in the power and fertilizer sectors. Allocations of supply to the customers are given as per various orders of the MoPNG. The amount of subsidy is the difference between the producer price as applicable to the participating companies and the APM rate, or the consumer price, applicable to different categories of customers in the northeastern region for the quantities of gas supplied. Subsidies on natural gas are provided through a budgetary grant from MoPNG.				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017	FY2018
	INR 625 crore	INR 661 crore	INR 660 crore	INR 745 crore	N/A
	USD 103 million	USD 108 million	USD 101 million	USD 111 million	N/A
Information Sources	1. (OECD, 2014) 2. (PPAC, n.d.d)				

Subsidy Mechanism	**Direct or Indirect Transfer of Funds and Liabilities→Direct Spending-Earmarks**
Stimulated Activity	Consumption → Use of diesel for irrigation
Subsidy Name	**OG.13** Diesel Subsidy in Drought and Deficit Rainfall Affected Areas
Jurisdiction	Administered by the federal government with the participation of state /UT administration on a participatory basis
Legislation/Endorsing Organization	Ministry of Agriculture
Policy Objective(s) of Subsidy	To make diesel prices cheaper for farmers for use in irrigation in drought- and rain-deficit affected areas
End Recipient of the Subsidy	Farmers in the drought and rain-deficit affected areas
Time Period	2015 onwards
Background	This subsidy is provided to farmers so that they can pursue life-saving irrigation by making use of diesel pump sets in the drought and deficit rainfall areas to prevent the standing crops from getting destroyed. The scheme was supposedly implemented with the participation of the state governments/UT administration, with a view to offsetting the cost of diesel used for pumping water to provide supplementary irrigation/protective irrigation. "The scheme will be applicable to such districts/talukas/areas where the rainfall deficit is more than 50 per cent as on 15th July 2015, (as reported by India Meteorological Department) or have been declared as drought affected area by the respective." For state government/UTs, the scheme will be applicable to "areas with prolonged dry spell continuously for 15 days, i.e. scanty rainfall (deficit of 60 per cent or more of normal) for any continuous 15 days period, after the onset date of Monsoon as per reports of IMD." A 50 per cent subsidy on the cost of diesel (INR 2,000 per hectare) is proposed to the affected farmers, limited to a maximum of two hectares per farmer. The cost of assistance was to be shared between the Government of India and the state government or UT Administration concerned on 50:50 basis.
Amount of Subsidy Conferred	Subsidy information not available for FY2014–FY2016. FY 2017: (RE) INR 7.40 crore
Sources:	1. (PIB, 2015c) 2. (PIB, 2015b) 3. (Department of Agriculture, 2017)

Subsidy Mechanism	**Direct or Indirect Transfer of Funds and Liabilities→Direct Spending-Earmarks**
Stimulated Activity	Consumption → Use of diesel for irrigation
Subsidy Name	**OG.13** Diesel Subsidy in Drought and Deficit Rainfall Affected Areas
Jurisdiction	Administered by the federal government with the participation of state /UT administration on a participatory basis
Legislation/Endorsing Organization	Ministry of Agriculture
Policy Objective(s) of Subsidy	To make diesel prices cheaper for farmers for use in irrigation in drought- and rain-deficit affected areas
End Recipient of the Subsidy	Farmers in the drought and rain-deficit affected areas
Time Period	2015 onwards
Background	This subsidy is provided to farmers so that they can pursue life-saving irrigation by making use of diesel pump sets in the drought and deficit rainfall areas to prevent the standing crops from getting destroyed. The scheme was supposedly implemented with the participation of the state governments/UT administration, with a view to offsetting the cost of diesel used for pumping water to provide supplementary irrigation/protective irrigation. "The scheme will be applicable to such districts/talukas/areas where the rainfall deficit is more than 50 per cent as on 15th July 2015, (as reported by India Meteorological Department) or have been declared as drought affected area by the respective." For state government/UTs, the scheme will be applicable to "areas with prolonged dry spell continuously for 15 days, i.e. scanty rainfall (deficit of 60 per cent or more of normal) for any continuous 15 days period, after the onset date of Monsoon as per reports of IMD." A 50 per cent subsidy on the cost of diesel (INR 2,000 per hectare) is proposed to the affected farmers, limited to a maximum of two hectares per farmer. The cost of assistance was to be shared between the Government of India and the state government or UT Administration concerned on 50:50 basis.
Amount of Subsidy Conferred	Subsidy information not available for FY2014–FY2016. FY 2017: (RE) INR 7.40 crore
Sources:	1. (PIB, 2015c) 2. (PIB, 2015b) 3. (Department of Agriculture, 2017)

Subsidy Mechanism	**Income or price support→ Market price support and regulation**				
Stimulated Activity	Consumption → Consumption of diesel, LPG and PDS kerosene				
Subsidy Name	Under-recovery of costs on sensitive petroleum products: • **OG.14** Under-recovery on diesel • **OG.15** Under-recovery on domestic LPG • **OG.16** Under-recovery on PDS kerosene				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Petroleum and Natural Gas under notification No. P-20029/18/2001-PP, dated 28 January 2003				
Policy Objective(s) of Subsidy	To provide market price support through regulated prices for petroleum products to make them affordable to consumers				
End Recipient(s) of Subsidy	Consumers of petroleum products				
Time Period	The control on price of petroleum products that include domestic LPG and PDS kerosene started way back in 1974, post-1973 oil crisis, under the Administrative Price Mechanism (APM). Although APM was dismantled in 2002, partial regulation still exists on these products.				
Background	In India, the prices of four sensitive products—namely petrol, diesel, PDS kerosene and domestic LPG—have historically been regulated by the government to increase their affordability for consumers. Since the prices of these products have usually been kept lower than the market price demanded by the downstream oil marketing companies, they continued to incur heavy "under-recoveries" over the years. The difference between the market-determined consumer price of a petroleum product and the government-controlled price of that product is referred to as the under-recovery per unit of the product. Part of the under-recovery has usually been paid as cash compensation/specific subsidy on domestic LPG and PDS kerosene (explained earlier as direct and freight subsidy) and by issuing special securities to downstream oil marketing companies (explained later). Another part had been borne by the upstream oil and gas companies (which are public sector enterprises). The residual part had been borne by the downstream oil companies. With deregulation of petrol price in 2010 and diesel prices in 2014, however, the under-recoveries have come down significantly. The data that has been presented here consists of only three products because the time period considered is from 2011 to post-deregulation of petrol prices.				
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**	**FY2018**
Diesel (Under recovery on Diesel was only upto 18th October '2014)	INR 62,837 crore	INR 10,935 crore	N/A	N/A	N/A
	USD 10,682 million	USD 1,788 million	N/A	N/A	N/A

Subsidized Domestic LPG (Government has taken decision to restrict the supply of subsidized LPG cylinders for each consumer to 12 cylinders annually from 2014-15 onwards)	INR 46,458 crore	INR 36,580 crore	INR 18 crore	N/A	N/A
	USD 7,898 million	USD 5,982 million	USD 3 million	N/A	N/A
PDS Kerosene	**INR 30,357 crore**	**INR** 24,799 crore	**INR** 11,496 crore	**INR** 7,595 crore	**INR** 8,662 crore (budget estimate)
	USD 5,054 million	**USD** 4,055 million	**USD** 1,756 million	**USD** 1,132 million	**USD** 1,312 million (budget estimate)
Information Sources	**1.** (PPAC, n.d.d)				

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from excise taxes/special taxes**
Stimulated Activity	Consumption →Consumption of LPG
Subsidy Name	**OG.17** Customs duty exemption on imported Liquefied Petroleum Gas (LPG) used for domestic use
Jurisdiction	Federal
Legislation/Endorsing Organization	CBEC notification dated no. 12/2012, dated March 17, 2012 and dated February 8, 2013
Policy Objective(s) of Subsidy	To reduce the end price of imported LPG due to shortage of domestically produced LPG
End Recipient(s) of Subsidy	End consumers of LPG
Time Period	From 2012 onwards
Background	LPG is subject to 5 per cent basic customs duty under S.No. 142 of the customs notification no. 12/2012 dated March 17, 2012. However, retrospective exemption was allowed for LPG imported by the Indian Oil Corporation Limited, Hindustan Petroleum Corporation Limited or Bharat Petroleum Corporation starting February 8, 2013.
Amount of Subsidy Conferred	Subsidies have not been computed for FY2014–FY2018
Information Sources	1. (GoI, 2014) 2. (PPAC, n.d.a)

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from excise taxes/special taxes**
Stimulated Activity	Consumption ⊠Consumption of LPG
Subsidy Name	**OG.19** Tax differential to LPG under Declared Good Status
Jurisdiction	Federal/States
Legislation/Endorsing Organization	Ministry of Finance, Section 14 of the Central Sales Tax (CST) Act
Policy Objective(s) of Subsidy	To moderate the price of LPG for domestic use
End Recipient(s) of Subsidy	End consumers of LPG
Time Period	From 2006 onwards
Background	Under the CST Act 1956 on imposition of sales tax or VAT, states place certain restrictions on declared goods of special importance. Article 286(3)(a) of the Constitution of India authorizes parliament to declare some goods "of special importance" and to impose restrictions and conditions in regard to the power of the states in regard to levies, rates and other taxes on such goods. Exercising power under section 14 of the Central Sales Tax Act 1956, the parliament has declared some goods "of special importance" and has placed restrictions under Section 15 of the CST Act on the imposition of sales tax or VAT on such goods by the state government. Section 2(c) of the CST Act defines Declared Goods as those declared under Section 14 of the CST Act as goods of Special Importance in inter-state trade or commerce. As per the government's policy on "Declared Goods," the state governments cannot charge sales tax of more than 5 per cent on such products. Domestic LPG has become a "Declared Good" under the CST Act and the maximum sales tax/VAT rate is 4 per cent, effective April 19, 2006 across all the states/UTs.
Amount of Subsidy Conferred	Subsidies have not been computed for FY2014–FY2018
Information Sources	1) (MoF, 2006) 2) (PPAC, n.d.b)

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from excise taxes/special taxes**
Stimulated Activity	Consumption →Consumption of PDS kerosene
Subsidy Name	**OG.20** Customs duty exemption on imported Kerosene for use in PDS
Jurisdiction	Federal
Legislation/Endorsing Organization	Central Board of Excise and Custom (CBEC) Notification No.12 /2012 dated 17.03.2012
Policy Objective(s) of Subsidy	To make imported kerosene cheaper for end consumers
End Recipient(s) of Subsidy	End consumers of kerosene
Time Period	From 2012 onwards
Background	Kerosene is subject to 5 per cent basic customs duty. However, under CBEC Notification No.12 /2012 dated March 17, 2012 the exemption was afforded to kerosene imported by the Indian Oil Corporation Limited, Hindustan Petroleum Corporation Limited or Bharat Petroleum Corporation for use in PDS.
Amount of Subsidy Conferred	Subsidies have not been computed for FY2014–FY2018
Information Sources	1. (GoI, 2014) 2. (PPAC, n.d.a) 3. (CBEC, n.d.a)

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from excise taxes/special taxes**				
Stimulated Activity	Consumption → Consumption of LPG and PDS kerosene				
Subsidy Name	Excise duty exemption: • **OG.18** Domestic LPG excise duty exemption • **OG.21** PDS Kerosene excise duty exemption				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Notification No. 12 /2012-Central Excise dated 17.03.2012				
Policy Objective(s) of Subsidy	To make domestic LPG for household use and PDS kerosene cheaper				
End Recipient(s) of Subsidy	End consumers of LPG and kerosene				
Time Period	From 2012 onwards				
Background	LPG and PDS kerosene for supply to household domestic consumers at subsidized prices, as notified by the Ministry of Petroleum and Natural Gas under notification No.P- 20029/18/2001-PP, dated January 28, 2003 are exempt from excise duties. There is no excise duty on a 14.2-kg cylinder of subsidized LPG used for domestic purposes, but a similar sized non-domestic bottle attracts an 8 per cent levy. For PDS kerosene there is an excise duty waiver, as compared to non-PDS kerosene which is levied at an excise tax of 14 per cent				
Amount of Subsidy Conferred	**FY2014**	**FY2015**	**FY2016**	**FY2017**	**FY2018**
Domestic LPG	INR 4,055.71 crore	INR 3,702.58 crore	INR 5,045.61 crore	INR 5,844.20 crore	N/A
	USD 689 million	USD 592 million	USD 757 million	USD 877 million	N/A
PDS Kerosene	INR 2,446 crore	INR 1,984 crore	INR 1,026 crore	INR 703 crore	N/A
	USD 404 million	USD 324 million	USD 157 million	USD 105 million	N/A
Information Sources	1. (GoI, 2012a) 2. (PPAC, n.d.a)				

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from excise taxes/special taxes**				
Stimulated Activity	Consumption → Promotion of liquefied natural gas (LNG) as fuel for power generation and other uses				
Subsidy Name	**OG.22** Customs duty exemption to power companies purchasing imported LNG				
Jurisdiction	Federal/States				
Legislation/Endorsing Organization	Ministry of Finance, S. No 139 of notification No. 12/2012-Customs dated 17.03.2012. This notification was replaced by notification no.6/2017 dated 02.02.2017 post the Federal Budget 2017-18				
Policy Objective(s) of Subsidy	To promote liquefied natural gas (LNG) use by power-generating companies				
End Recipient(s) of Subsidy	Initially, power companies using natural gas as a fuel, but post-Federal Budget 2017/18 this has been extended to all end-users				
Time Period	From 2012 onwards				
Background	In the Union Budget 2012/13, the central government exempted power companies purchasing imported LNG from paying the 5 per cent customs duty otherwise levied on this product. This decision was taken to encourage power-generating companies to switch to imported gas in the current scenario of declining domestic production of natural gas. Natural gas is associated with less air pollution relative to coal, but imported LNG is a significantly more expensive fuel source for power generation. This exemption is only provided to power generation companies and not to captive power plants that are set up by companies primarily to meet their own electricity requirements. However, in the Union Budget 2017/18, the customs duty on LNG was reduced from 5 per cent to 2.5 per cent and the exemption was extended to all end-users.				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017	FY2018
	INR 911 crore	INR 534 crore	INR 248.46 crore	INR 58.11 crore	N/A
	USD 151 million	USD 87 million	USD 37 million	USD 9 million	N/A
Information Sources	1. (MoF, 2012) 2. (PPAC, n.d.b) 3. (IMF, n.d.) 4. (Lok Sabha Secretariat , 2017) 5. (MoF, 2017e)				

Subsidy Mechanism	**Provision of goods or services below market value → Government provided goods and services → Government provided goods and services at below market rate**				
Stimulated Activity	Consumption → Household use of LPG cooking stoves				
Subsidy Name	**OG.23** PM Ujjwala Yojana				
Jurisdiction	Federal				
Legislation/Endorsing Organization	MoPNG, Government of India				
Policy Objective(s) of Subsidy	As stated in the webpage of PM Ujjwala Yojana, the objective is "to safeguard the health of women and children in the household by providing them with a clean cooking fuel – LPG so that they don't have to compromise their health in smoky kitchens or wander in unsafe areas collecting firewood."				
End Recipient(s) of Subsidy	Women members of the below poverty line (BPL) households who do not have an LPG connection.				
Time	From May 1, 2016				
Background	The scheme was inaugurated by the Hon. Prime Minister Shri Narendra Modi on May 1, 2016 in Balia district on the border of Bihar and Uttar Pradesh. The scheme, proposes a 5 crore LPG connection be provided to BPL families with the connections issued in the name of women members of an eligible household. Support of INR 1,600 for every connection was proposed for three years starting from inception. The BPL households would be selected by resorting to Socio Economic Caste Census Data.				
Amount of Subsidy Conferred (RE = revised estimate BE = budget estimate)	FY2014	FY2015	FY2016	FY2017	FY2018
	N/A	N/A	N/A	INR 2,500 crore (RE)	INR 2,500 crore (BE)
	N/A	N/A	N/A	USD 365 million (RE)	USD 375 million (BE)
Information Sources	1. (Ujjwala, 2016) 2. (Standing Committee on Petroleum & Natural Gas, 2017)				

Subsidy Mechanism	**Provision of goods or services below market value → Government provided goods and services → Government provided goods and services at below market rate**				
Stimulated Activity	Consumption → Household use of LPG cooking stoves				
Subsidy Name	**OG.24** OMC Support for Extension of LPG connection to poor families under CSR Scheme				
Jurisdiction	Federal				
Legislation/Endorsing Organization	MoPNG, Government of India				
Policy Objective(s) of Subsidy	Support under CSR scheme to improve access to LPG connection				
End Recipient(s) of Subsidy	Women members of BPL households who do not have an LPG connection.				
Time	Beginning May 1, 2016				
Background	Under this scheme, BPL families can have a new LPG connection without paying the security deposit of one cylinder (14.2 kg or 5 kg capacity, as the case may be) and one pressure regulator. However, the other expenses pertaining to release of new LPG connections are supposed to be borne by the beneficiaries. BPL ration cardholders can get only a deposit-free single cylinder under the scheme. If the BPL ration cardholder wants to have a second cylinder, they will be allowed to receive that at the prevailing deposit rate.				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017	FY2018
	INR 39.14 crore	INR 224.75 crore	INR 791.49 crore	N/A	N/A
	USD 7 million	USD 36 million	USD 119 million	N/A	N/A
Information Sources	(myLPG.in, n.d.)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Direct Spending→ Research and Development Support**				
Stimulated Activity	Production → R&D in the oil and gas sector				
Subsidy Name	**OG.25** Oil Industry Development Board (OIDB) Financial Assistance in the form of Grants and Subsidies				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Finance /Ministry of Petroleum and Natural Gas under Oil Industry (Development) Act, 1974				
Policy Objective(s) of Subsidy	To provide financial and other assistance for the development of the oil industry				
End Recipient(s) of Subsidy	Oil industry in general and organizations engaged in the development of the oil industry				
Time Period	From 1974 onwards				
Background	The Oil Industry (Development) Act, 1974 was enacted following successive and steep increases in the international prices of crude oil and petroleum products since early 1973, when the need for progressive self-reliance in petroleum and petroleum-based industrial raw materials assumed more importance. The following objects were included in the statement of Objects and Reasons for the Oil Industry (Development) Bill, 1974: • The programs for securing self-reliance in petroleum and petroleum-based raw materials should be rapidly stepped up. • Necessary resources for execution of such programs must be assured. • For these purposes, cess to be levied on crude oil and natural gas to create an Oil Industry (Development) Fund. • The fund would be used exclusively to provide financial assistance to the organizations engaged in development programs for the oil industry. • The act provides for the establishment of a board for the development of the oil industry and for that purpose to levy duty of excise on crude oil and natural gas and for matters connected therewith. The Oil Industry Development Board, so formed under the aegis of the Oil Industry (Development) Act, 1974, has been entrusted with the responsibility to render financial and other assistance for the promotion of all such measures that are conducive to the development of the oil industry. The board renders assistance by way of grant of loans for projects, disbursements of grants for R&D programs, refinancing of loans and funding expenditures for scientific advisory committees, study groups, task forces, etc.				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017	FY2018
	INR 152 crore	INR 311 crore	INR 275 crore	N/A	N/A
	USD 25 million	USD 51 million	USD 42 million	N/A	N/A
Information Source	(OIDB)(annual reports for various years)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Earmarks and ownership of energy-related enterprises → Security-related enterprises**				
Stimulated Activity	Consumption				
Subsidy Name	**OG.26** Provision towards Strategic Petroleum Reserve in India				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Finance				
Policy Objective(s) of Subsidy	To protect the economy against oil supply disruptions				
End Recipient(s) of Subsidy	The crude stockpiles would eventually be utilized by the downstream refiners				
Time Period	2015/16 to 2017/18 onwards				
Background	India's Strategic Petroleum Reserves Limited has signed an agreement on oil storage and management with United Arab Emirates' Abu Dhabi National Oil Company (ADNOC). The agreement mandates the storage of crude oil for emergency needs and covers the storage of 5.86 million barrels of ADNOC crude oil in Mangalore underground oil storage facilities in Karnataka. Half of the stockpile of 1.5 million tonnes (mmt) constituting 0.75 mmt will be stocked and hired by ADNOC, while 0.5 mmt belonging to India can be used during emergencies. This covenant, thus aims to establish a framework for the storage of crude oil by ADNOC in India and to further strengthen the strategic relationship between the two countries in the field of energy. The Union Budget 2017/18 has also exempted the sale of leftover stock in strategic petroleum reserves by foreign companies from taxes after the expiry of the arrangement. The intent seems to be facilitating India's recent agreement with the United Arab Emirates to fill up half of the Mangalore facility. Presently, under Phase I of the Strategic Petroleum Reserve, 5.33 million tonnes of crude oil is stored at three locations: Vishakhapatnam (1.33 million tonnes), Mangalore (1.50 million tonnes) and Padur (2.5 million tonnes). India is now seeking to finance Phase II of the Strategic Petroleum Reserve to speed up construction and filling the reserve. Under this phase, four more caverns are to be established in Chandikhol, Bikaner, Rajkot and Padur, about which a detailed feasibility report has been prepared. Budget 2017/18 proposes setting up strategic crude oil reserves for two more locations, namely, Chandikhol in Odisha and Bikaner in Rajasthan. This will take the strategic reserve capacity to 15.33 mmt.				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017	FY2018
	N/A	N/A	INR 1,160 crore	INR 2,046 crore	INR 2,579 crore
	N/A	N/A	USD 177 million	USD 305 million	USD 391 million
Information Sources	1. (GoI, 2017a) 2. (PIB, 2017c)				

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities→ Direct Spending**				
Stimulated Activity	Production → Cross-cutting through value chain				
Subsidy Name	**OG.27** Capital Outlay Exploration and Production				
Jurisdiction	Federal				
Legislation/Endorsing Organization	Ministry of Petroleum and Natural Gas				
Policy Objective(s) of Subsidy	To incentivize exploration and extraction activities				
End Recipient(s) of Subsidy	Companies engaged in exploration and production activities				
Time Period	Data is available from 2015 onwards				
Background	The outlay includes provisions for seismic surveys, exploratory and development drilling, capital projects and purchases, R&D, joint venture companies domestic and integration projects, etc.				
Amount of Subsidy Conferred **(RE = revised estimate** **BE = budget estimate)**	FY2014	FY2015	FY2016	FY2017	FY2018
	N/A	N/A	INR 1,153 crore	INR 2,483 crore (RE)	INR 3,847 crore (BE)
	N/A	N/A	USD 176 million	USD 370 million	USD 583 million
Information Sources	1. (MoF, 2017d)				

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from special taxes**
Stimulated Activity	Production → Development, extraction and preparation of mineral oil
Subsidy Name	**OG.28** Income Tax exemption to companies engaged in production of mineral oil from NELP blocks
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 80 IB (9) of the Income Tax Act /Ministry of Finance
Policy Objective(s) of Subsidy	To encourage entry of private players in the upstream sector in India
End Recipient(s) of Subsidy	Participating companies engaged in production of mineral oil from blocks awarded in the first eight rounds of bidding under the New Exploration and Licensing Policy (NELP)
Time Period	From 1997 onwards for all of India (northeast allowed before 1997)
Background	The government provides an incentive of a tax holiday (exemption) equal to 100 per cent of taxable profits for the first seven years of operation to companies: • Located in any part of India that begins commercial production of mineral oil on or after April 1, 1977 in the blocks that are licensed under NELP before April 1, 2011 • Engaged in the refining of mineral oil and begins refining on or after October 1, 1998 but before March 31, 2012 • Engaged in the commercial production of natural gas in blocks licensed under the NELP – VIII round that begins production on or after April 1, 2009 • Engaged in the commercial production of natural gas in blocks licensed under the IV round of bidding for coal bed methane blocks that begin production on or after April 1, 2009 The tax holiday is not available in respect of oil and gas blocks awarded after March 31, 2017; further, a tax holiday is not available for an undertaking that began refining after March 31, 2012.
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (OECD, 2014) 2. (PPAC, n.d.d) 3. (Ernst & Young, 2016) 4. (Bhimani, 2013)

<table>
<tr><td>Subsidy Mechanism</td><td>Government revenue foregone→ Tax breaks and special taxes→tax expenditures</td></tr>
<tr><td>Stimulated Activity</td><td>Production → Cross-cutting through value chain</td></tr>
<tr><td>Subsidy Name</td><td>OG.29 Differential taxes between Indian and foreign companies engaged in E&P</td></tr>
<tr><td>Jurisdiction</td><td>Federal</td></tr>
<tr><td>Legislation/Endorsing Organization</td><td>Section 44B of Income Tax Act 1961/Ministry of Finance</td></tr>
<tr><td>Policy Objective(s) of Subsidy</td><td>To encourage domestic companies in E&P</td></tr>
<tr><td>End Recipient(s) of Subsidy</td><td>Domestic companies are the beneficiaries of lower tax rates</td></tr>
<tr><td>Time Period</td><td>Not available</td></tr>
<tr><td>Background</td><td>A tax rate of 30 per cent is levied on domestic companies, and foreign companies are taxed at the rate of 40 per cent. Furthermore, if the income of the company exceeds INR 10 million, additional surcharges of 7 per cent and 2 per cent are levied on tax for domestic and foreign companies, respectively. The surcharges get revised to 12 per cent on tax for a domestic company and 5 per cent for a foreign company if the income of the company crosses the INR 100 million mark. Besides the taxes, an education levy of 3 per cent also applies.

Effective differential tax rates are summarized below:
<table>
<tr><td>Category</td><td>Indian</td><td>Foreign</td></tr>
<tr><td>For net income, up to and including INR 10 million</td><td>30.9%</td><td>41.2%</td></tr>
<tr><td>For net income exceeding INR 10 million</td><td>33.06%</td><td>42.02%</td></tr>
<tr><td>For net income exceeding INR 100 million</td><td>34.61%</td><td>43.26%</td></tr>
</table>
</td></tr>
<tr><td>Amount of Subsidy Conferred</td><td>Not calculated</td></tr>
<tr><td>Information Sources</td><td>1. (OECD, 2014)

2. (Ernst & Young, 2016)</td></tr>
</table>

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ tax expenditures**
Stimulated Activity	Consumption → Cross-cutting through value chain
Subsidy Name	**OG.30** Income Tax exemption to foreign companies involved in storage and selling of crude oil in India
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 10 (48) of the Income Tax Act 1961/ Ministry of Finance
Policy Objective(s) of Subsidy	To incentivize participation by foreign companies in selling of crude oil in India
End Recipient(s) of Subsidy	Foreign companies involved in storage and selling of crude oil in India
Time Period	From April 2014 onwards and further modified in April 2016
Background	Any income earned in India from the sale of crude oil by a foreign company is exempt from income tax if the income is earned in Indian currency and the following conditions are satisfied: • The income earned by the foreign company is pursuant to an agreement with the central government or after getting approval from the central government. • The foreign company and the agreement should be notified by the central government. • The foreign company should only be engaged in the activity of receipt of such income in India. In effect starting April 1, 2016, the exemption is also available on income earned by a foreign company from storage of crude oil in any facility in India and sale thereof to any person residing in India.
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Bombay Chartered Accountant Society, 2015) 2. (Nishith Desai Associates, 2016)

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes**
Stimulated Activity	Production → Cross-cutting through value chain
Subsidy Name	**OG.31** Special allowances to companies engaged in E&P
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 42 of the Income Tax Act 1961/ Ministry of Finance
Policy Objective(s) of Subsidy	To incentivize companies engaged in exploration and production activity in India
End Recipient(s) of Subsidy	Companies engaged in E& P activity in India
Time Period	From April 2014 onwards
Background	Income from E&P operations is taxable on a net income basis (i.e., gross revenue less allowable expenses). • Special allowances are permitted to E&P companies (in addition to allowances permitted under the domestic tax laws) for: unfruitful or abortive exploration expenses in respect of any area surrendered prior to the beginning of commercial production; after the beginning of commercial production; expenditure incurred, whether before or after such commercial production, in respect of drilling or exploration activities or services or in respect of physical assets used in that connection. • Depletion of mineral oil in the mining area post-commercial production
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Ernst & Young, 2016) 2. (Nishith Desai Associates, 2016)

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ tax expenditures**
Stimulated Activity	**Production → Decommissioning and rehabilitation**
Subsidy Name	**OG.32** Special Allowance/Deduction for site restoration expenses
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 42 of the Income Tax Act 1961/ Ministry of Finance and governed by the provisions of the Production Sharing Contract between E&P companies and the Government
Policy Objective(s) of Subsidy	To incentivize companies engaged in E&P activity in India for restoration of
End Recipient(s) of Subsidy	Companies engaged in E& P activity in India
Time Period	Currently existing but inception date not available
Background	Special deduction is allowed pertaining to provisions relating to site restoration expenses if the amount is deposited in a designated bank account. Whichever is lower is considered for deduction, either: 1. The amount deposited in a separate bank account or site restoration account 2. Twenty per cent of the profits of the business of the relevant financial year
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Saraswat, 2012) 2. (Ernst & Young, 2016) 3. Income Tax India (1998)

Subsidy Mechanism	**Government revenue foregone→ Capital/Investment Incentives**
Stimulated Activity	Production → Development, extraction and preparation of mineral oil
Subsidy Name	**OG.33** Accelerated Depreciation on specified assets for mineral oil exploration
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 32 of the Income Tax Act 1961/ Ministry of Finance
Policy Objective(s) of Subsidy	To incentivize companies engaged in E&P activity in India
End Recipient(s) of Subsidy	Companies engaged in E&P activity in India
Time Period	Currently existing but inception date not available
Background	Depreciation is calculated "by using the declining-balance method and is allowed on a class of assets. For field operations carried out by mineral oil concerns, the depreciation rate is 60 per cent for specified assets." "Mineral oil concerns include – a) Plant used in field operations (above ground) distribution; b) Plant used in field operations (below ground), not including curbside pumps but including underground tanks and fittings used in field operations (distribution)." The general rate of depreciation that is applicable to the majority of the assets is 15 per cent. An additional depreciation of 20 per cent is allowed on the actual cost of new machinery or plant in the first year and "is permitted for all persons engaged in the business of manufacturing or producing any article or thing for new plant and machinery acquired after 31 March 2005."
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Saraswat, 2012) 2. (Ernst & Young, 2016) 3. (Lex Warrior, 2012)

Subsidy Mechanism	**Government revenue foregone→ Capital/Investment Incentives**
Stimulated Activity	Production → Cross-cutting through value chain
Subsidy Name	**OG.34** Allowance for investment in new machinery
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 32AC of the Income Tax Act 1961/ Ministry of Finance
Policy Objective(s) of Subsidy	To incentivize companies investing in acquisition and installation of new plants and machinery related to oil and gas operation
End Recipient(s) of Subsidy	Companies engaged in oil and gas business and manufacture of a product that involves investing in acquisition and installation of new plants and machinery
Time Period	2014/15 onwards
Background	A deduction of 15 per cent of cost of new assets is allowed where a company invests more than INR 250 million in acquisition and installation of new plant and machinery, up to March 31, 2017, subject to the fulfilment of certain conditions. This deduction is allowed on a year-on-year basis, provided that the investment threshold of INR 250 million is met every year, up to March 31, 2017. Separately, in respect of an undertaking set up in any of the notified backward states, an additional deduction of 15 per cent is also available on the actual cost of new machinery or plant acquired between April 1, 2015 and March 31, 2020.
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Saraswat, 2012) 2. (Ernst & Young, 2016) 3. (Deloitte, 2014)

Subsidy Mechanism	**Government revenue foregone→ Capital/Investment Incentives**
Stimulated Activity	Production and consumption → Storage and transport
Subsidy Name	**OG.35** Allowance/Incentives for investment in cross-country pipeline network for distribution and storage facilities
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 35AD of the Income Tax Act 1961/ Ministry of Finance
Policy Objective(s) of Subsidy	To incentivize companies investing in cross-country pipeline network
End Recipient(s) of Subsidy	Companies engaged in the business and manufacture of a product that involves investing in acquisition and installation of new plants and machinery
Time Period	From 2011 onwards
Background	Companies are allowed to claim an allowance with respect to capital expenditure that has been incurred in laying and operating a cross-country natural gas, crude or petroleum oil pipeline network for distribution, including storage facilities if a company commences its operation post-2007.
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Saraswat, 2012) 2. (Ernst & Young, 2016) 3. (Deloitte, 2014)

Subsidy Mechanism	**Government revenue foregone→ Capital/Investment Incentives**
Stimulated Activity	Production and consumption → Research
Subsidy Name	**OG.36** Allowance/incentives for capital expenditure on research
Jurisdiction	Federal
Legislation/Endorsing Organization	Section 35 of the Income Tax Act, 1961/ Ministry of Finance
Policy Objective(s) of Subsidy	To incentivize research by a company investing in oil and gas
End Recipient(s) of Subsidy	Companies engaged in the manufacturing or production of a product that involves expenditure on research, including capital expenditure
Time Period	From 2013 onwards
Background	When an income tax assessee carries on any scientific research, the expenditure incurred by him for such may be classified as: (a) revenue expenditure or (b) capital expenditure. In addition to revenue expenditure, which is already available for deduction, specific capital expenditure related to research is allowed an outright deduction in the year it occurred. Where a company is engaged in the manufacture or production of a product and incurs expenditure on research, including capital expenditure, a deduction of 200 per cent of the revenue and capital expenditure may be allowed. The benefit deduction of 200 per cent is applicable to the company undertaking research in an in-house research and development facility that is approved by the Secretary, Department of Scientific and Industrial Research, Government of India.
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Saraswat, 2012) 2. (Ernst & Young, 2016) 3. (Deloitte, 2014)

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Exemptions from excise taxes/special taxes**
Stimulated Activity	Production → Cross-cutting through value chain
Subsidy Name	**OG.37** Customs duty exemption to import of specified goods required for petroleum operations
Jurisdiction	Federal/states
Legislation/Endorsing Organization	CBEC notification dated no. 12/2012, dated March 17, 2012 and 12/2016 dated March 1, 2016
Policy Objective(s) of Subsidy	To provide a boost to exploration and production of petroleum
End Recipient(s) of Subsidy	Upstream oil companies
Time Period	From 2012 onwards
Background	In accordance with the provision under customs notification no. 12/2012, dated March 17, 2012, an exemption of customs duties was allowed for the import of specified equipment and other goods required for petroleum operations undertaken under various types of licenses or leases (issued after April 1, 1999), pre-NELP contracts, NELP contracts, Marginal Field Policy (MFP) and Coal Bed Methane (CBM) Policy. Further, the existing exemption benefit was also extended for import of specified goods required for petroleum operation undertaken under petroleum exploration licensing or mining licensing issued on or before April 1, 1999.
Amount of Subsidy Conferred	Not calculated

<table>
<tr><td>Subsidy Mechanism</td><td>Provision of goods and services below market value→ Government owned energy minerals→ Royalty relief or reductions in other taxes due on extraction</td></tr>
<tr><td>Stimulated Activity</td><td>Production → Development and extraction of oil and natural gas</td></tr>
<tr><td>Subsidy Name</td><td>OG.38 Concessional Royalty under Hydrocarbon Exploration and Licensing Policy (HELP)</td></tr>
<tr><td>Jurisdiction</td><td>Federal</td></tr>
<tr><td>Legislation/Endorsing Organization</td><td>Governed by the provisions of the Production Sharing Contract between government and E&P companies. Authorities responsible are Directorate General of Hydrocarbon (DGH) and Department of Revenue, Ministry of Finance.</td></tr>
<tr><td>Policy Objective(s) of Subsidy</td><td>To incentivize exploration and development activities, especially in offshore areas</td></tr>
<tr><td>End Recipient(s) of Subsidy</td><td>Companies involved in exploration and production, especially in offshore areas</td></tr>
<tr><td>Time Period</td><td>From 2016 onwards</td></tr>
<tr><td>Background</td><td>India has a mixed system consisting of elements of royalty as well as production sharing with the government under a production-sharing contract. The central government is entitled to royalties from offshore fields, whereas the royalties from onshore fields accrue to the state government. The royalty structure under the erstwhile NELP is given below:

Onshore areas:

Crude oil — 12.5 per cent, natural gas — 10 per cent, coal bed methane — 10 per cent

Shallow water offshore areas:

Crude oil and natural gas — 10 per cent

Deepwater offshore areas:

Crude oil and natural gas — 5 per cent for the first seven years of commercial production, and 10 per cent thereafter

Under the more liberalized HELP, a concessional rate of royalty is being applied. The concessional rate is provided below.

<table>
<tr><th>Type of Hydrocarbon</th><th>Duration</th><th>Royalty Rates (oil)</th><th>Royalty Rates (natural gas)</th></tr>
<tr><td>On-land</td><td>Throughout</td><td>12.5%</td><td>10%</td></tr>
<tr><td>Shallow water</td><td>Throughout</td><td>7.5%</td><td>7.5%</td></tr>
<tr><td>Deep water</td><td>First 7 years</td><td>Nil</td><td>Nil</td></tr>
<tr><td></td><td>After 7 years</td><td>5%</td><td>5%</td></tr>
<tr><td>Ultra-Deep water</td><td>First 7 years</td><td>Nil</td><td>Nil</td></tr>
</table>
</td></tr>
</table>

	<table><tr><td></td><td>After 7 years</td><td>2%</td><td>2%</td></tr></table> Thus, HELP brings with it concessional royalties for deep water and ultra deep water that are difficult to explore and reduced royalties for shallow water. The royalty rates for on-land exploration remain unaltered.
Amount of Subsidy Conferred	Not calculated
Information Sources	1. (Ernst & Young, 2016) 2. (Directorate General of Hydrocarbons , 2017)

Subsidy Mechanism	**Provision of goods or services below market value → Government provided goods and services → Government provided goods and services at below market rate**
Stimulated Activity	Consumption → Household use of LPG cooking stoves
Subsidy Name	**OG.39** Anila Bhagya
Jurisdiction	Karnataka (a southern Indian state)
Legislation/Endorsing Organization	Food and Civil Supplies Department, Government of Karnataka
Policy Objective(s) of Subsidy	"To safeguard the health of women and children by providing them with clean cooking fuel—LPG—and also providing a subsidy for cooking stoves, so that they don't have to compromise their health in smoky kitchens or wander in unsafe areas collecting firewood."
End Recipient(s) of Subsidy	Women members of the BPL households who do not have an LPG connection.
Time Period	Since 2017/18
Background	With the 2018 state election around the corner, Chief Minister of Karnataka, Siddaramaiah announced the scheme in the State Budget 2017/18. The scheme is implemented by the Department of Food and Civil Supplies, Government of Karnataka. The scheme proposes: • Distribution of free stoves • A subsidy of INR 1,920 to be provided for gas connection by state government to oil companies It has been reportedly estimated that approximately 5 lakh families will benefit from this scheme. Furthermore, the scheme specifies that one family is entitled to one LPG connection and one gas stove. Different family members from the same family would not be able to take advantage of the benefits.
Amount of Subsidy Conferred	The state government has reportedly set aside INR 300 crore for the implementation of the scheme
Information Sources	1. (Moudgal, 2017) 2. (sarkariniti, 2017) 3. (The Hindu, 2017)

A4. Renewable Energy

A4.1. Central Government Support to Renewable Energy

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**
Stimulated Activity	Production → Installation of renewable energy plants
Subsidy Name	**RE.1** Viability Gap Funding (VGF) Scheme - 750 MW, 2000 MW and 5000 MW under Jawaharlal Nehru National Solar Mission (JNNSM) Phase-II
Jurisdiction	Central government
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.
Policy Objective(s) of Subsidy	To promote installation of large-scale solar power plants to bring economies of scale, promote domestic manufacturing of solar photovoltaic (PV) and help achieve Renewable Purchase Obligation (RPO) requirement of utilities.
End Recipient(s) of Subsidy	Project developers
Time Period	2014–19
Background	JNNSM was launched in January 2010 with a target of deploying 20 GW of grid-connected solar power by 2022, later revised to 100 GW. It is aimed at reducing the cost of solar power generation in the country through: (i) long-term policy; (ii) large-scale deployment goals; (iii) R&D; and (iv) domestic production of critical raw materials, components and products. Under this mission, the government is providing support via two modes for the development of grid-connected solar power: 1. Bundling of solar power with relatively less expensive thermal power from unallocated quota of NTPC stations 2. Viability Gap Funding (VGF) Phase I of JNNSM was implemented in two batches in the bundling mode. On the other hand in Phase II, Batch II is in bundling mode, while Batch I, III and IV are being provided VGF for setting up large-scale ground-mounted solar PV projects: • Projects with aggregate capacity of 750 MW • Projects with aggregate capacity of 2,000 MW • Projects with aggregate capacity of 50,00 MW The projects are selected through a process of openly competitive reverse bidding on VGF; the bidders are required to supply solar power to Solar Energy Corporation of India (SECI) at a fixed tariff for 25 years. Batch I is complete with successful installation of projects with aggregate capacity of 680 MW and are operational now. Batch III is under implementation and the Batch IV process has commenced.

Amount of Subsidy Conferred	FY2014* (* Budget Outlay)	FY2015* (* Budget Outlay)	FY2016	FY2017* (* Budget Outlay)
(In INR crore)	468	468	481	2,593
(In USD million)	77.48	76.66	73.48	386.61
	Total budget outlay for these schemes are INR 1875 crore (~USD 306 million) for 750 MW from FY2014 to FY2017; INR 2100 crore (~USD 320 million) for 2,000 MW from FY2017 to FY2022; and INR 5,000 crore (USD ~745 million) for 5,000 MW from FY2016 to FY2020. Note: For FY2016, actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2014, FY2015 and FY2017			
Information Sources	1. (Ministry of New and Renewable Energy [MNRE], 2013a) 2. (MNRE, 2015b) 3. (MNRE, 2016b)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Promotion of off-grid applications for renewable energy			
Subsidy Name	**RE.2** Off-Grid and Decentralized Solar Application Scheme			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To promote off-grid applications of solar PV systems for meeting lighting and electricity requirements of individuals, institutions, communities, commercial and industrial establishments.			
End Recipient(s) of Subsidy	Individuals/entities owning the property			
Time Period	2013–17			
Background	Under this program, various off-grid and decentralized PV systems up to a maximum capacity of 500 kWp per site are supported to meet lighting and power requirements. It is a capital subsidy scheme for installation of solar thermal systems. Systems considered for grant of capital subsidy in this scheme are: i. Solar water heating ii. Solar air heating iii. Solar steam generation/pressurized hot water/air systems iv. Solar thermal refrigeration/cooling v. Solar thermal power pack (including hybrid with solar PV) vi. Solar stills			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	not available	224.27	684.48	31.47
(In USD million)		36.68	104.56	4.69
Information Sources	1. (MNRE, 2014f)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy plants			
Subsidy Name	**RE.3** Scheme for development of Solar Parks and Ultra Mega Solar Power Projects			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The objective of this scheme is to encourage investors and project developers to invest in solar energy generation, trigger economies of scale for cost-reductions, achieve large-scale reductions in greenhouse gas emissions and help achieve RPO requirement of utilities.			
End Recipient(s) of Subsidy	Project developers			
Time Period	FY2015–19			
Background	This scheme was formulated under Phase II of JNNSM. Under this scheme, the government has planned to set up at least 25 solar parks and Ultra Mega Solar Power Projects, each with a capacity of 500 MW and above, to accomplish over 40 GW of installed capacity in a span of five years. A solar park is a concentrated zone for development of solar power generation projects that provides developers an area that is well characterized with proper infrastructure and access to amenities. The Ultra-Mega Solar Power Project is a single power project with a capacity of over 500 MW. These projects may be set up in some of these solar parks. Financial support is provided by the government to establish solar parks for the creation of infrastructure necessary for setting up solar power projects (e.g., land, transmission and evacuation lines, access roads, availability of water, etc.) These solar parks can be developed in four modes: • By a state-designated nodal agency—a state PSU or a special purpose vehicle of the state government • By a joint venture company between a state-designated nodal agency and SECI with an equity of 50 per cent by each • SECI as a nodal agency designated by state • Private entrepreneurs (may have equity participation from the state government or its agencies)			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	Not in Place	172.50	365.72	162.80
(In USD million)	Not in Place	28.21	55.87	24.27
Information Sources	1. (MNRE, 2014i)			

Subsidy Mechanism	**Direct and indirect transfer of funds and liabilities → Direct spending → Research and Development support**			
Stimulated Activity	Production → Research and training across various renewable energy activities			
Subsidy Name	**RE.4** Support for Research and Development activities			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India. Policy Guidelines of Research, Design, Development, Demonstration (RDD&D) and Manufacture of New and Renewable Energy R&D Sectoral Project Appraisal Committee (RDSPAC)/ Technology Demonstration Project Appraisal Committee (TDPAC)			
Policy Objective(s) of Subsidy	The objective of the scheme is to make industry competitive and renewable energy generation supply self-sustainable/profitable.			
End Recipient(s) of Subsidy	Industries, civil society organizations, government institutions, academic institutes, etc.			
Time Period	From 2006 onwards			
Background	The R&D Advisory Committee of MNRE launched a comprehensive program on RDD&D and established the Research, Design and Development Project Appraisal Committee to facilitate faster approvals in 2006. RDD&D focuses on resource assessment, technology development, demonstration and commercialization for promoting the large-scale use of new and renewable energy across the country. RDD&D works jointly with R&D institutions, academics, developers and manufacturers (material, processes and products). Partners vary from joint ventures between India and foreign companies, PSUs, state departments and entrepreneurs. Under the scheme, government provides up to 100 per cent financial support to government/non-profit research organizations/ non-governmental organizations and 50 per cent to industry.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017* (Budget outlay)
(in INR crore)	146.94	131.63	92.25	205.10
(in USD million)	24.29	21.53	14.09	30.57
Information Sources	Note: For FY2014, FY2015 and FY2016, actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2017 1. (MNRE, 2017a) 2. (MNRE, 2010)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Installation of renewable energy plants			
Subsidy Name	**RE.5** Grid Connected Rooftop and Small Solar Power Plants Programme			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To promote installation of rooftop solar PV systems for residential and institutional establishments			
End Recipient(s) of Subsidy	Individuals/entities owning the property			
Time Period	2013–17			
Background	This is a continuation of the Off-Grid and Decentralized Solar Application Scheme. Under this program, capital subsidy is provided for installing rooftop solar PV power generation plants that can be used for self-consumption as well as supply/sale of electricity to the grid. A minimum capacity of 1.0 KW and maximum capacity of 500 KW is eligible under this program. The program is being implemented through multiple agencies like SECI, PSUs, local governments, municipal departments, etc. Under the scheme, Central Financial Assistance (CFA) up to 30 per cent of the benchmark cost (fixed by MNRE) of the grid-connected rooftop solar PV plant is provided to developers. In special category states, support may extend up to 70 per cent. In addition to this, 6.5 per cent of CFA is earmarked for service charges to state nodal agencies, capacity-building purposes, awareness campaigns and administration-related purposes. There can be many business models under this program, such as: **a. Solar installations owned by consumer.** i. Solar rooftop facility owned, operated and maintained by the consumer(s) ii. Solar rooftop facility owned by consumer but operated and maintained by a 3rd party **b. Solar installations owned, operated and maintained by a third party** i. Arrangement as a captive generating plant for the roof owners ii. Solar Lease Model, Sale to Grid **c. Solar Installations owned by the utility** i. Solar installations owned, operated and maintained by the DISCOM ii. Distribution licensee provides appropriate viability gap funds			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	1.54	3.68	4.02	499.60
(In USD Million)	0.25	0.60	0.61	74.47
Information Sources	1. (MNRE, 2014f)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption→ Installation of renewable energy applications			
Subsidy Name	**RE.6** National Biogas and Manure Management Programme (NBMMP)			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To provide clean biogaseous fuel mainly for cooking purposes, reducing the use of LPG and other conventional fuels, and provide bio-fertilizer/organic manure to reduce the use of chemical fertilizers.			
End Recipient(s) of Subsidy	State nodal departments/state nodal agencies End-user of biogas plants (households) and manure (farmers)			
Time Period	Since 1981/82			
Background	This program was implemented in 1981/82. It mainly catered to the setting up of family-type biogas plants in rural and semi-urban areas. A family-type biogas plant generates biogas from organic substances such as cattle dung, and other biodegradable materials such as biomass from farms, kitchens, soil wastes, etc. The program was implemented by various state nodal agencies/state nodal departments (SNDs). Under this program, the central subsidies of INR 15,000–17,000 per plant for northeastern states and INR 5,500-11,000 per plant for other states are provided for developing the plant. Additional funds are provided for turn-key job fees, including a five-year warranty and financial support for repair of old non-functional plants.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016* (Budget Outlay)	FY2017* (Budget Outlay)
(In INR crore)	90.26	122.73	131.10	142.00
(In USD million)	14.92	20.07	20.03	21.17
Information Sources	Note: For FY2014 and FY2015, actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2016 and FY2017 1. (MNRE, 2016d) 2. (MNRE, 2017f) 3. (MNRE, 2014d) 4. (MNRE, 2017e) 5. (MNRE, 2016f) 6. (MNRE, 2015d)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy plants			
Subsidy Name	**RE.7** Scheme for setting up of over 300 MW of solar power projects by defence establishments			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To utilize available land/rooftop of defence sector/paramilitary forces for achieving energy security by installing solar power plants and to promote use of domestically manufactured solar plant equipment.			
End Recipient(s) of Subsidy	Ministry of Defence and project developers			
Time Period	2015–19			
Background	This scheme was formulated under Phase-II/III of JNNSM to set up over 300 MW of grid-connected and off-grid solar PV power projects by defence establishments under the Ministry of Defence and Para Military Forces (under Ministry of Home Affairs) with VGF. The projects can be developed in two modes: 1. Developer mode – the project is given to a developer that makes the investment, owns the project and supplies power to defence establishments 2. Engineering, Procurement, and Construction mode – the investment will be made by defence establishments/paramilitary forces and be built through a contractor. The power generated by these plants is purchased/utilized by defence establishments/ paramilitary forces or their sister establishments. So far, projects with 356 MW of capacity have been allocated (no plants have been commissioned) under the scheme.			
Amount of Subsidy Conferred* **(Budget Outlay)**	FY2014	FY2015	FY2016	FY2017
(In INR crore)	Not in Place	150	150	150
(In USD millions)	Not in Place	24.53	22.91	22.36
	Total budget outlay for this scheme is INR 750 crore (~USD 111 million) to be disbursed in five years from FY2015 to FY2019. Note: Since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2015, FY2016 and FY2017			
Information Sources	1. (MNRE, 2015e)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy plants			
Subsidy Name	**RE.8** Scheme for setting up of 1,000 MW of Grid-Connected Solar PV Power Projects by Central Public Sector Undertakings (CPSUs) under Phase II of JNNSM			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To promote large-scale installation of solar power projects by CPSUs and promote use of domestically manufactured solar plant equipment			
End Recipient(s) of Subsidy	Central public sector undertakings			
Time Period	FY2015-18			
Background	This scheme was formulated under Phase II of JNNSM for setting up 1,000 MW of grid-connected solar PV power projects rooftop/land by CPSUs and government organizations with VGF. The power generated can be for self-use/third party sale/merchant sale/sale to DISCOMs. here is a mandatory condition that all PV cells and modules used in solar plants set up under this scheme should be manufactured in India. Under the scheme, 1,032 MW of capacity has been allocated to 16 CPSUs/government organizations with the sanctioned VGF support of INR 1,000 crore (~USD 149 million).			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	Not in Place	Not in Place	128.75	348.44
(In USD million)	Not in Place	Not in Place	19.76	45.38
	Budget outlay of INR 1,000 crore (~USD 149 million) spanning over 4 years from FY2015 to FY2018.			
Information Sources	1. (MNRE, 2015c) 2. (MNRE, 2017a)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**				
Stimulated Activity	Production → Installation of renewable energy plants				
Subsidy Name	**RE.9** MNRE Small Hydro Incentive Schemes				
Jurisdiction	Central Government				
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.				
Policy Objective(s) of Subsidy	To lower the cost of equipment, increase its reliability and set up projects in remote and inaccessible areas that give the maximum advantage in terms of capacity utilization.				
End Recipient(s) of Subsidy	Project developers				
Time Period	2007 – Present				
Background	Hydro projects up to 25 MW capacity are categorized as small hydropower projects. MNRE has been allocated the business of hydropower plants with up to 25 MW station capacity; hydro plants of higher capacity fall under the Ministry of Power. The estimated potential of small hydro in India is 20,000 MW. Most of the potential is inaccessible and in remote areas, for example in the Himalayan states, as river-based projects. 6,474 potential sites have been identified so far. As of June 30, 2016, installed capacity of small hydro was 4,333.86 MW. Under this scheme, financial support to set up small hydropower varies by the ownership. **For private/co-operative/joint sector (100 KW to 25 MW)**: • INR 1.50 crore/MW (limited to INR 5 crore/project) to special category states • INR 1 crore/MW (limited to INR 5 crore/project) to other states **For government/ state/ public sector**: **100 KW to 1,000 KW** • INR 75,000/KW to northeastern states and special category states. • INR 35,000/KW to other states. **1 MW to 25 MW** • INR 7.50 crore/MW (limited to INR 20 crore/project) to northeastern states and special category states. • INR 3.5 crore/MW (limited to INR 20 crore/project) to other states.				
Amount of Subsidy Conferred	Type	FY2014	FY2015	FY2016	FY2017
(In INR crore)	Grid	107.13	99.49	95.00	

	Off-grid	6.99	7.00	5.00	not available
(In USD million)	Grid	17.71	16.27	14.51	
	Off-grid	1.16	1.14	0.76	
Information Sources	1. (MNRE, 2017c) 2. (MNRE, 2014a) 3. (MNRE, 2016a)				

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Credit support→ Subsidized credit to domestic infrastructure and power plant**
Stimulated Activity	Production → Installation of renewable energy power plants
Subsidy Name	**RE.10** Financing and Non Financing by IREDA
Jurisdiction	Central government
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.
Policy Objective(s) of Subsidy	To provide effective and efficient financing in renewable energy
End Recipient(s) of Subsidy	Project developers
Time Period	Since 1987
Background	**Financing:** The MNRE administers the Indian Renewable Energy Development Agency Ltd. (IREDA), a non-banking financial institution that provides financial assistance for renewable energy and energy-efficiency projects. MNRE provides low-interest bearing funds from the NCEF to IREDA for financing viable renewable energy projects at a concessional rate of interest. IREDA also raises funds by issuing various bonds and borrowing from multilateral bodies, namely: Japan International Cooperation Agency, KfW, Asian Development Bank, Agence Française de Development, European Investment Bank, International Finance Corporation, U.S. Agency for International Development and the World Bank. The schemes under IREDA vary among project financing, equipment financing, loans to manufacturers, bridge loans, financial intermediaries, etc. IREDA provides loans to private companies, PSUs, state utilities, transmission companies, generation companies, joint ventures, etc. Rate of interest by IREDA varies from 9.75 per cent to 11.50 per cent depending on the credit rating of the project as compared to the SBI benchmark prime lending rate of greater than 14 per cent. IREDA shall charge an additional interest rate of 0.25 per cent per annum (the same is not applicable for projects in the wind and solar energy sectors) over and above applicable interest rates. **Priority Sector Lending:** Loans to renewable energy are treated as priority sector lending (PSL). PSL obligations are specified by Reserve Bank of India to the banks for providing a portion of the bank lending to a few specific sectors, like agriculture, education, infrastructure, etc. According to PSL, banks have to give 40 per cent of their loans to identified priority sectors. Loans up to a limit of INR 15 crore to borrowers (individual households: INR 10 lakh) for solar, biomass, wind and micro-hydro are considered as PSL under "Renewable Energy."

Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	39.28	77.14	122.37	not available
(in USD million)	6.49	12.62	18.69	not available
Information Sources	1. (IREDA, 2016) 2. (Shakti Sustainable Energy Foundation, 2013)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy plants			
Subsidy Name	**RE.11** Scheme for development of grid-connected solar PV power plants on canal banks and canal tops			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To promote installation of grid-connected solar PV projects on top of canals to utilize the canal-top area and also the vacant government land along the banks of canals.			
End Recipient(s) of Subsidy	Government-owned power sector utilities/organizations			
Time Period	2014–17			
Background	This scheme, formulated under Phase II of JNNSM, is a pilot-cum-demonstration project for the development of grid-connected solar PV power plants on canal banks and canal tops with a target capacity of 100 MW. MNRE, through this scheme, proposes to encourage government utilities to set up grid-connected solar PV power plants (each of 1–10 MW capacity) on canal tops (50 MW) and canal banks (50 MW) by providing a capital subsidy of INR 3 crore/MW (~USD 0.45 million/MW) for canal top solar PV projects and 1.5crore/MW for canal bank solar PV projects. These power plants can be developed by only those government utilities that either operate in the power sector or own canal systems (i.e., are into irrigation). Also, only those states that have either fulfilled their solar RPOs or commit to do so within a given time frame are eligible for this scheme. The entire targeted capacity under the scheme has been approved. Some projects have been commissioned as well.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016* (Budget Outlay)	FY2017* (Budget Outlay)
(In INR crore)	not in place	69	76	76
(In USD million)	not in place	11.28	11.61	11.53
	INR 159 crore (~USD 23.7 million) is sanctioned and to be released from FY2017 to FY2019. Note: For FY2015 actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2016 and FY2017			
Information Sources	1. (MNRE, 2014g)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy plants			
Subsidy Name	**RE.12** Support for Grid Interactive Biomass Power and Bagasse Cogeneration in Sugar Mills			
Jurisdiction	Central			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To promote setting up of biomass power and bagasse cogeneration projects for surplus power generation in private/cooperative/public sector sugar mills			
End Recipient(s) of Subsidy	Project developers			
Time Period	From 2007 onwards			
Background	Bagasse is a by-product from sugarcane crushing in sugar mills. Bagasse can be used as fuel to generate steam for thermal purposes or electricity generation in industries. The electricity generated can either be used for captive use or sale to grid. Under this scheme, financial support is provided under three categories: i. CFA for biomass power projects and bagasse-based cogeneration projects by sugar mills in the private, joint, cooperative or public sector ii. CFA for bagasse-based cogeneration projects in sugar mills in the cooperative or public sector implemented by Independent Power Producers or state government undertakings or special purpose vehicles (Urja Ankur Trust) on Build-Own-Operate-Transfer (BOOT) or Built-Own-Lease-Transfer (BOLT) basis iii. CFA for bagasse-based cogeneration projects in existing sugar mills in the cooperative sector employing boiler modifications			
Amount of Subsidy Conferred	FY2014	FY2015* (Budget Outlay)	FY2016	FY2017
(in INR crore)	5.59	77.50	29	10.30
(in USD million)	0.92	12.67	4.43	1.54
	Total budget outlay for this scheme is INR 310 crore (~USD 47.36 million) to be disbursed in 4 years from FY2014 to FY2017.			
Information Sources	1. (MNRE, 2014h) 2. (MNRE, 2017b)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy applications			
Subsidy Name	**RE.13** Biomass Gasifier Programme			
Jurisdiction	Central Government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	The objective is to promote biomass resources for captive electrical and thermal needs of various industries in rural areas.			
End Recipient(s) of Subsidy	Project developers			
Time Period	2014–17			
Background	Biomass gasification is thermo-chemical conversion of biomass into a combustible gas mixture (producer gas) through a partial combustion. MNRE is promoting multifaceted biomass gasifier-based power plants for producing electricity using locally available biomass resources in rural areas. The main components of the biomass gasifier programs are: **i. Distributed/off-grid power for rural areas** Under this component, a capital subsidy of INR 15,000 per KW to biomass-based projects and INR 2,500 per KW to duel fuel mode engines are provided. **ii. Captive power generation applications in rice mills and other industries** Under this component, capital subsidy of INR 2 lakh/300 KW for thermal applications; INR 2.5 lakh/100KW for dual fuel engines and INR 10,000/KW for biomass-based projects are provided. **iii. Tail-end grid-connected power projects up to 2 MW capacities** Under this component, a capital subsidy of INR 10 lakh/100 KW to biomass gasifier systems is provided. In addition to the above three components, INR 1.50 lakh per 50 kW is provided for ensuring regular availability, collection, processing, storage, operation and maintenance of biomass for five years.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	not in place	14.33	14.33	14.33
(In USD million)	not in place	2.34	2.19	2.14
	Budget of INR 43 crore (~USD 6.41 million) spanning three years from FY2015 to FY2017. Amount equally distributed over the years.			
Information Sources	1. (MNRE, 2017f) 2. (MNRE, 2014c) 3. MNRE, (2014b)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Installation of renewable energy applications			
Subsidy Name	**RE.14** Small Wind Energy and Hybrid Systems (SWES) Programme			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To develop and promote the applications of water pumping windmills and aerogenerators/wind–solar hybrid systems			
End Recipient(s) of Subsidy	Project developers			
Time Period	From 2010 onwards			
Background	Small wind energy systems include water pumping windmills, aerogenerators and wind–solar hybrid systems for harnessing wind and solar energy in unelectrified areas or areas having intermittent electric supply. The government has been encouraging small wind turbines and wind solar hybrid systems since the early 1990s. The scheme was modified in 2010 and continued during the 12th plan period. The total installed capacity as on March 31, 2017 was 2.97 MW. Under the scheme, a capital subsidy of INR 1.00 lakh/kW is provided to wind–solar hybrid system project developers. In addition, 50 per cent of capital costs is provided to developers of water-pumping windmills (90 per cent for unelectrified islands and northeastern states) subject to upper ceilings.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	5	10	3	10
(In USD million)	0.83	1.65	0.46	1.49
Information Sources	1. (MNRE, 2017f) 2. (MNRE, 2017a) 3. (MNRE, 2013b) 4. (MNRE, 2016d)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Installation of renewable energy applications for agricultural uses			
Subsidy Name	**RE.15** Capital Subsidy Scheme for Promoting Solar Photovoltaic Water Pumping Systems for Irrigation Purpose			
Jurisdiction	Central government/state government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To decrease the dependency of farmers on diesel pumps by promoting solar water pumps			
End Recipient(s) of Subsidy	Manufacturers/entrepreneurs			
Time Period	2015–2017			
Background	The scheme provides financial support for installation of 10,000 solar photovoltaic water pumping systems for irrigation purposes to individual farmers. It is being administered through National Bank for Agriculture and Rural Development throughout the country. Loans are provided to the consumers by banks for installation of solar PV pumping systems for the purpose of irrigation. Under this scheme, 40 per cent of the system cost is provided by the MNRE as a subsidy, 20 per cent is to be provided by the beneficiary and the remaining amount is extended as a loan by the banks at a nominal rate of interest. The subsidy is directly credited to the Subsidy Reserve Fund Account of the borrower. No interest is charged by the bank on the subsidy component. Under the scheme, additional assistance for the same project from state governments in the form of capital subsidy, interest subvention, etc., is also allowed.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(In INR crore)	not in place	5.91	14.70	not available
(In USD million)	not in place	0.97	2.25	not available
	Total budget outlay for this scheme is INR 228 crore (~USD 34.83 million) to be disbursed in two years from FY2015 to FY2016. Out of 228 crore, INR 120 crore (~USD 18.33 million) is disbursed to the National Bank for Agriculture and Rural Development for implementation of the scheme.			
Information Sources	1. (MNRE, 2014e)			

Subsidy mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Installation of renewable energy applications			
Subsidy Name	**RE.16** Biogas Power (off-grid) Programme for Decentralized Power Generation Applications and Thermal Applications			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To create infrastructure and capacity building in rural areas to use a large quantity of locally available biowaste for decentralized power generation.			
End Recipient(s) of Subsidy	State nodal organization/ implementing agencies/Biogas Development and Training Centre			
Time Period	2015-17			
	Under the scheme, the MNRE provides financial support for setting up biogas-based power generation, including thermal applications that range from 3 kW to 250 kW. The subsidy provided for thermal application is half of the subsidy provided for power generation projects of the same capacity. The implementing agency, selected by the MNRE, provides technical supervision, training support and submission of the project completion and monitoring report. The developer is required to maintain and operate the plant for a minimum period of 10 years.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	5.85	0.44	3.18	not available
(in USD million)	0.97	0.07	0.49	not available
Information Sources	1. (MNRE, 2015a)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production → Estimation of renewable energy potential			
Subsidy Name	**RE.17** Implementation of Wind Resource Assessment in Uncovered/New Areas under NCEF Scheme and subsequent development.			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To carry out wind resource assessment in the uncovered/new areas at a height of 100 m to assess realistic potential across country.			
End Recipient(s) of Subsidy	Project developers			
Time Period	Not available			
Background	The National Institute of Wind Energy (formerly Centre for Wind Energy Technology) under the MNRE is responsible for wind resource assessment across India. Under the National Wind Resource Assessment program, 808 dedicated Wind Monitoring Stations have been installed throughout the country as of March 2016. Initially, the wind monitoring was carried out only in known windy areas. Now it has extended to new/uncovered areas that were not explored in earlier projects to complete the Indian wind resource mapping. Under this scheme, 40 per cent of the total project cost is provided from the NCEF as reimbursement through the National Institute of Wind Energy, with rest to be borne by the concerned state nodal agencies and private developers.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crores)	0.89	0.46	1.80	not available
(in USD million)	0.15	0.08	0.28	
Information Sources	1. (MNRE, 2017f) 2. (National Institute of Wind Energy, 2017) 3. (MNRE, 2016c) 4. (MNRE, 2014c)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Installation of renewable energy applications			
Subsidy Name	**RE.18** Scheme for Installation of Solar Charging Stations with LED Lanterns			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To provide better lighting in the villages that are either unelectrified or electrified but power supply is erratic.			
End Recipient(s) of Subsidy	Entrepreneurs			
Time Period	2012–14			
Background	The government provides a 90 per cent subsidy for the benchmark cost of INR 1.5 lakh per station, to establish a total of 6,000 solar charging stations in 100 villages in each of the districts affected by left-wing extremism in the states of Andhra Pradesh, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Uttar Pradesh and West Bengal. The remaining 10 per cent cost is met by the local entrepreneurs/state government/other government or non-government funding sources			
Amount of Subsidy Conferred (In INR crore)	FY2014	FY2015	FY2016	FY2017
	Not in place			
Information Sources	1. (MNRE, 2012)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Increase in access to renewable energy applications			
Subsidy Name	**RE.19** Akshay Urja Shops Programme			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To support the establishment of one shop in each district for creation of a network of retail outlets in form of Akshay Urja Shops in all the districts for sale and service of solar energy and other renewable energy products.			
End Recipient(s) of Subsidy	Entrepreneurs			
Time Period	From 2000 onwards			
Background	The MNRE has been promoting the establishment of Aditya Solar Shops in major cities of the country since 1995, with a view to make solar energy products easily available and to provide easy after-sales repair services. During the 9th plan period, shops were established by the state nodal agencies/manufacturer's associations and reputable non-governmental organizations. During the 10th plan period, private entrepreneurs have also been allowed to establish these shops. Under the present scheme, the shops are renamed Akshay Urja Shops with a view to cover wider sales and service of all renewable energy devices and systems, including solar energy products. Under this program, loans are provided at subsidized rates (7 per cent) repayable over a period of five years. Further, a monthly recurring grant of INR 5,000/month is provided toward manpower, electricity, telephone bills and other miscellaneous expenses. An incentive of INR 5,000/per month is also provided subject to achievement of turnover targets.			
Amount of Subsidy Conferred (In INR crore)	FY2014	FY2015	FY2016	FY2017
	Information on loans disbursed for establishing Akshay Urja Shops is not available in the public domain.			
Note: Only monthly recurring grant is estimated				
Information Sources	1. (MNRE, 2017d)			

Subsidy Mechanism	**Government revenue foregone → Tax breaks and special taxes → Excise taxes/special taxes**			
Stimulated Activity	Production → Installation of renewable energy power plants			
Subsidy Name	**RE.20** Accelerated Depreciation			
Jurisdiction	Central Government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To attract private sector investment			
End Recipient(s) of Subsidy	Project developers			
Time Period	From 1994 onwards			
Background	This scheme is applicable for all renewable energy, including wind, solar, biomass and small hydro. Accelerated Depreciation (AD) is a tax-saving scheme. Under the scheme, depreciation on assets is increased during the initial years of the asset, which allows developers to write off the value of the asset, thus reducing taxable income. The reduced tax liability in early years increases profits in the near term at the cost of higher taxation in longer term. In 1994, AD at a rate of 100 per cent was allowed. As the market developed, AD benefits were revised to 80 per cent in 2002 and later withdrawn in 2012. The scheme was reintroduced with a renewed push towards renewable in 2014 at an 80 per cent depreciation rate. However, AD benefits have been lowered to a maximum of a 40 per cent depreciation rate, in effect from April 2017.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	909	2,686	3,885	5,471
(in USD million)	150.2	439.3	593.5	815.4
Information Sources	1. (Business Standard, 2016)			

Subsidy Mechanism	**Government revenue foregone→ Tax breaks and special taxes→ Excise taxes/special taxes**			
Stimulated Activity	Production → Installation of renewable energy power plants			
Subsidy Name	**RE.21** Lower Tax and Tax Exemption on Equipment's Use for Generation from Renewable Energy Sources			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Section 25 of the Customs Act, 1962 (52 of 1962), Provisions of the Custom Tariff Act, 1975 and The Central Excise Act, 1944			
Policy Objective(s) of Subsidy	To lower capital costs for setting up projects and also cost of generation			
End Recipient(s) of Subsidy	Manufacturers/importers of equipment			
Time Period	Recent years			
Background	Excise duty and custom duties on selected machinery—including apparatus and appliances, transmission equipment and auxiliary equipment, and components used for generation from solar and wind sources—are either 0 per cent or 5 per cent, whichever is lower compared to other equipment in the same category.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	641.54	1,682.38	2,364.76	4,659.71
(in USD million)	106.05	275.14	361.25	694.55
Information Sources	1. (MoF, 2017c) 2. (EXIMKEY, 2012)			

Subsidy Mechanism	**Provision of goods or services below market value → Government-owned infrastructure → Use of government-provided infrastructure**			
Stimulated Activity	Production → Installation of renewable energy power plants			
Subsidy Name	**RE.22** Waiver of interstate transmission charges and losses on transmission of electricity generated from solar and wind plants			
Jurisdiction	Central government			
Legislation/Endorsing Organization	Revised tariff policy under Section 3(3) of Electricity Act, 2003			
Policy Objective(s) of Subsidy	To encourage renewable sources of energy			
End Recipient(s) of Subsidy	Power generators			
Time Period	From 2016 onwards			
Background	Transmission charges and losses are waived off for wind projects commissioned until March 31, 2019 and solar projects commissioned until June 30, 2017. The waiver will be available for a period of 25 years from the date of commissioning of such projects that are entering into power purchase agreements, for sale of electricity to the DISCOMs to comply with their renewable purchase obligation. The waiver is allowed only to those projects awarded through competitive bidding.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	not in place	not in place	not in place	not available
Information Sources	1. (MoP, 2016f)			

Subsidy Mechanism	**Income or price support → Market price support and regulation → Regulated prices set at above-market rates**			
Stimulated Activity	Production → Investment in renewable power generation			
Subsidy Name	**RE.23** Generation Based Incentive (GBI) for Grid Interactive Wind Power Projects (Feed-in-Tariff)			
Jurisdiction	Central Government			
Legislation/Endorsing Organization	Budgetary support provided by the Government of India. Ref: Article 112, 116 and 282 of the Constitution of India.			
Policy Objective(s) of Subsidy	To the broaden investor base by facilitating the entry of large independent power producers and Foreign Direct Investment.			
End Recipient(s) of Subsidy	Project developers			
Time Period	From 2009 onwards			
Background	In 2009, the MNRE introduced the Generation Based Incentive (GBI) scheme for wind and solar power projects. The rationale behind the scheme is to incentivize higher-efficiency projects for transition from an investment-based incentive to an outcome-based incentive. Under the scheme for wind power, GBI is being provided to wind developers at a rate of INR 0.50 per unit of electricity fed into the grid for a period of not less than four years and a maximum period of 10 years, with a cap of INR 100 lakh per MW. These incentives are over and above the tariff that is approved by state utilities. The plant can be employed for captive generation, but incentives would apply to electricity sold to the grid only (it excludes generation for captive use). GBI is provided in addition to the feed-in tariff provided by state utilities. The projects that are not taking advantage of AD benefits are eligible for GBI incentives. The GBI scheme for solar was discontinued after completion of Phase I.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	171	171	171	171
(in USD million)	28.27	27.97	26.12	25.49
	Funds of INR 855.16 crores (~USD 140 million) disbursed from FY2013 to FY2017. Amount equally distributed over the years.			
Information Sources	1. (IREDA, 2013) 2. (IREDA, 2017) 3. (Business Standard, 2014)			

Subsidy Mechanism	Direct and indirect transfer of funds and liabilities → Direct spending → Agency appropriations and contracts			
Stimulated Activity	Production ⧅ Installation of renewable energy applications			
Subsidy Name	Market Development and Promotion of Solar Concentrators Based Process Heat Applications in India			
Jurisdiction	Central government			
Legislation/ Endorsing Organization	Budgetary support provided by the central government.			
Policy Objective(s) of Subsidy	The broad objective of this scheme is to promote the use of solar concentrators for process heat applications by overcoming existing barriers in technology, awareness, capacity, market and financial.			
End Recipient(s) of Subsidy	Project implementation agencies			
Time Period	March 2012–March 2017			
Background				
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
	INR 7.49 crore	INR 8.32 crore	Not in Place	Not in Place
	USD 1.375 million	USD 1.375 milion	Not in Place	Not in Place
Information Sources				

A4.2. State Government Support to Renewables for the State of Tamil Nadu

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Promotion of renewable energy applications			
Subsidy Name	**RE.24** Off-Grid Solar PV and Thermal Applications			
Jurisdiction	Tamil Nadu state			
Legislation/ Endorsing Organization	Electricity Act 2003, mandates establishing Tamil Nadu Energy Development Agency (TEDA) and Tamil Nadu Electricity Board (TNEB) restructured as per G.O.114 dated October 8, 2008			
Policy Objective(s) of Subsidy	To promote solar appliances in rural households			
End Recipient(s) of Subsidy	Individuals/local entities			
Time Period	From 2008 onwards			
Background	Under this program, a capital subsidy scheme is provided for installation of solar PV and thermal systems. Systems considered for grant of capital subsidy in this scheme are: i. Solar PV pumping system- AC/DC pumps ii. Solar PV power plants (upto 500 Wp) iii. Micro grid upto 10 kWp iv. Mini grid upto 500 kWp v. Solar PV street lights vi. Solar lighting systems: Street lights and home lights, LEDs vii. Solar water heaters viii. Solar steam generation systems			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	3.41	120.83	184.95	not available
(in USD million)	0.56	6.45	5.65	not available
Information Sources	Note: For FY2015, FY2016 and FY2017, actual figures are presented, and since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2014. For FY2014, the budget outlay is only for thermal PV systems. 1. (Government of Tamil Nadu, 2014, 2015, 2016)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Promotion of renewable energy applications			
Subsidy Name	**RE.25** Energisation of Street Lights through Solar Power			
Jurisdiction	Tamil Nadu state			
Legislation/Endorsing Organization	Electricity Act 2003, mandates establishing Tamil Nadu Energy Development Agency (TEDA) and Tamil Nadu Electricity Board (TNEB) restructured as per G.O.114 dated October 8, 2008			
Policy Objective(s) of Subsidy	To promote solar appliances in rural households			
End Recipient(s) of Subsidy	Individuals/local entities			
Time Period	FT2012 to FY2016			
Background	Under this scheme, 1 lakh street lights are targeted to be constructed in village *panchayats* through solar power over a period of five years ending in 2016.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	52.5	52.5	52.5	not in place
(in USD million)	8.68	8.59	8.02	not in place
Information Sources	1. (Tamil Naidu Energy Development Agency, 2017) 2. (Government of Tamil Nadu, 2014, 2015, 2016)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Promotion of renewable energy applications			
Subsidy Name	**RE.26** CM'S Solar Powered Green House Scheme			
Jurisdiction	Tamil Nadu state			
Legislation/Endorsing Organization	Electricity Act 2003, mandates establishing Tamil Nadu Energy Development Agency (TEDA) and Tamil Nadu Electricity Board (TNEB) restructured as per G.O.114 dated October 8, 2008			
Policy Objective(s) of Subsidy	To promote solar appliances in rural households			
End Recipient(s) of Subsidy	Individuals/local entities			
Time Period	FY2012 to FY2016			
Background	Under this scheme, 3 lakh houses are to be constructed with solar powered lighting systems over a period of five years, from FY2012 to FY2016, in rural areas.			
Amount of Subsidy Conferred	FY2014*	FY2015*	FY2016*	FY2017
(in INR crore)	36	36	36	not in place
(in USD million)	5.95	5.89	5.50	not in place
Information Sources	Note: Since information on actual expenditure was not available in the public domain, budget outlay has been considered for FY2014, FY2015 and FY2016 1. (Tamil Naidu Energy Development Agency, 2017) 2. (Government of Tamil Nadu, 2014, 2015, 2016)			

Subsidy Mechanism	**Direct and indirect transfers of funds and liabilities → Direct spending → Agency appropriations and contracts**			
Stimulated Activity	Production and consumption → Promotion of renewable energy applications			
Subsidy Name	**RE.27** CM's Solar Rooftop Capital Incentive Scheme			
Jurisdiction	Tamil Nadu state			
Legislation/Endorsing Organization	Electricity Act 2003, mandates establishing Tamil Nadu Energy Development Agency (TEDA) and Tamil Nadu Electricity Board (TNEB) restructured as per G.O.114 dated October 8, 2008			
Policy Objective(s) of Subsidy	To promote solar rooftops on homes			
End Recipient(s) of Subsidy	Individuals/local entities			
Time Period	From 2013 onwards			
Background	Under this scheme, the state government provides capital support of INR 20,000 per KW in addition to the subsidy provided by the MNRE for the installation of grid-connected solar rooftop of 1 KW to 10,000 domestic consumers.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	1.33	1.33	1.33	not available
(in USD million)	0.22	0.22	0.20	not available
Information Sources	1. (Tamil Naidu Energy Development Agency, 2017) 2. (Government of Tamil Nadu, 2015)			

Subsidy Mechanism	**Income or price support → Market price support and regulation → Regulated prices set at above-market rates**			
Stimulated Activity	Production → Power generation from renewable energy			
Subsidy Name	**RE.28** Feed-in Tariff Scheme			
Jurisdiction	Tamil Nadu state			
Legislation/ Endorsing Organization	Tariff Policy dated January 6, 2006 in compliance with Section 3 of the Electricity Act 2003			
Policy Objective(s) of Subsidy	To promote production of renewable energy sources			
End Recipient(s) of Subsidy	Project developer			
Time Period	For recent years			
Background	Feed-in tariffs are long-term contracts and guarantee firm pricing to producers by DISCOMS. They are provided based on the electricity produced and vary with different renewable energy technologies. In Tamil Nadu, the renewable energy generators sell power to Tamil Nadu's DISCOMs, as determined by the Tamil Nadu Energy Regulatory Commission (TNERC). These tariffs are based on costs of production of power based on the inputs of various stakeholders. Feed-in tariffs in India are considered subsidies, as they are preferential tariffs paid by the utility for power, which can be sourced from cheaper thermal sources in order to fulfill its RPO obligation.			
Amount of Subsidy Conferred	FY2014	FY2015	FY2016	FY2017
(in INR crore)	0.81	2.08	12.58	not available
(in USD million)	0.13	0.34	1.92	not available
Information Sources	1. (TNERC, 2017) 2. (TNERC, 2016b) 3. (TNERC, 2016a)			

ANNEX B. METHODOLOGY FOR CALCULATED SUBSIDIES

B1. T&D

B1.1. Subsidized Loans from Multilateral Organizations

Subsidy amounts for low-cost financing from bilateral and multilateral agencies have been estimated by subtracting actual interest paid on the loans from the interest amount that would have been paid at the coupon rates of corporate bonds issued by POWERGRID for respective years. This is calculated for illustrative purpose only; the values are not accounted for in total subsidy estimates.

B2. Coal

B2.1. Concessional Duty Rebates on Coal Mining Equipment

1. Total value of capital goods, stores, spares and components imported by CIL and its subsidiaries are taken from CIL annual and accounts reports of respective years.
2. Total revenues foregone have been estimated by subtracting custom duty paid at actual rates from custom duty that would have been paid at normal rates, which is applicable on other similar products (highest rate applicable in that category).

B2.2. Concessional Custom Duty Rates on Import of Coal

1. Total value of different grades of imports (in INR) are taken from reports of the Ministry of Commerce.
2. Total revenues foregone have been estimated by subtracting custom duty paid at actual rates from custom duty that would have been paid at normal rates, which is applicable on other similar energy products (highest rate applicable in that category).

B2.3. Concessional Excise Duty Rates on Coal Production

1. Total net cost of coal by CIL is taken from CIL annual report and accounts of respective years.
2. As excise duty is applicable on Basic Cost + Crushing Charges + Surface Transportation Cost, the cost build up applicable on total coal produced by CIL are estimated.
3. Total revenues foregone have been estimated by subtracting excise duty paid at actual rates from excise duty that would have been paid at normal rates, which is applicable on other similar products (highest rate applicable in that category).

B2.4. Lower VAT Rates on Sale of Coal in State of Chhattisgarh

1. VAT is levied on goods that are being produced and consumed within the state. VAT rates are applicable on Basic Cost + Crushing Charge + STC + SED + Royalty + Central Excise Duty + Clean Energy Cess.
2. Subsidy has been estimated for coal supplied to the power sector only due to non-availability of coal consumption-related data for other sectors.
3. Total revenues foregone have been estimated by subtracting VAT paid at actual rates from VAT that would have been paid at normal rates, which is applicable on other similar products (highest rate applicable in that category).

B2.5. Credit Support from Multilateral Organizations

Subsidy amounts for low-cost financing from bilateral and multilateral agencies have been estimated by subtracting actual interest paid on the loans from the interest amount that would have been paid at the

rate applicable for other domestic loans, which are reflected in CIL annual reports. This is calculated for illustrative purpose only; the values are not accounted for in total subsidy estimates.

B2.6. Non-Incurrence of Costs for Coal Washing Due to Non-Compliance of Mandate Related to Coal Washing/Beneficiation

1. Net washed coal requirement is estimated taking the difference between all-India coal consumption (where transportation of coal is >=1,000 km) and all-India washed coal.
2. Subsidy amounts for non-incurrence of costs of coal washing has been estimated by taking product of net washed coal requirement and cost of washed coal.

B3. Oil and Gas

B3.1. Customs Duty Exemption for Power Companies Purchasing Imported LNG

Total value of imported LNG has been obtained from the website of Petroleum Planning and Analysis Cell (PPAC) of the Ministry of Petroleum and Natural Gas, Government of India. The share of the power sector in LNG consumption for different years has been obtained from PPAC Ready Reckoner for different years, which is available at the PPAC website, and also picked up from the website of 'Indiastat' (www.indiastat.com). After obtaining the figure on consumption of LNG by the power sector, it is multiplied by the customs duty waiver of 5 per cent that is applicable on consumption of imported LNG by the sector to obtain the figure for subsidy on account of customs duty waiver.

B3.2. Domestic LPG Excise Duty Exemption

Total value of domestic LPG is obtained by multiplying the retail price of a 14.5-kg cylinder with the total amount of LPG consumed (in kg). The domestic LPG consumption (in kg) is derived through conversion from LPG consumption in metric tonnes. The data on consumption of domestic LPG is obtained from the PPAC Ready Reckoner and the retail selling price from the PPAC website. The waiver of 8 per cent for domestic LPG (as compared to non-domestic LPG) is then multiplied by the total value of domestic LPG to arrive at the subsidy figure.

B3.3. PDS Kerosene Excise Duty Exemption

Total value of public distribution system (PDS) kerosene is obtained by multiplying the consumption of PDS kerosene (in litres) with the retail selling price. The PDS kerosene consumption (in litres) is derived through conversion of consumption from metric tonnes to litres. The data on consumption of PDS kerosene is obtained from the PPAC Ready Reckoner and the retail selling price from PPAC website. The waiver of 14 per cent for PDS kerosene (as compared to non-PDS kerosene) is then applied by multiplying it by the total value of PDS kerosene, and the subsidy figure is obtained.

B4. Renewable Energy

B4.1. Financing and Non-Financing Schemes by IREDA

Subsidy amounts for low-cost financing from IREDA have been estimated by subtracting interest paid on loans from IREDA (at actual interest rate) from the amount that would have been at benchmark priority sector lending rates.

B4.2. Tax Breaks on Excise and Custom Duty: Solar and Wind Energy

1. Benchmark cost norm of solar PV modules and currency exchange rates from the Central Electricity Regulatory Commission (CERC) have been used to estimate the cost of modules.

2. Share of projects that are established using domestic modules is estimated on the basis of share of Domestic Content Requirement projects tendered/commissioned during the last four years (17.5 per cent of total installed capacity). On domestic modules, excise duty is applicable.
3. The remaining ~82.5 per cent of total installed capacity is assumed to be imported. On imported modules, custom duty is applicable.
4. Total revenues foregone have been estimated by subtracting excise and custom duties paid at actual rates from excise and custom duties that would have been paid at normal rates, which is applicable on other similar products (highest rate applicable in that category).

B4.3. Accelerated Depreciation (AD)

1. Using CERC benchmarks for capital costs for wind and solar PV, annual cash flows and tax benefits for the investments are evaluated.
2. Two scenarios are considered in the model: first, tax applicable without the AD benefit and second, tax applicable when the AD benefit of 80 per cent is taken by the developer.
3. The assumptions used in the model are the same as those used by CERC to calculate generic renewable technology tariffs.
4. Total annual subsidy on account of AD is the difference between the tax benefits in these two scenarios.
5. As no resource is available publicly that provides the exact number of projects and associated capacities that have availed AD benefits, a conservative approach assumes that only corporate additions and public sector developers would have benefited from AD benefits.

B4.4. Feed-in Tariff Benefit for State of Tamil Nadu

The subsidy amount from feed-in tariff benefits have been estimated by subtracting feed-in tariffs provided to developers from the average cost of power procurement on total units (MUs) sold at preferential tariff to the utility, as mentioned in the annual revenue requirement report of the Tamil Nadu Generation and Distribution Corporation Ltd.

Global Subsidies Initiative