
# Financial Supports for Coal and Renewables in Indonesia

## GSI REPORT

IISD
International Institute for Sustainable Development

Global Subsidies Initiative

Danish Embassy, Jakarta

Swedish Energy Agency

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## About GSI

GSI is an initiative of the International Institute for Sustainable Development (IISD). GSI is headquartered in Geneva, Switzerland and works with partners located around the world. Its principal funders have included the governments of Denmark, the Netherlands, New Zealand, Norway, Sweden and the United Kingdom.

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### Financial Supports for Coal and Renewables in Indonesia

May 2017

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*This report has been developed by IISD-GSI with financial support of the Embassy of Denmark in Jakarta and the Swedish Energy Agency. The views expressed are those of IISD-GSI.*

## Key Findings

- This report shows that the "true cost" of coal, including subsidies[1] and externalities, is considerably greater than the cost of renewable energy.
- The report identifies 15 subsidies to Indonesia's coal industry. It was possible to quantify seven of these. In 2015, subsidies to coal production were estimated to be worth approximately IDR 8.5 trillion (USD 644 million). In 2014, this figure was estimated at IDR 12.4 trillion (USD 946 million). Due to a lack of data and inability to quantify all subsidies, current estimates for coal are considered to be in the lower range.
- Subsidies to coal are significantly larger than subsidies to renewables. In 2015, renewables received an equivalent of roughly USD 133 million in subsidies, a considerable increase from around USD 36 million in 2014.
- From 2010 to 2015, renewables received a cumulative total of USD 179 million. This is far less than the amount of subsidies provided for coal through the export tariff exemption alone, totalling USD 719.6 million from 2012 to 2015.
- The report demonstrates that subsidies to the coal industry are associated with significantly higher external costs than renewable energy. Subsidies to coal drive and lock in these externalities, whereas subsidies to renewable energy do not.
- The report provides strong evidence that, from a "true cost" perspective, the overall goal of Indonesia's energy policy should be to increase the share of renewable energy while reducing the share of coal.

[1] See below as well as Sections 1.1 and 3 for discussion of the applied definition of the term "subsidies" as it is used in this report.

# Executive Summary

Electricity generation remains a key issue for Indonesian policy-makers. Millions of households are still without access to electricity, and large investments are needed to supply reliable power for households and industries across the country.

Coal has become an increasingly central part of Indonesia's power plans and is expected by the government to continue to play a significant role in the decades to come. In 2014, coal accounted for 31 per cent of Indonesia's primary energy mix, up from 17 per cent in 2004. In 2025, the government expects coal to meet around 30 per cent of Indonesia's primary energy demand. In 2050, projections estimate coal to account for 25 per cent of Indonesia's primary energy mix.

While this would see the total share of coal in the energy mix decline slightly, the projected growth in total energy consumption implies a large expansion in coal power production. This is also reflected in the government's near-term plans to rapidly expand power production by 35 gigawatts (GW), with more than 20 GW of this amount to come from coal (Sanchez, Toft, Bridle, & Lontoh, 2016).

Nevertheless, concerns over the environmental impact of coal use and a desire to expand access to energy as quickly and cost-effectively as possible have created pressure to adopt cleaner forms of energy production.

Despite its negative impact, Indonesia's coal industry and electricity sector have access to subsidies that can lock in coal use for the coming decades. By contrast, renewable energy is often perceived as too expensive to build on a large scale. However, such opinions are usually not based on an assessment of the true costs of generating electricity from renewables, which can be competitive with or even lower than coal. This is especially true when taking account of negative externalities such as air pollution and greenhouse gas emissions.

This report provides an estimate of subsidies to coal and renewables in Indonesia. It also considers the cost of externalities in order to make a comparison of the true costs associated with electricity generation from coal and renewable energy respectively.

## Use of the Term "Subsidy" in This Report

The term "subsidy" is used in Indonesia mainly to refer to supports provided directly to the people of Indonesia or lowering the price of a commodity, such as gasoline or diesel. Supports to industry are not commonly considered as subsidies. This differs from international definitions of the term, which can be applied in cases where companies receive supports, in addition to individuals. In this report, the research team has applied the international definition of subsidy to attempt to identify policies and other situations where industry is receiving, or has access to financial supports for coal and renewable energy. With that in mind, all references to the term subsidy in this report refer to the international, not Indonesian context and definition of the term. Further information on the definition of the term "subsidy" in this report is outlined in Section 1.1 and Section 3.

## Subsidies to Indonesia's Coal Industry

In order to assess the true cost of coal, the report includes an inventory of subsidies to coal in Indonesia. The inventory identifies 15 policies considered to provide a subsidy to the coal industry.

The inventory identified a total value of USD 946.1 million (IDR 12.4 trillion) subsidies to coal in 2014 and USD 644.8 million (IDR 8.5 trillion) in subsidies in 2015. At the time of publication, this

inventory of subsidies to coal is believed to be the most detailed review ever undertaken in Indonesia. The findings challenge the conventional wisdom that coal is a cheap and unsubsidized source of energy.

As it was not possible, due to a lack of data, to quantify all identified subsidies, the total value of coal subsidies is likely to be an underestimate.

## Subsidies to Renewable Energy in Indonesia

The report also provides an inventory of subsidies to renewable energy. The major subsidy to the renewable energy industry is the support provided through the feed-in tariff (FiT) system. Renewables subsidies are quantified based on a price-gap analysis in order to compare a reference price for electricity generation and the value of the FiT paid to each generator type. The subsidy is equal to the difference between the reference price and the FiT price.

In addition to the FiTs, the renewable energy industry can receive support through the Geothermal Fund, the DKE fund and the corporate income tax exemptions awarded by the Pioneer Industries program to renewable energy technologies.

It should be noted that the government of Indonesia has taken action to assist in reducing the cost of renewable energy in Indonesia. Regulation 12/2017 regulates the price of electricity purchased for various technologies including solar, wind, biomass, geothermal and other energy sources (Solar & Off-Grid Renewables Southeast Asia, 2017). It is possible that subsidies for renewable energy will be eliminated with this shift. With this in mind, the energy estimation should be considered in terms of how the sector has operated in the past. While it is still too early to predict how the sector will behave under the new regime, looking historically does provide some perspective and allows for comparison against coal power in Indonesia.

**Table E1. Summary of Renewable Energy Subsidies in Indonesia**

| | 2015 |
|---|---|
| Subsidies through FiTs | USD 126.4 million |
| Pioneer Industry Tax Exemptions | USD 6.4 million |
| Geothermal Fund | Not Quantified |
| DKE Fund | Not Quantified |
| Total | USD 132.8 million |

## Externality Costs

In addition to the direct costs that subsidies to coal and renewable energy generators imply, there are large indirect social, economic and environmental costs and benefits to the population.

The cost to society of air pollution and the cost of carbon emissions both add to the cost of electricity generated from coal. It is estimated that the total external cost, using examples derived from an international literature review (see section 6), will be equal to approximately USD 6 cents per kWh.

External costs of this magnitude influence the economics of coal expansion plans, and policy-makers should consider them carefully.

## Comparing the True Costs of Coal and Renewable Energy

Finally, the report compares the cost of electricity generation from coal and renewable energy, including the cost of subsidies and externalities. The report highlights subsidies as one of the key tools used by governments to implement energy policy. The allocation of subsidies therefore provides a good indication of governmental priorities. Table E2 highlights the total amount of subsidies identified for coal and renewable energy in absolute terms and per-unit terms.

The table shows that total subsidies to the coal industry are far nearly five times greater than the subsidies to the renewable energy industry. This shows that in absolute terms the coal industry receives far more support than the renewable energy industry. However, Indonesia generates more electricity from coal than renewable energy, so on a per-unit basis the subsidy to renewable energy and coal is similar.

**Table E2. Electricity generated and subsidy costs in 2015**

| | RENEWABLE ENERGY | COAL |
|---|---|---|
| | 2015 | 2015 |
| Electricity Generated (GWh) | 25,197 | 130,508 |
| Total Subsidy Costs (USD million) | 133 | 664 |
| Subsidy cost per unit (USD per kWh) | 0.0055 | 0.0049 |

Considering these estimated levels, can subsidies to coal and renewables be considered justified?

There are several common justifications for energy subsidies often put forward by policy-makers.

First, subsidies can be designed to promote a particular industry and create employment; subsidies to both coal and renewable energy create jobs in those sectors. Second, subsidies are a tool to drive energy sector investment to meet government targets; subsidies to renewable energy and coal could both be justified by these criteria.

However, the report finds that the key difference between subsidies to renewable energy and subsidies to the coal industry is that renewable energy is associated with significantly lower environmental and health externalities compared to coal.

One method of building externalities into the decision-making process is to compare the external costs alongside the costs of subsidies and generation costs. Figure E1 shows a comparison of the costs of coal and renewable energy, including an assessment of the monetary cost of environmental and health externalities.

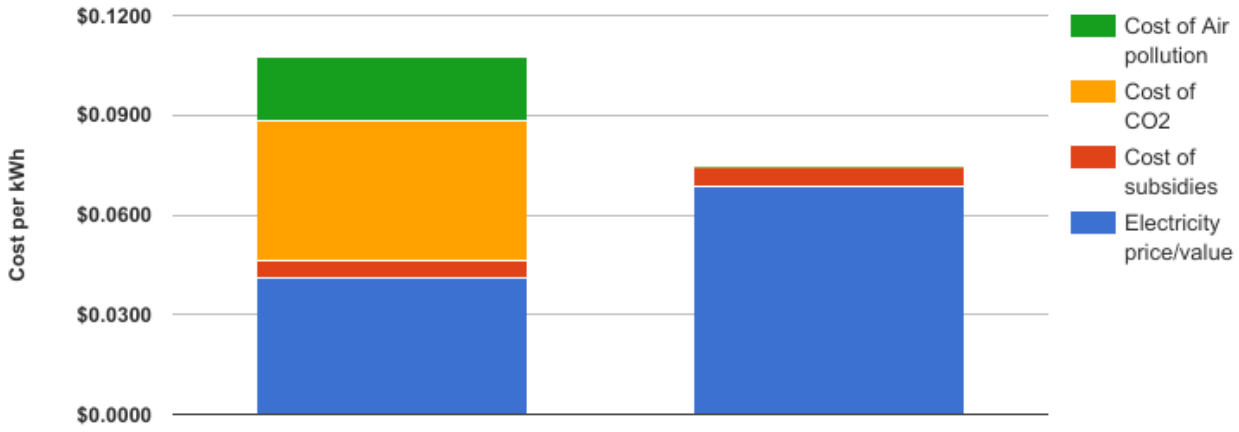


**Figure E1. Comparison between the costs of coal (left) and renewable energy (right) – cost per kWh**

*Source: Authors' calculations.*

Figure E1 illustrates that the true cost of coal—including, subsidies and externalities—is considerably greater than the cost of renewable energy. Put another way, subsidies that support the deployment of renewable energy may increase short-term financial costs, but also lead to the generation of electricity that effectively reduces air pollution and $CO_2$ emissions, reducing the cost to society over the longer term.

In conclusion, when generation costs and subsidies are considered on a per-unit basis, coal appears to be the cheaper form of electricity generation. However, when the cost to society of air pollution and $CO_2$ emissions are taken into account, the "true cost" of coal is significantly greater than the cost of renewable energy. This full cost of energy should be considered both in terms of future expansion of generation, and in terms of whether the current subsidy system could be reformed to lead to better environmental outcomes.

# Table of Contents

# 1.0 Introduction

Energy subsidies are a long-standing feature of the Indonesian economy. Not only have they represented a significant and recurring fiscal burden for the government, they play a major part in shaping the energy sector of Indonesia today.

Historically, the majority of subsidies for fossil fuels totalled IDR 211 trillion (USD 15.8 billion) in 2015 prior to reforms, equivalent to 10 per cent of the state budget (Pradiptyo, et. al., 2016). Since late 2014, however, the Government of Indonesia (GOI) has taken significant steps to rationalize its fossil fuel subsidies, most notably for gasoline and diesel.

At the same time as Indonesia has been rationalizing elements of its fuel subsidy regime, it has embarked on an ambitious effort to increase electricity capacity. The need to expand electricity access is abundantly clear. With an electricity access rate of around 84 per cent, millions of households are still without access to electricity, and large investments are needed to supply reliable power for households and industries across the country (Asian Development Bank, 2016).

To this end, coal has become an increasingly central part of Indonesia's power plans and expected to continue to play a significant role in the decades to come. In 2015, coal accounted for 25 per cent of Indonesia's primary energy mix. In 2025, the government expects coal to meet around 30 per cent of Indonesia's primary energy demand. In 2050, government projections estimate coal to account for 25 per cent of Indonesia's primary energy mix (ADB, 2015).

While this would see the total share of coal in the energy mix decline slightly, the projected growth in total energy consumption implies a large expansion in coal power production. This is also reflected in the government's near-term plans to rapidly expand power production by 35 GW, of which 20 GW is expected to come from coal (Sanchez et al., 2016).

Nevertheless, concerns over the environmental impact of coal use and a desire to expand access to energy as quickly and cost-effectively as possible have created pressure to adopt cleaner forms of energy production.

Indonesia has set an official goal as part of its Nationally Determined Contributions (NDCs) to reduce greenhouse gas emissions by 29 per cent in 2030, or by 41 per cent with international assistance (Republic of Indonesia, 2016). A continued reliance on coal in Indonesia is expected to be a key driver of greenhouse gas emissions. According to the Asian Development Bank, Indonesia's energy sector emissions will double over the next 25 years, totalling more than 800 million tons of $CO_2$ in 2035 (ADB, 2016).

Despite the negative impacts of coal use, Indonesia's coal industry and electricity sector receive subsidies that lock in coal use in the electricity sector. By contrast, renewable energy is perceived as too expensive to build at a large scale—however, such opinions are usually not based on an assessment of the true costs of generating electricity from renewables, which can be competitive with or even lower than coal. This is especially true when taking account of negative externalities such as air pollution and greenhouse gas emissions.

However, while fuel consumption subsidies in Indonesia have been transparently reported for many years through the state budget, subsidies to coal and renewable energy have not been equally accessible. Particularly with regard to coal, there has historically been very limited reporting on subsidies in Indonesia.

Holding to the idea that "you cannot manage what you do not measure," IISD's Global Subsidies Initiative has identified and analyzed subsidies in more than 20 countries under a three-step approach: identify, measure and evaluate.

This report follows the same approach in order to provide estimates of subsidies to coal and renewables in Indonesia. In addition, the report will also consider the cost of externalities i.e., social, economic and environmental costs that do not create an immediate or direct cost to producers or consumers, but have a considerable long-term effect. The adverse impact of externalities needs to be taken into account when policy-makers make long-term decisions about Indonesia's energy future.

IISD's inventory of coal and renewable energy subsidies is intended to improve transparency around the true cost of generating energy from coal and renewable energy. This information can inform and promote the debate about whether current subsidies to coal and renewables are justified and help policy-makers make decisions on how to best design energy sector policies in order to weigh the energy sources more transparently against each other.

## 1.1 Use of the Term "Subsidy" in This Report

The term subsidy is used in Indonesia mainly to refer to supports provided directly to the people of Indonesia or lowering the price of a commodity, such as gasoline or diesel. Subsidies for renewable energy production are expressly forbidden under the new renewable energy regulation launched in early 2017 (Sundaryani, 2016). Supports to industry for energy production in general are not considered subsidies, which refer only to the supports provided to energy consumers.

This differs from the international definition of the term subsidy, under which the term is generally understood to include direct transfers, foregone revenue, market price support and provision of goods or services below market. The recipients of subsidies can be all types of companies, in addition to individuals. There are several competing definitions available. Perhaps the most rigorously tested is that of the World Trade Organization's (WTO) Agreement on Subsidies and Countervailing Measures (ASCM), which can be summed up as "a financial contribution by a government, or agent of a government, that confers a benefit on its recipients" (Steenblik, n.d.; Beaton, et al., 2013). The WTO definition has been agreed by its 153 members and is supported by extensive legal analysis and jurisprudence from the Dispute Settlement Body and the Appellate Body (Global Subsidies Initiative, 2010).

In this report, the research team has applied a definition based on the ASCM to attempt to identify policies and other situations where industry is receiving, or has access to financial supports for coal and renewable energy. We understand that this definition is not the one used by the Indonesian government. The report does not intend to challenge the official use of the term subsidy by the Government of Indonesia. However, it does utilize an international definition of the term as a guide for identifying Indonesian policies that provide fiscal supports for the coal and renewable energy industry, even if they are not officially defined as subsidies in Indonesia.

With that in mind, all future references to the term subsidy in this report refer to the international, not Indonesian, definition of the term.

# 2.0 Indonesia's Coal Sector

In recent decades, the importance of coal in Indonesia has increased considerably. With significant domestic resources available, Indonesia has become the single largest coal exporter in the world and one of the leading producers globally.

From a national perspective, the impact of coal on Indonesia's energy sector as a whole has been remarkable. In 2015, coal constituted 25 per cent of Indonesia's primary energy mix, up from 13 per cent in 2004. Energy models predict coal to account for at least 30 per cent of Indonesia's primary energy mix in 2025 and 25 per cent in 2050 (Ministry of Energy and Natural Resources, 2016b; ADB, 2015).

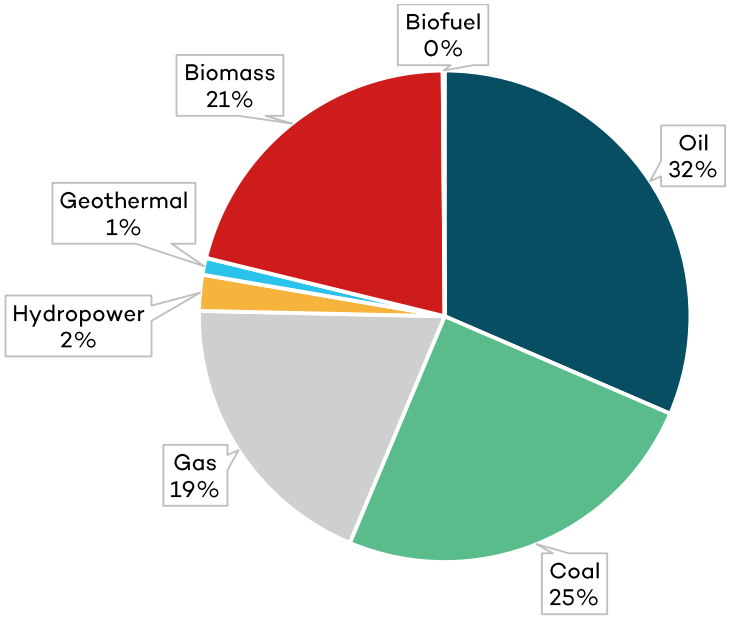


**Figure 1. Indonesia's Primary Energy Mix 2015**

*Source: Ministry of Energy and Natural Resources, 2016b.*

Coal is primarily used in Indonesia for electricity production, accounting for more than 60 per cent of coal sales, with the remainder consumed by other industries including cement and pulp and paper. Alongside mounting coal production and consumption through coal-fired electricity generation, Indonesia saw a significant rise in coal exports from the 1990s to 2013 (when low international prices curtailed production and exports).

The majority of reserves are located in Kalimantan (the Indonesian part of Borneo) and Sumatra. Reserves are also present in Papua, Java, Maluku and Sulawesi. In 2014, Indonesia's coal reserves were estimated to be around 32 billion tonnes and coal production around 458 million tonnes (IEA, 2015).

In 2006, the government introduced the first of three fast-track programs (FTPs), designed to increase power capacity. FTP 1 relied exclusively on coal. Since then, two additional FTPs have followed, both relying to a very large degree on coal, but also adding renewables. FTP-3, the most recent program (2015–2019) is expected by the government to add 35 GW of capacity to Indonesia's grid. Around 20 GW of this is planned to come from coal, leading to a considerable boom in coal-fired power plant investments and construction. Nevertheless, FTP-3 has been slow to start since being launched in May 2015. As of June 2016, increased power capacity under the plan had only reached 223 MW or 0.6 per cent of the overall target (Toft, 2016).

Fossil fuels dominate Indonesia's electricity sector, with almost 90 per cent of total power generation. In 2015, 55 per cent of Indonesia's total electricity generation came from coal (Sanchez et al., 2016).

Figure 2 shows the evolution of PT PLN's capacity mix between 2006 and 2014. PT PLN is Indonesia's state-owned electricity company, being the main actor responsible for power generation.

Investments in energy capacity in Indonesia have mostly focused on the development of steam coal, which grew by an average of 13 per cent between 2006 and 2014, and in 2014 represented over 50 per cent of the total generation capacity. Coal was followed by geothermal and combined cycle gas, which grew on average by 5 per cent and 3 per cent respectively over the same period.

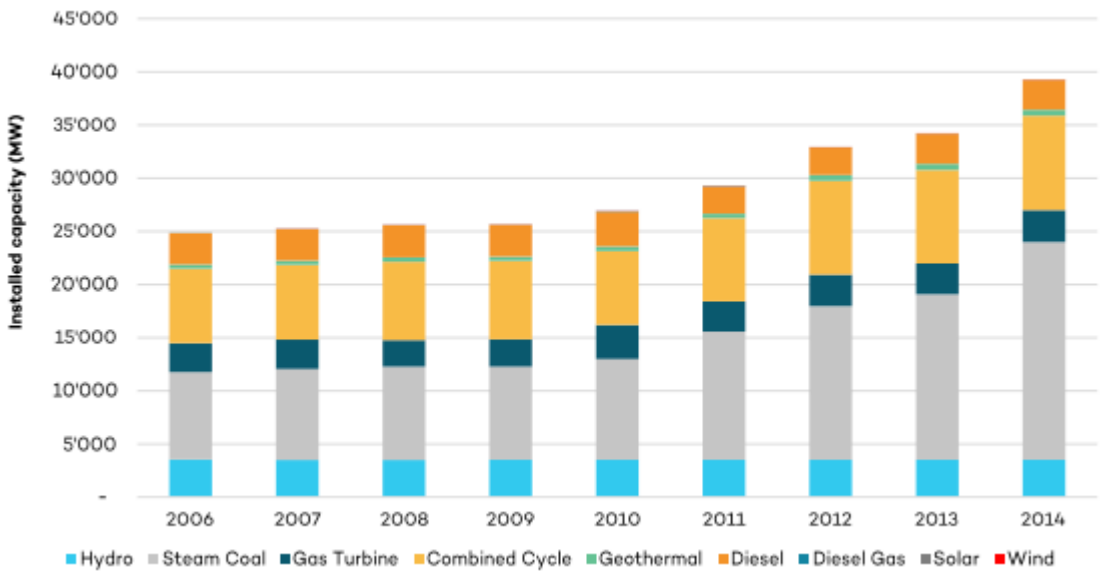


**Figure 2. Evolution of PLN's power generation capacity mix per source**

*Source: Sanchez et al., 2016.*

In 2009, the government introduced a new, more decentralized coal mining regime. The 2009 Mineral and Coal Mining Law replaced Indonesia's previous mining framework from 1967 and made a number of regulatory changes to make coal mining more attractive. Among other things, the new licensing regime allowed all levels of government to issue mining licenses. The 2009 Mining Law also promoted the role of foreign investments and split the licensing procedure into two separate processes, one for exploration and one for production (International Energy Agency [IEA], 2015).

Indonesia's coal market is further reinforced by a policy of domestic market obligation (DMO). This policy requires selected coal producers to sell a certain amount of total production to the domestic market to ensure a sufficient supply of coal for power production. In 2014, the DMO required 85 companies to sell 95 million tonnes of coal domestically, equivalent to around 26 per cent of total production (PricewaterhouseCoopers [PwC], 2014). The exact percentage for the DMO is set every year by the government, based on an estimation of domestic needs. The government set a coal DMO of 111 million tonnes for 2016 (26.5 per cent of forecast 2016 total production) (PwC, 2016). The majority of the DMO is consumed by the electricity generation sector (81 per cent), followed by cement (12 per cent), metallurgy, fertilizer, textile, paper and briquettes (each 2 per cent or less) (Indonesian Coal Mining Association, 2016a).

Lower international coal prices since 2013 resulted in lower production and exports, and many coal producers in Indonesia have suffered economically. Recently, this led the Indonesian Coal

Mining Association (APBI-ICMA) to call on the government to increase price support for the industry. Based on a joint report with PricewaterhouseCoopers, APBI-ICMA noted that at current price levels, Indonesia's economically viable coal reserves could be exhausted somewhere between 2033 and 2036, jeopardizing the government's plans to expand power generation (Indonesian Coal Mining Association, 2016b). Other organizations strongly opposed the claims on environmental and economic grounds, noting that the call for support underlines the fact that Indonesia should turn away from coal entirely as sources of coal finance are drying up and becoming a huge fiscal liability as stranded assets (Toft, 2016)

Since June 2016, the Indonesian Coal Reference Price (HBA) has increased significantly, due to an effort by China to reduce excess mining capacity, leading to an increase in Chinese imports of coal. The increase is likely to be temporary until China increases its coal production and in January 2017 the HBA decreased from around USD 100 per tonnes to USD 86 per tonnes (Platts.com, 2016).

# 3.0 Subsidy Definition and Methodology

## 3.1 Subsidy Definitions

Finding and labelling subsidy policies can be controversial. First, because subsidy definitions vary. While some elements—such as direct transfers of money to a specific company— are common across all subsidy definitions, others are not.

Second, from a political economy point of view, subsidies policies are often highly sensitive and form part of the social contract between a government and its people. This is the case in Indonesia, as outlined in Section 1.1 of this paper, which expands on the Indonesian government's definition of "subsidy" versus the definition used in this report.

Nevertheless, in order to estimate and measure subsidies for this report, a clear definition is needed. The GSI bases its definition of subsidies on The World Trade Organization's (WTO) Agreement on Subsidies and Countervailing Measures (ASCM), supported by 158 countries. The ASCM defines four categories of subsidies:

1. A direct transfer of funds or liabilities, such as the provision of grants.
2. Foregoing or otherwise failing to collect revenue, including tax exemptions and reductions.
3. Providing goods or services below market rates, such as the provision of land, services or inputs.
4. Providing income or price support, for example through price regulation.

The ASCM definition of subsidies does not imply a judgement on whether a certain subsidy policy is good or bad. Subsidies may indeed be justified where they have been put in place to correct a market failure, such as the unsustainable depletion of a natural resource. The ASCM definition is used exclusively to define, and therefore identify, subsidy policies in certain sectors of any given economy.

In order to qualify as a subsidy, according to the ASCM definition, the policy has to be benefiting a specific company or industry. This could, for example, be in the form of a budgetary transfer to a public utility to cover losses from under recoveries, a tax exemption for production equipment or a VAT rebate or any other policy that meets the criteria listed above (Beaton et al., 2013).

Focusing on subsidies to fossil fuels, these policies support the consumption and production of coal, oil and gas products. In practice, fossil fuel subsidies are often split into three main categories:

**Consumer Subsidies:** Subsidies provided by governments to consumers to lower the price of using energy products.

**Producer Subsidies:** Subsidies provided for the exploration and production of oil, gas and coal.

**Electricity Subsidies:** Subsidies provided by governments to electricity companies to fund operations and keep electricity tariffs low. Some types of electricity subsidies can be seen as a subset of producer subsidies or consumer subsidies, since electricity generators are a consumer of fossil fuel inputs but produce electricity.

This study focuses exclusively on producer subsidies to the coal industry in Indonesia including electricity subsidies that are allocated to coal and renewable energy generators.

## 3.2 Subsidy Estimation Methodologies

When identifying and measuring subsidies, there are two common methodologies that are often used: a price-gap approach and an inventory approach.

### 3.2.1 Price-Gap Approach

Both the IEA and the IMF use the price-gap approach, which estimates the difference between domestic energy prices and international reference prices. If domestic prices are lower than the international reference price, subsidies exist, formed by the gap between the two. The price-gap approach is useful for estimating subsidies at the global level and for comparing subsidies across countries. It is particularly useful for estimating consumer subsidies, for example provided via administered low fuel prices. However, some production subsidies, such as a tax holiday for purchasing equipment, will not be directly reflected in the subsidy estimation (Beaton et al., 2013).

### 3.2.2 Inventory Approach

The inventory approach to measuring subsidies is a bottom-up method where a subsidy inventory is created by investigating all policies that may provide subsidies to a certain industry. The approach is used by the Organisation for Economic Co-operation and Development (OECD) and the GSI. The method is a very thorough and labour-intensive way to identify subsidies, requiring a direct examination of all relevant government policies and programs in a certain area or industry. The method provides a great amount of detail about specific subsidies and allows identification of the policies responsible. The inventory approach is highly dependent on the availability of data, often representing a challenge in terms of quantifying specific policies (Xue, Wang, Bridle, Gerasimchuk, & Attwood, 2015). This report applies an inventory approach to subsidies to the coal industry to highlight gaps in transparency and promote improved reporting of subsidies over time.

### 3.2.3 Fossil Fuel Subsidies and Externalities

The ASCM definition of subsidies does not explicitly mention externalities. In fact, most subsidy estimation methodologies overlook the under-pricing of energy by not including the externality costs from the use of fossil fuels. This is also the case for the definition of subsidies applied in this report and in line with a mainstream interpretation of the ASCM subsidy definition.

That is not to say that the costs to society of externalities associated with the use of oil, gas and coal are insignificant. In this regard, the estimations of fossil fuel subsidies from the International Monetary Fund (IMF) are noteworthy in that they include externality costs to society from local air pollution and greenhouse gas emissions. As a consequence, the IMF's global estimate for fossil fuel subsidies at USD 5.3 trillion in 2015 is significantly higher than estimates from other organizations who do not include externalities in their subsidy definitions (IMF, 2015).

While in this study we follow the ASCM definition of subsidies, we have also chosen to produce estimates of externality costs as a separate analysis. Because of the potentially large scale of these costs, we think it important that they be presented alongside the other subsidy estimates in order for Indonesian policy-makers to consider them when looking at future energy policies.

### 3.2.4 Populating the Subsidy Inventory

To arrive at the coal subsidy inventory presented in this analysis, the authors applied a systematic selection process of a large number of Indonesian national and subnational policies and conducted a thorough literature review of existing data.

In addition, fiscal policies were extracted over a period from September 2016 to December 2016 from an online database published by Indonesia's Ministry of Finance (Government of Indonesia, 2015).

To select relevant fiscal policies, a keyword search was applied, focusing on relevant terms, including but not limited to terms including: "subsidy," "coal," "electricity," "tax relief," "waiver" and "tariff."

In the following section, each subsidy to coal is presented with a summary table, additional background information, quantification where possible and references to relevant government policies and regulations.

# 4.0 Inventory of Coal Subsidies

## 4.1 Summary of Coal Subsidies

The GSI subsidy inventory identified 15 policies that are considered to provide a subsidy to the coal industry. Table 1 shows an overview of these subsidies. Where possible, estimates have been made for the value of the identified subsidies. A description of each subsidy and the calculations behind the estimates are also described in the following sections. The subsidies have been categorized according to the four types of subsidies describe in the WTO's Agreement on Subsidies and Countervailing Measures (see Section 3).

The survey identified a total value of USD 946.1 million (IDR 12.4 trillion) in subsidies to coal in 2014 and USD 644.8 million (IDR 8.5 trillion) subsidies in 2015. At the time of publication, this inventory of subsidies to coal is believed to be the most detailed review ever undertaken in Indonesia. This inventory challenges the conventional wisdom that coal is a cheap and unsubsidized source of energy. The reason that many of these policies have not been explicitly identified as coal subsidies is that subsidies are not often labelled as such. Only a detailed review can assess whether policies do in fact provide a subsidy to the coal industry and can uncover their true extent.

**Table 1. Subsidies to coal producers in Indonesia**

| REPORT SECTION NUMBER | SUBSIDY | DESCRIPTION | VALUE | | | |
|---|---|---|---|---|---|---|
| | | | 2014 | 2015 | 2014 | 2015 |
| | | | USD (million) | | IDR (billion) | |
| | | **DIRECT AND INDIRECT TRANSFER OF FUNDS AND LIABILITIES** | | | | |
| 4.2.1 | Government credit support through loan guarantees | A Business Viability Guarantee Letter is granted by the Ministry of Finance to PT PLN to ensure that PT PLN can meet its financial obligations with reference to the Power Purchase Agreement with the Independent Power Producer (IPP).<br>The guarantee is addressed to the project company (not lenders), but the project company is entitled to assign the guarantee by way of security to the lenders. | 70.2 | 60.9 | 913.6 | 792 |
| 4.2.2 | Indonesia Infrastructure Guarantee Fund (IIGF)—coal-related projects | Support through the Indonesia Infrastructure Guarantee Fund for three coal-related projects | NQ | NQ | NQ | NQ |
| | | **GOVERNMENT REVENUE FOREGONE** | | | | |
| 4.3.1 | Export tax exemption on coal | In 2012, the government designated thermal coal as a commodity excluded export tariffs. A tariff was later imposed, coming into effect on August 8, 2015. The tariff is an income tax of 1.5% of the export value of coal. | 201.7 | 91.1 | 2,662 | 1,202 |
| 4.3.2 | Waiving import tariff for certain advanced equipment in budget year of 2011 | Imported machinery for coal power generations is one of the Strategic Taxable Goods which were exempted from VAT. | NQ | NQ | NQ | NQ |
| 4.3.3 | Preferential VAT rate for goods and services purchased by coal mining companies | Six coal mining companies (known as the first generation of coal mining companies) have a special privilege of having the VAT waived for their purchases on goods and services and for their sales on certain goods and services. This estimation covers only the waived VAT from the purchase of one of the six privileged companies. | 0.0614 | 0.099 | 0.8 | 1.3 |

| REPORT SECTION NUMBER | SUBSIDY | DESCRIPTION | VALUE | | | |
|---|---|---|---|---|---|---|
| | | | 2014 | 2015 | 2014 | 2015 |
| | | | USD (million) | | IDR (billion) | |
| 4.3.4 | Domestic Market Obligation | The Domestic Market Obligation (DMO) aims to secure sufficient energy and mineral resources to meet domestic consumption requirements. The DMO-regulation relates to all types of coal and minerals, but is currently only applicable to coal producers. | NQ | 14.7 | NQ | 194.04 |
| 4.3.5 | Failure to collect land and building tax for coal mines | Since 2012, land and building tax has been calculated only on the value of the surface of the land, including buildings. This is despite the implementing regulations containing mechanisms to take into account the value of coal under the surface. From 2015, the value of the land for tax purposes was calculated on the value of the coal under the ground as well as the surface value. | NQ | NQ | NQ | NQ |
| 4.3.6 | Preferential corporate tax rate for businesses in specified fields including coal mining | To grant a reduction in corporate income tax for certain business sectors including coal mining (as specified in the annex to Regulation 52/2011), with all coal producers benefiting. | NQ | NQ | NQ | NQ |
| 4.3.7 | Reduction in corporate tax for coal mining companies registered after August 15, 2011 | Coal mining companies registered as legal entities after August 15, 2011 were eligible for ongoing reduction in corporate tax following its introduction in 2015. | NQ | NQ | NQ | NQ |
| 4.3.8 | Failure to collect taxes and royalties from unregulated or illegal coal mines | Indonesia produces around 5–15% more coal annually than the Ministry of Energy and Mineral Resources reports based on production, export and consumption data. | 95.2 | NQ | 1,256 | NQ |
| 4.3.9 | Tax Allowance 30% for coal liquefaction and coal gasification | A reduction in taxable income of up to 30% of investments, accelerated depreciation, reduced withholding taxes and provisions to carry forward losses for investments in coal liquefaction and coal gasification. | NQ | NQ | NQ | NQ |
| 4.3.10 | Preferential royalty rates and corporate tax rates for small coal mining license holders | Royalties and tax rates vary among Indonesian coal mining companies. Holders of coal mining licenses issued by provincial governments or districts are subject to lower royalty and corporate and tax rates than companies licensed through the national regime. | 565 | 471 | 7,458 | 6,217 |
| 4.3.11 | Value added tax exemption to coal | Since 2000, coal (and other minerals) have been exempt from VAT. | NQ | NQ | NQ | NQ |
| | | **PROVISION OF GOODS OR SERVICES BELOW MARKET VALUE** | | | | |
| 4.4.1 | Support for research, development, technology and training | Since 1956, the national government has funded a centre to support R&D and training in the mineral and coal industry. It is now known as the Centre for Research and Development of Mineral and Coal Technology and is housed within the Ministry for Energy and Mineral Resources. | 14 | 7 | 184.8 | 92.4 |
| | | **INCOME OR PRICE SUPPORT** | | | | |
| 4.5.1 | Subsidy for mine owners prior to the amendment of the existing regulation on mine mouth coal pricing | A pricing mechanism for coal from mine mouth power plants, making it more attractive to burn low-grade coal at generators located at or near coal mines. | NQ | NQ | NQ | NQ |
| **TOTAL** | | | **946.2** | **644.8** | **12,476.3** | **8,499.5** |

## 4.2 Direct and Indirect Transfer of Funds and Liabilities

### 4.2.1 Government Credit Support Through Loan Guarantees

**Table 2. Government Credit Support Through Loan Guarantees**

| SUBSIDY CATEGORY | DIRECT AND INDIRECT TRANSFER OF FUNDS AND LIABILITIES |
|---|---|
| Stimulated Activity | Coal production to support coal-fired electricity generation |
| Subsidy Name | Loan guarantees |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Presidential Regulation Number 4 Year 2016 on Accelerating the Development of Electricity Infrastructure<br>Minister of Finance Regulations: 130/PMK.08/2016; 173/PMK.011/2014; 44/PMK01/2008 |
| Policy Objective(s) of Subsidy | To provide loan guarantees for projects self-managed by PT PLN and feasibility assurance for PT PLN projects executed by independent power producers. The broader objective is to support building 35,000 MW of power plants and 46,000 km of transmission lines. |
| End Recipient(s) of Subsidy | Electricity generation companies including coal-fired generators |
| Time Period | 2008 to present |
| Background | Coal-fired electricity generators can, in formal partnership with PT PLN, apply for a government loan guarantee and feasibility assurance.<br>The Business Viability Guarantee Letter is granted by the Ministry of Finance to PT PLN to ensure that PT PLN can meet its financial obligations with reference to the Power Purchase Agreement with the Independent Power Producer (IPP).<br>The guarantee is addressed to the project company, but the project company is entitled to assign the guarantee by way of security to the lenders.<br>To be eligible, the creditor must have a signed agreement with PT PLN, and projects must be approved by the Ministry of Energy and Mineral Resources and the Directorate General of Investment and Risk Management. |
| Amount of Subsidy Conferred | |
| Information Sources | Minister of Finance, 2008, 2014a, 2016. |

#### Further Background

In order to increase power generation, Indonesia has since 2006 launched three Fast-Track Programmes (FTP), designed to expand power capacity. FTP 1, running from 2006 to 2009, relied exclusively on coal and was backed by a government loan guarantee to secure power plant investments.

As part of FTP 1, the government has up to September 2016 issued 36 guarantee letters (11 in USD and 25 in IDR) covering a total USD 6.7 billion (IDR 87 trillion) (Ministry of Finance Indonesia, 2016).

The main purpose of government loan guarantees is to shift the risk of default from the lender to the government, thereby eliminating risk for the private creditor. This often leads to a more favourable loan rate or indeed facilitates a loan that may otherwise have been denied (Earthtrack, 2016). The guarantee can also allow the borrower to reduce the equity to debt ratio of the loan, releasing capital for other purposes.

The OECD has valued loan guarantee subsidies at 1 per cent of the loan value, which may be appropriate for larger firms in developed countries but underestimates the value of support for smaller projects in high-risk business sectors or regions (Earthtrack, 2016). A review of several large loan guarantee programs found that the range of net fiscal cost may vary from zero to at least 15% per annum of the value of outstanding guarantees (Honohan, 2010).

For Indonesia, it is possible to extract the realized amount (i.e., losses) of the loan guarantees directly from the government's financial statements. See Table 3 (Ministry of Finance Indonesia, 2016).

**Table 3. Subsidy Estimation**

| SUBSIDY | 2012 | 2013 | 2014 | 2015 | 2016 | TOTAL |
|---|---|---|---|---|---|---|
| IDR (in million) | 623,000 | 611,215 | 913,620 | 792,000 | 570,530 | 3,510,365 |
| USD (in millions) | 47,923,076 | 47,016,538 | 70,278,461 | 60,923,076 | 43,221,969 | 269,363,120 |

### 4.2.2 Indonesia Infrastructure Guarantee Fund (IIGF) – Coal-related Projects

**Table 4. Indonesia Infrastructure Guarantee Fund (IIGF) – Coal-related Projects**

| SUBSIDY CATEGORY | CREDIT SUPPORT, LOAN GUARANTEES |
|---|---|
| Stimulated Activity | Coal-fired electricity generation |
| Subsidy Name | Indonesia Infrastructure Guarantee Fund (IIGF) – coal projects |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Perpres 78/2010 |
| Policy Objective(s) of Subsidy | To support the development of key infrastructure projects through PPPs and loan guarantees |
| End Recipient(s) of Subsidy | Coal-fired electricity generation and infrastructure |
| Time Period | 2009–present |
| Background | The IIGF supports several coal-related projects, including the development of the 2,000 MW Batang coal power plant in Central Java and two coal-fired power plants of a total of 1,200 MW and 600 MW in South Sumatra and a railway project in Kalimantan. |
| Amount of Subsidy Conferred | NQ |
| Information Sources | IIGF, 2016. |

#### Further Background

Established in 2009 through government regulation No. 35/2009, the IIGF is the main entity for providing government guarantees for Public-Private Partnership (PPP) infrastructure projects in Indonesia.

The IIGF has been providing loan guarantees for coal-related projects. As mentioned above, the OECD has valued loan guarantee subsidies at 1 per cent of the total loan value (Earthtrack, 2016).

The IIGF has supported several coal-related projects, including the development of the 2,000 MW Batang coal power plant in Central Java and two coal-fired power plants of a total of 1,200 MW and 600 MW respectively in South Sumatra and a railway project in Kalimantan (Greenpeace, 2015b).

The Batang coal power plant has a total value of USD 4 billion and has been provided with a loan guarantee of USD 33.9 million from IIGF for project-related risks. The project was initiated in 2011, and the plant is expected to be operational in 2018 (Oil Change International, 2013).

The South Sumatra Mine mouth coal power plant project involves the development of a steam-

powered power plant in South Sumatra. Sumsel 9 has a capacity of 2 x 600 MW while Sumsel 10's capacity is 1 x 600 MW. The Sumsel power plant project is covered by a guarantee from the IIGF.

The IIGF also initially supported the development of the Central Kalimantan Puruk Cahu-Bangkuang coal railway, estimated at around USD 2.8 billion, but the guarantee was withdrawn in late 2014 by the then-newly appointed Jokowi Administration, and the project is currently not moving forward (Endcoal.org, 2014).

### Subsidy Estimation

It has not been possible to estimate the total cost to the IIGF loan guarantees due to a lack of data on the impact on project cost of capital.

**Table 5.**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR | NQ | NQ | NQ | NQ | NQ | NQ |
| USD | NQ | NQ | NQ | NQ | NQ | NQ |

*NQ = Not quantified*

## 4.3 Government Revenue Foregone

### 4.3.1 Export Tax Exemption on Coal

**Table 6. Export Tax Exemption on Coal**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal exports |
| Subsidy Name | Exemption of export tariff for thermal coal |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulations 75/PMK.011 / 2012 and 107/PMK.010/2015, Ministry of Finance |
| Policy Objective(s) of Subsidy | To support coal exports |
| End Recipient(s) of Subsidy | Coal exporters |
| Time Period | May 2012- August 2015 |
| Background | In 2012, the Minister of Finance designated thermal coal as a commodity excluded export tariffs. A tariff was later imposed, coming into effect on August 8, 2015. The tariff is a tax of 1.5% of the export value of coal. |
| Amount of Subsidy Conferred | USD 91.1 million (IDR 1,202 billion) in 2015 and USD 201.7 million in 2014 ( IDR 2,662 billion ) |
| Information Sources | Minister of Finance, 2012b, 2015a. |

### Further Background

To calculate government revenue foregone due to exemptions from export tariffs for thermal coal from 2012 to August 2015, the authors collected data on the volume of coal exports in metric tonnes from all companies listed in the Ministry of Energy and Mineral Resources' database.

The total estimate of exempted export from 2012 to 2015, USD 719.6 million, is used as a proxy of foregone government revenue which could be avoided if coal exports had not explicitly been excluded from export royalties since 2012.

The government changed the policy in August 2015, requiring companies operating under a mining license (IUP) to pay the royalty on exports. Companies operating under so-called Coal Contract of Works (CCoW) (mining operations under the Mining Law from 1967) are still exempt from the export tariff.

The government has, however, expressed its intent to streamline coal licenses with the new Mining Law, requiring all CCoW holders to be converted to a Mining Business License under the new Mining Law within a year after adoption (Baker McKenzie, 2016).

### Subsidy Estimation

**Table 7.**

| SUBSIDY | 2012 | 2013 | 2014 | 2015 | TOTAL |
|---|---|---|---|---|---|
| IDR (in millions) | 2,178.8 | 3,368.3 | 2,662.4 | 1,202.5 | 9,354.8 |
| USD (in millions) | 167.6 | 259.1 | 201.7 | 91.1 | 719.6 |

## 4.3.2 Waiving Import Tariff for Certain Advanced Equipment in Budget Year of 2011

**Table 8. Waiving Import Tariff for Certain Advanced Equipment in Budget Year of 2011**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Promotion of coal-fired electricity generation |
| Subsidy Name | Waiving import tariff for certain advanced equipment in budget year 2011. |
| Jurisdiction | National Authority |
| Legislation/Endorsing Organization | Regulation 104/PMK.011/2011, Minister of Finance |
| Policy Objective(s) of Subsidy | To improve the supply of goods or services to enhance competitiveness of the manufacturing industry for electricity generation in Indonesia. |
| End Recipient(s) of Subsidy | Manufactures of boilers and/or transformers for electricity power plants. |
| Time Period | July 2011–June 2012 (one budget year only) |
| Background | This regulation waives the import duty for boilers and other materials for electricity generators.<br>The subsidy had a budget ceiling of IDR 3.446 billion, equalling the total value of the import tariff exemptions. Researchers could find no information on the projects funded by the policy or drawdown of the budget allocation.<br>Therefore, as an estimate, the IDR 3.446 billion budget allocation was used a proxy for the value of the subsidy to thermal electricity generators. In 2011, 44 per cent of total electricity generation was derived from coal. Thus, 44 per cent of the benefit of this subsidy could be apportioned to support of coal-fired electricity generation. |
| Amount of Subsidy Conferred | IDR 1.51 billion / USD 116,153 in 2011 (budget allocation not actual expenditure, for which data is not available) |
| Information Source | Minister of Finance, 2011. |

### 4.3.3 Preferential VAT Rate for Goods and Services Purchased by coal Mining Companies

**Table 9. Preferential VAT Rate for Goods and Services Purchased by coal Mining Companies**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal mining companies established before 1985 ("First-Generation" coal producers) |
| Subsidy Name | Preferential VAT rate for goods and services purchased by coal mining companies |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulations 194/PMK.03/2012 and 130/PMK.011/2013, Minister of Finance<br>Law Number 11 Year 1994 on the imposition of Value Added Tax and Sales Tax on luxury goods in the field of oil and gas, mining and other mining products through sharing contracts, the work contract or cooperative agreement. |
| Policy Objective(s) of Subsidy | To support extractive industries by reducing the VAT paid by specified coal mining companies on purchases of goods and services from third parties. |
| End Recipient(s) of Subsidy | Six coal companies that signed an agreement with the State Coal Company as a before the date of 1 April 1985 (PT Arutmin Indonesia, PT Kendilo BHP Coal Indonesia, PT Kaltim Prima Coal, PT Kideco Jaya Agung, PT Adaro Indonesia and PT Berau Coal) |
| Time Period | 1994 to present (until contracts expire) |
| Background | The preferential rate is a maximum of 2.5–5% compared with the usual rate of 10–15%. |
| Amount of Subsidy Conferred | USD 61,400 in 2014 and USD 99,000 in 2015 |
| Information Source | Minister of Finance, 2012a. |

#### Subsidy Discussion

The policy is something of a legacy subsidy. In 1985 the government signed a contract with six coal companies under the Coal Mining Agreement. The agreement provided this first generation with the contractual right to pay a reduced rate of VAT on the purchase of goods and services from third parties (Minister of Finance, 2012a). Since 1985 the tax system has been reformed and new entrants no longer receive a reduction in VAT so the policy exclusively benefits the first generation of coal producers as long as the original contract is in force.

The first generation of coal mining contractors pays lower sales tax for a long list of goods, including mining-related products, building materials, fuels, consumer goods foods and chemicals listed in the annex of the regulation (Minister of Finance, 2012a). Compared to the normal VAT, the tax for listed items is significantly lower: 2.5–5 per cent, while the normal tax for goods range from 10 per cent (VAT) to 50 per cent (for luxury goods).

#### Subsidy Estimation

The value of this subsidy is equal to the tax that would have been paid had standard rates of tax been applied. To estimate this value, the authors collected information on purchasing data from the six "first-generation" coal-producing companies. Not all of these six companies publish their financial reports or sustainability reports. In addition, there is no standard of information provided in these reports. Only one company provided data on the value of total procurement from domestic suppliers. Based on an assumption that this company pays an effective average VAT rate of 4.5 per cent compared to the standard 10 per cent, the subsidy has been calculated as USD 61,400 in 2014 and USD 99,000 in 2015. It is likely that the other five companies receive similar subsidies, though data has not been identified to confirm this.

**Table 10.**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR millions | NQ | NQ | NQ | 810.48 | 1,306.8 | NQ |
| USD thousands | NQ | NQ | NQ | 61.4 | 99 | NQ |

*Notes: NA = not available; NQ = Not quantified*

### 4.3.4 Domestic Market Obligation for Coal

**Table 11. Domestic Market Obligation for Coal**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal production and consumption |
| Subsidy Name | Domestic Market Obligation (DMO) |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulation 34/2009, Minister of Energy and Mineral Resources. Implementing legislation: Law Number 4 Year 2009 on Mineral and Coal Mining Article 5 Paragraphs 1 and 2 (Government of Indonesia, 2009b) |
| Policy Objective(s) of Subsidy | To allocate a guaranteed amount of coal for domestic consumption at a government-determined benchmark price |
| End Recipient(s) of Subsidy | Coal-fired electricity generators and other nominated coal-consuming industries |
| Time Period | 2009 to present |
| Background | The Domestic Market Obligation (DMO) aims to secure sufficient energy and mineral resources to meet domestic consumption requirements. The DMO-regulation relates to all types of coal and minerals, but is currently only applicable to coal producers. |
| Amount of Subsidy Conferred | USD 14.7 million (IDR 194 billion) in 2015 |
| Information Sources | Ministry of Energy and Mineral Resources, 2009; PwC, 2016. |

#### Further Background

The DMO requires domestic coal producers to allocate a certain amount of production to the domestic market. The allocation is determined annually by the Ministry of Energy and Mineral Resources.

There is no consistent percentage allocated to the domestic market, but the DMO has generally been below 25 per cent of total production. The price paid to producers for DMO coal is linked to the Indonesian Government Benchmark Thermal Coal Price (HBA). The HBA is the benchmark price for Indonesian coal, and is a monthly average price based 25 per cent on Platts Kalimantan 5,900 kcal/kg GAR assessment; 25 per cent on the Argus-Indonesia Coal Index 1 (6,500 kcal/kg GAR); 25 per cent on the Newcastle Export Index and 25 per cent on the global COAL Newcastle (6,000 kcal/kg NAR) index (Platts.com, 2016).

The Minister for Energy and Mineral Resources sets the DMO annually based on forecast domestic requirements (as submitted by coal consumers) and production plans of coal mining companies. Mining companies must demonstrate adherence to their DMO allocation or face penalties.

The Government set a coal DMO of 111 million tonnes for 2016 (approximately 26.5 per cent of forecast 2016 total production) (PwC, 2016). The primary beneficiary is coal-fired electricity generators, notably the state-owned electricity company PT PLN. The majority of the DMO is

consumed by the electricity generation sector (81 per cent), followed by cement (12 per cent), metallurgy, fertilizer, textile, paper and briquettes (each 2 per cent or less) (Indonesia Coal Mining Association, 2016).

The DMO could potentially constitute a coal subsidy in at least two different ways:

1. The grade of coal allocated under the DMO is of lower quality than exported coal. This could allow producers to sell low-grade coal at artificially higher (subsidized) prices based on international benchmark prices for higher grades of coal.

   It has not been possible to identify as part of this study whether coal companies allocate a relatively larger proportion of lower quality coal to the domestic market than to coal exports as a means of increasing revenue.

2. The national government foregoes the coal export royalty due to higher domestic coal consumption and decreased international exports.

   Indonesia's National Medium-Term Development Plan for the period 2015–19 (RPJMN 2015–19) projects that 60 per cent of total Indonesian coal production will be allocated to the domestic market in 2019. Including a production cap at 400 Mt, this is expected to allocate 260 Mt for domestic consumers, reducing coal exports to 160 Mt in 2019, down from 365 Mt in 2015 (Ministry of Energy and Natural Resources, 2016b).

   This will constitute significant foregone revenue for the government, as it will no longer be able to claim export royalty of 1.5 per cent from coal exports.

   In 2016, the DMO totalled 111 Mt. This is an increase from 76 Mt in 2014 and 92.3 Mt in 2015. So far, due to a lack of enforcement of the coal production cap, exports have not fallen as dramatically as forecasted. Nevertheless, assuming that the additional coal allocated to the DMO between 2014 and 2016 would otherwise have been exported, the revenue foregone equals USD 32.4 million in 2016 and USD 14.7 million in 2015. This is based on a yearly average HBA price at USD 61.84 per tonne in 2016 and USD 60.13 per tonne in 2015 (Ministry of Energy and Natural Resources, 2016b; PwC, 2016).

   Going forward, the subsidy would be expected to increase significantly if exports are reduced to supply coal for the domestic market under the DMO. In 2019, the revenue foregone would be projected to total USD 134.4 million (based on 2016 coal prices).

**Table 12. Subsidy Estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR billions | NQ | NQ | NQ | NQ | 194.04 | 427.7 |
| USD millions | NQ | NQ | NQ | NQ | 14.7 | 32.4 |

*Notes: NA = not available; NQ = Not quantified*

### 4.3.5 Failure to Collect Land and Building Tax for Coal Mines

**Table 13. Failure to Collect Land and Building Tax for Coal Mines**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal mining |
| Subsidy Name | Reduced land and building tax for coal mines |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Policy PER-32/PJ/2012 and Regulation PER-47/PJ/2015, Ministry of Finance |
| Policy Objective(s) of Subsidy | The policies determine how coal and other mining producers must pay for land and building tax. |
| End Recipient(s) of Subsidy | Coal mining companies |
| Time Period | December 2012–December 2015 |
| Background | Since 2012, land and building tax has been calculated only on the value of the surface of the land, including buildings. This is despite the implementing regulations containing mechanisms to take into account the value of coal under the surface. From 2015, the value of the land for tax purposes was calculated on the value of the coal under the ground as well as the surface value. |
| Amount of Subsidy Conferred | Not Quantified |
| Information Sources | Ministry of Finance, 2012c; Ministry of Finance, 2015c; Duta, 2016. |

#### Further Background

Regulation PER-32/PJ/2012 and its 2015 amendment PER-47/PJ/2015 consider that underground coal mining fields must be reported and taxed. However, there is evidence that this regulation has not been properly followed by coal mining companies (Duta, 2016).

In 2015, the Indonesian Coal Mining Association claimed that the proper application of the underground coal taxation raised the Land and Building Tax (PBB) collections by 200 per cent. According to Duta (2016) this was due to the use of new "detailed procedures" to impose the PBB by the Ministry of Finance. However, these procedures would apply only to companies holding Coal Contracts of Work, second- and third-generation.

An examination of the policies themselves indicates no obvious subsidy, since the taxation of the underground coal was and is compulsory. However, at least some coal producers are reported to have benefited from a tax break when the value of coal was not included in land tax evaluation between 2012 and 2015. This is a form of foregone tax revenue that would have increased Indonesian government revenue had it been applied earlier.

#### Subsidy Estimation

In order to quantify this subsidy, Land and Building tax paid by coal mining companies from 2012 and 2015 could be used and compared, considering the type of CCoW. However, these data is not publicly available at the required granular level to identify a potential subsidy.

### 4.3.6 Preferential Corporate Tax Rate for Businesses in Specified Fields, Including Coal Mining

**Table 14. Preferential Corporate Tax Rate for Businesses in Specified Fields, Including Coal Mining**

| SUBSIDY CATEGORY | TAX BREAK, FOREGONE GOVERNMENT REVENUE |
|---|---|
| Stimulated Activity | Coal mining |
| Subsidy Name | Preferential corporate tax rate for businesses in specified fields including coal mining |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulations 144/2012, No. 1/2007, 52/2011, 159/2015. (Ministry of Finance, 2012; Ministry of Finance of Indonesia, 2015b) |
| Policy Objective(s) of Subsidy | To support investments in coal mining (Ministry of Finance, 2015d; MOF, 2015) |
| End Recipient(s) of Subsidy | Coal mining companies |
| Time Period | 2012–15 |
| Background | Regulation 144/2012 grants a reduction in corporate income tax for certain business sectors including coal mining (as specified in the annex to Regulation 52/2011), with all coal producers benefiting. The regulation allows for tax deductions of between 10% and 100% of taxable income and was for a period of 5–15 years from the year that production commences. The standard corporate tax rate is 25%.<br>In 2015, Regulation 159/2015 effectively reimposed the corporate tax liability for the coal mining sector by removing this exemption. The regulation does, however, make exemptions for enterprises that operate in a "special economic zone." See separate entry for below for "Reduction in corporate tax for coal mining companies registered after August 15, 2011." |
| Amount of Subsidy Conferred | NQ |
| Information Sources | Minister of Finance, 2015d; PwC Indonesia, 2016. |

#### Further Background

Between 2012 and 2015, corporations operating in key sectors of the economy including coal received a reduction in corporation tax. Eligible firms received reductions of between 10 and 100 per cent. By reducing the tax rate, revenue was foregone and a subsidy was effectively provided to these companies.

In 2015 a new regime was introduced that provided a reduction in corporation tax to companies operating in special economic zones rather than by industry. This measure is described in Section 4.3.7, "Reduction in corporate tax for coal mining companies registered after August 15, 2011."

#### Subsidy Estimation

To estimate the value of this subsidy would require data on the level of reduction and the corporation tax that was paid for each eligible company. This data was not available. Another potential approach would be to compare the level of corporation tax before and after the end of the policy. Total corporation tax revenues, including royalties from the coal sector do not show an increase in 2015, going from IDR 19 trillion in 2014 to IDR 18 trillion in 2015. However, these figures are too general to allow conclusions to be drawn on the impact of preferential rates for corporate taxation.

**Table 15. Subsidy estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR | NQ | NQ | NQ | NQ | NQ | NQ |
| USD | NQ | NQ | NQ | NQ | NQ | NQ |

*Notes: NA = not available; NQ = Not quantified*

### 4.3.7 Reduction in Corporate Tax for Coal Mining Companies Registered After August 15, 2011

**Table 16.**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal mining |
| Subsidy Name | Reduction in corporate tax for coal mining companies registered after August 15, 2011 |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulation 159/2015 (Ministry of Finance of Indonesia, 2015) |
| Policy Objective(s) of Subsidy | To promote specified pioneer industries (which do not include coal) and processing industries in special economic zones (which may include coal) |
| End Recipient(s) of Subsidy | Coal processing companies operating in special economic zones |
| Time Period | 2015 to present |
| Background | Coal mining companies registered as a legal entity after August 15, 2011 were eligible for ongoing reduction in corporate tax following its introduction in 2015. To qualify, they must make an investment above IDR 1 trillion (with at least 10% deposited in Indonesian banks), process their coal and have operational areas in designated special economic zones. |
| Amount of Subsidy Conferred | NQ |
| Information Sources | |

#### Further Background

This policy replaces the corporate tax exemptions listed in Section 4.3.6: "Preferential corporate tax rate for businesses in specified fields including coal mining." The regulation provides a reduced rate of corporation taxes for companies working in certain industries including oil refining, telecommunications and chemicals but excluding coal. However, the regulation also includes provision for lower corporate tax in special economic zones. Coal companies within these zones may receive a subsidy from this regulation.

Special economic zones (*Kawasan Ekonomi Khusus*, or KEK) are designated regions considered to have economic and geostrategic value that warrants accelerated economic growth in one or more fields: export processing, logistics, industry, technology development, tourism or energy. The government provides investment incentives and infrastructure for these regions (Government of Indonesia, 2009a).

Since this policy applies to a number of industries, it is not clear that it can be considered a subsidy for the coal industry. To make this judgement it would need to be shown that the coal industry predominantly benefits from the policy. This has not been possible as part of this study.

### Subsidy Estimation

The subsidy to coal companies would be equal to the tax reduction received by coal companies in special economic zones. A company-by-company analysis of profits and tax payments would be needed to establish an estimate. It has not been possible to complete such an analysis in this project.

**Table 17. Subsidy estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR | NQ | NQ | NQ | NQ | NQ | NQ |
| USD | NQ | NQ | NQ | NQ | NQ | NQ |

*Notes: NA = not available; NQ = Not quantified*

**Table 18. Failure to Collect Taxes and Royalties From Unregulated or Illegal Coal Mines**

| Subsidy Category | Government revenue foregone |
|---|---|
| Stimulated Activity | Coal mining |
| Subsidy Name | Failure to collect taxes and royalties from unregulated or illegal coal mines |
| Jurisdiction | National |
| Legislation/Endorsing Organization | N/A |
| Policy Objective(s) of Subsidy | |
| End Recipient(s) of Subsidy | Illegal coal miners and exporters |
| Time Period | Ongoing |
| Background | Indonesia produces around 5–15% more coal annually than the Ministry of Energy and Mineral Resources reports based on production, export and consumption data (Own calculations and (Jensen, 2013). The gap is reported to represent more than USD 2 billion worth of the coal mined illegally and going untaxed each year, leading to USD 100–200 million in lost revenue. |
| Amount of Subsidy Conferred | USD 95.2 million (IDR 1,256 billion) in 2014 |
| Information Sources | |

### Further Background

There is a significant gap between the official coal production reported by the Ministry of Energy and Mineral Resources and the total coal exported or consumed. This gap is thought to be due to production of coal in mines that are not fully registered and do not pay the appropriate royalties on their production. One report states around USD 460 million was lost in revenue through unpaid royalties in 2012 (Jensen, 2013). It is not clear why production would not be recorded officially, but this could potentially be due to corruption or administrative shortcomings.

The inability to regulate mining and collect taxes and royalties from all coal mines is effectively foregone revenue and can be considered a subsidy.

### Subsidy Estimation

To quantify the subsidy, it was assumed that royalties were not collected on coal that was not included in official production figures, and therefore the revenues that would have been collected were foregone. The authors evaluated official production data, export data and domestic consumption data and found that significantly more coal was either consumed or exported than official figures showed had been produced (Indonesia Investments, 2016; Badan Pusat Statistik, 2016). It was assumed that

this discrepancy indicates that a proportion of coal production is not being properly recorded and therefore no royalties are being paid. The estimate below shows the size of the foregone revenue for this coal that not accounted for in the official production figures.

**Table 19.**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR billions | 5,187.6 | 2,478.96 | 1,221 | 1,256.6 | NQ | NQ |
| USD (million) | 393 | 187.8 | 92.5 | 95.2 | NQ | NQ |

*Notes: NA = not available; NQ = Not quantified*

### 4.3.8 Tax Allowance 30 per cent for Coal Liquefaction and Coal Gasification

**Table 20. Tax Allowance 30% per cent for Coal Liquefaction and Coal Gasification**

| SUBSIDY CATEGORY | TAX BREAK, GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal liquefaction and coal gasification |
| Subsidy Name | Tax Allowance 30% for coal liquefaction and coal gasification |
| Jurisdiction | National (except Java province) |
| Legislation/Endorsing Organization | Government of Indonesia, Ministry of Finance |
| Policy Objective(s) of Subsidy | Promote the development of coal conversion into gas and liquid in order to improve the usability of low-medium quality coal |
| End Recipient(s) of Subsidy | Coal processing industry |
| Time Period | Since 2016 |
| Background | The National Energy Policy on Government Regulation No. 79 in 2014 stated that the usage of low-quality coal should increase for coal gasification and coal liquefaction. To promote this, tax reduction measures were implemented including: |
| Amount of Subsidy Conferred | Not Quantified |
| Information Sources | GR No. 9/2016, MoF Regulation No. 89/PMK.010/2015, (PwC, 2016) |

#### Further Background

This policy is a consequence of the National Energy Policy and the Mining Law 2009 regarding the creation of value-added coal products. Coal gasification and coal liquefaction became eligible for the tax allowances with the Government Regulation GR No. 9/2016 (GR 9)—an amendment to the previously existing GR No. 18/2015. GR 9 confirms that taxpayers who obtain this tax incentive cannot use the other tax facilities such as those for Integrated Economic Development Zones (Kawasan Pengembangan Ekonomi Terpadu, or KAPET) or the Tax Holiday.

#### Subsidy Estimation

Given the recent introduction of this subsidy (implemented in 2016), there is no data regarding actual tax breaks on coal processing plants and thus it cannot be quantified at this stage

**Table 21. Subsidy estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR | NQ | NQ | NQ | NQ | NQ | NQ |
| USD | NQ | NQ | NQ | NQ | NQ | NQ |

*Notes: NA = not available; NQ = Not quantified*

### 4.3.9 Preferential Royalty Rates and Corporate Tax Rates for Small Coal Mining License Holders

**Table 22. Preferential Royalty Rates and Corporate Tax Rates for Small Coal Mining License Holders**

| SUBSIDY CATEGORY | TAX BREAK, GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Holders of licenses from provincial governments |
| Subsidy Name | Preferential royalty rates and corporate tax rates for small coal mining license holders |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Ministry of Finance (107/2015) and Ministry of Energy and Mineral Resources (Regulation 9/2012) |
| Policy Objective(s) of Subsidy | To impose lower tax burdens on smaller coal mining companies. |
| End Recipient(s) of Subsidy | Holders of coal mining licenses issued by provincial governments (Izin Usaha Pertambangan or IUP holders) |
| Time Period | |
| Background | In 2009 Indonesia introduced a new mining law that replaced previous legislation dating from 1967. Contained in this legislation was a provision to replace contractually based mining concessions ("Coal Contract of Works" or CCoW) with a single area-based licensing system (Izin Usaha Pertambangan, or IUPs). The two licensing regimes introduced differential royalties and tax rates that vary among Indonesian coal mining companies (PwC, 2016). |
| Amount of Subsidy Conferred | USD 565 million (IDR 7,458 billion) in 2014 and USD 471 million (IDR 6,217 billion) in 2015 |
| Information Sources | Indonesia Investments, 2015a; Ministry of Energy and Mineral Resources, 2012; Platts Singapore, 2015. |

#### Further Background

In 2009, Indonesia introduced a new mining law that replaced previous legislation dating from 1967. Contained in this legislation was a provision to replace contractually based mining concessions (Coal Contract of Works, or CCoW) with a single area-based licensing system (Izin Usaha Pertambangan, or IUP).

There are currently around 960 coal companies in the production stage in Indonesia. About 900 of these companies are IUP holders, who contribute approximately 20 per cent of Indonesia's total annual coal production (Indonesia Investments, 2015b).

Licenses issued under the old CCoW regime pay a corporate tax of 45 per cent and royalty of 13.5 per cent, while holders of newer IUP coal mining licenses issued by provincial governments pay 3–7 per cent royalties, with a corporate tax rate of 25 per cent.

There have been various attempts to reform licensing to standardize and simplify it. Proposals have been put forward to increase royalty rates for IUP license holders (see Table 23), but implementation has been delayed on a number of occasions.

Finally, in 2015 a new export tax of 1.5 per cent for IUPs (Regulation 107/2015) was introduced to increase tax revenues and bridge the gap between IUP and CCoW license holders (Platts Singapore, 2015; Indonesia Investments, 2015a). This is covered in Item 2 – Income tax break on the export value of coal.

**Table 23. Current and proposed royalty rates for IUP license holders**

| COAL TYPE | CURRENT ROYALTIES | PROPOSED ROYALTIES |
|---|---|---|
| < 5,100 cal/gr | 3% | 7% |
| 5,100 - 6,100 cal/gr | 5% | 9% |
| > 6,100 cal/gr | 7% | 13.5% |

*Source: Indonesia Investments, 2015a.*

The varying royalty and tax rates applying to different coal mining license holders make it difficult to estimate the net subsidy conferred. IUP license holders were favoured with lower royalties and a lower corporate tax rate. After the new export tax was introduced, some of this benefit will have been eroded. IUP license holders are considered to have an advantage over other operators, with this advantage reducing after the changes in legislation in 2015. One approach is to consider as a subsidy the gap in corporate tax rate and royalty rate that gives IUPs a lower rate.

### Subsidy Estimation

Estimating the subsidy conferred to IUP producers because of reduced corporate tax rates is difficult, as data on company profits or detailed tax revenues is not available.

To give an estimate of subsidy due to lower royalties for IUPs, total production is apportioned to IUPs using the 20 per cent rate mentioned above; this IUP production is multiplied by price information to give a value against which the reduced rate of royalties can be evaluated. The average gap between IUP royalty rates and that levied on CCoW license holders is used to find an estimate of the potential subsidy. For 2015, this gives a value of IDR 6.2 trillion of potential lost revenue.

This estimate is of a similar magnitude to those produced elsewhere. A media report from 2013 estimated that the government could gain an additional IDR 4 trillion in revenue by increasing royalties for IUP holders to 10 per cent (Siahaan, 2013).

**Table 24. Subsidy Estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|
| IDR (billion) | 9,379 | 8,829 | 8,818 | 7,458 | 6,217 |
| USD (million) | 711 | 669 | 668 | 565 | 471 |

*Notes: NA = not available; NQ = Not quantified*

### 4.3.10 Value Added Tax Exemption for Coal

**Table 25. Value Added Tax Exemption for Coal**

| SUBSIDY CATEGORY | GOVERNMENT REVENUE FOREGONE |
|---|---|
| Stimulated Activity | Coal sales |
| Subsidy Name | Value Added Tax Exemption for Coal |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulation PP No. 144/2000, President of Indonesia |
| Policy Objective(s) of Subsidy | To avoid double taxation of goods mostly used as inputs and of staple commodities. |
| End Recipient(s) of Subsidy | Coal consumers |
| Time period | 1984 to present |
| Background | Since 2000, coal has been exempt from VAT. The exemption also applies to other extractive resources including crude oil, natural gas, geothermal power and several mineral resources. Before 2000 companies were exempt from VAT or received a VAT rebate depending on the tax obligations specified in their contracts and prevailing legislation. |
| Amount of Subsidy Conferred | Not Quantified |
| Information Sources | Government of Indonesia, 2000; Suprapto & Dwi Darmawan, 2009; Prakoso, 2016. |

#### Further Background

Tax arrangements vary among coal producers depending on when they commenced operation. Contacts for "first-generation" coal producers, signed before 1984, specifically stated their tax obligations. As VAT did not exist in Indonesia at the time, there was no obligation to pay it even after it was imposed. From 1985 to 1997, contracts for "second-generation" coal producers specified that they must pay prevailing taxes but were provided with a VAT exemption in their contracts. From 1997 to 2000, contracts for "third-generation" coal producers specified that they needed to pay the taxes enshrined at the time of their contract (including VAT), but they received a rebate. In 2000, a blanket VAT exemption for unprocessed coal was enacted.

There is some contention and confusion arising from different interpretations of these obligations (Lingga, 2016). Third-generation companies claim they continue to pay 10 per cent VAT on coal sold domestically because the VAT obligation is specified in their contracts. But they do not receive a rebate given that coal does not officially attract VAT. They seek reimbursement of over USD 110 million in VAT rebates (Lingga, 2016). Coal that has been value-added (e.g., washed) can also attract VAT, adding to the inconsistency and the need for interpretation around implementation of VAT.

**Table 26. Subsidy Estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR | NQ | NQ | NQ | NQ | NQ | NQ |
| USD | NQ | NQ | NQ | NQ | NQ | NQ |

*Notes: NA = not available; NQ = Not quantified*

## 4.4 Provision of Goods or Services Below Market Value

### 4.4.1 Support for Research, Development, Technology and Training

**Table 27. Support for Research, Development, Technology and Training**

| SUBSIDY CATEGORY | PROVISION OF GOODS OR SERVICES BELOW MARKET VALUE |
|---|---|
| Stimulated Activity | Coal exploration, mining, processing and consumption |
| Subsidy Name | Support for research, development, technology and training |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulations 11.779/1956 and 55/2010, Ministry of Energy and Mineral Resources |
| Policy Objective(s) of Subsidy | To support R&D activities that ensures the continuity of supply of coal and mineral products, value adding for industrial and other sectors and capacity building for coal producers. |
| End Recipient(s) of Subsidy | Coal industry and consumers |
| Time Period | 1956 onwards |
| Background | Since 1956, the national government has funded a centre to support R&D and training in the mineral and coal industry. It is now known as the Centre for Research and Development of Mineral and Coal Technology and is housed within the Ministry for Energy and Mineral Resources. About half of the centre's work is dedicated to coal as opposed to other minerals. The Ministry of Energy and Mineral Resources gave its budget for program development and exploitation of mineral and coal as IDR 377 million for 2015 budget. Using the assumption that approximately 50% of the budget is used for coal gives a total of IDR 189 million.<br>The Ministry's role in providing R&D and training services is set out in a 2010 regulation on (55/2010). |
| Amount of Subsidy Conferred | USD 14 million (IDR 184.8 billion) in 2015 |
| Information Sources | Ministry of Energy and Mineral Resources, 2010; Ministry of Energy and Mineral Resources, 2016e; Ministry of Energy and Mineral Resources, 2016a. |

#### Further Background

Recent projects related to coal include gasification, boiler development, briquette manufacture, quality improvement, mine site stabilization and monitoring, and environmental impact assessment. The centre also provides resources and services for the coal industry, including a laboratory for analysis of coal and peat (determining composition and calorific content), a coal bed methane (CBM) mobile laboratory to support CBM exploration (measurement of gas content and composition) (Ministry of Energy and Mineral Resources, 2016d). The relationship between the centre and the coal industry is based on ad hoc collaborative research, formal memorandums of understanding and cooperation in technological exhibitions.

Through funding of coal-specific R&D, training and education, the Ministry of Energy and Mineral Resources is supporting coal exploration, mining and processing. This funding therefore confers a subsidy to the sector.

#### Subsidy Estimation

The annual budget of the Ministry of Energy and Mineral Resources for development and exploitation of minerals and coal has been used as the basis for estimating this subsidy. Based on a review of projects undertaken by the Centre for Research and Development of Mineral and Coal

Technology, we estimate that approximately half involve coal. This value has been used to estimate the proportion that is a subsidy to coal over other minerals.

Based on these assumptions we estimate the subsidy to be IDR 189 billion (roughly USD 14 million) in 2015 (Ministry of Energy and Mineral Resources, 2016a).

The Ministry also has other budget allocation to research and development that totalled IDR 1.6 billion, but insufficient information was available to be able allocate a proportion of this to coal (Ministry of Energy and Mineral Resources, 2016a).

**Table 28. Subsidy Estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR (billions) | NQ | NQ | NQ | NQ | 184.8 | 92.4 |
| USD (millions) | NQ | NQ | NQ | NQ | 14 | 7 |

*NA = not available; NQ = Not quantified*

## 4.5 Income or Price Support

### 4.5.1 Above-Market Pricing for Coal Supplied to Mine Mouth Electricity Generators

**Table 29. Above-Market Pricing for Coal Supplied to Mine Mouth Electricity Generators**

| SUBSIDY CATEGORY | INCOME OR PRICE SUPPORT |
|---|---|
| Stimulated Activity | Coal production |
| Subsidy Name | Above-market pricing for coal supplied to mine mouth electricity generators |
| Jurisdiction | National |
| Legislation/Endorsing Organization | Regulation No. 1348.K/30/DJB/2011, Regulation No. 10/2014, Regulation No. 9/2016, 4th April 2016, Ministry of Energy and Mineral Resources |
| Policy Objective(s) of Subsidy | To develop a market for low-calorific coal |
| End Recipient(s) of Subsidy | Mine mouth coal companies |
| Time Period | 2011–2016 |
| Background | A pricing mechanism for coal from mine mouth power plants, making it more attractive to burn low-grade coal at generators located at or near coal mines |
| Amount of Subsidy Conferred | N.Q. |
| Information Sources | Gumelar, 2016; Ministry of Energy and Mineral Resources, 2016c; Ministry of Energy and Mineral Resources, 2016d. |

#### Further Background

A mine mouth electric plant is a coal power plant built close to a coal mine.

Since 2011, Indonesian mine mouth power plants have had special rules around the pricing of coal, with the government being closely involved.

From 2011 to 2014, under regulation No. 1348.K/30/DJB/2011, coal was allowed to be sold at a lower price than the HBA domestic coal price for calorific values above 3,000 KCal/Kg GAR (contingent on government approval). For calorific values below this benchmark, coal prices were

determined at production costs plus a profit margin of 25 per cent. The policy was intended to make it more attractive for Indonesia's coal sector to develop and use low-grade coal at domestic mine mouth power plants (Global Business Guide, 2016).

In 2014, the government moderated the regulation, introducing a fixed profit margin at 25 per cent above production costs for coal producers supplying to mine mouth electricity generation companies.

This remained effective until April 2016, when the government, through regulation No. 9/2016, announced a price range for mine mouth coal between 15 per cent and 25 per cent above total production cost (Global Business Guide, 2016).

Six months later, in September 2016 the government revised the regulation for mine mouth coal pricing again, allowing certain elements of the price of coal to be determined between the mining company and the electricity generator (with subsequent approval by the government). The policy change aimed to lower the coal price for mine mouth power plant owners—thereby restarting a range of projects that were stalled due to a low international coal price environment in which generators found it hard to buy coal at production costs plus the profit margin (Baker McKenzie, 2016).

The mine mouth pricing policies that have been in place since 2011 are likely to constitute a subsidy, at least up until the most recent policy change in September 2016.

Both PT PLN and independent power producers have voiced concerns that the profit margins have been too high compared with international coal price developments. Likewise, the fact that the policy was initially designed to make low-calorific coal more attractive suggests that the government aimed to incentivize the use of coal through pricing support.

In addition, the Indonesian Coal Mining Association has called for the replication of the mine mouth pricing mechanism to the entire sector in order to secure coal supply, indicating that the cost-based pricing has been favourable to the sector (Indonesian Coal Mining Association, 2016b).

Unfortunately, due to a lack of data, it has not been possible to quantify the subsidy.

### Subsidy Estimation

**Table 30. Subsidy Estimation**

| SUBSIDY | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|
| IDR | NQ | NQ | NQ | NQ | NQ | NQ |
| USD | NQ | NQ | NQ | NQ | NQ | NQ |

*Notes: NA = not available; NQ = Not quantified*

# 5.0 Renewable Energy and Subsidies in Indonesia

Renewable energy has the potential to provide a significant proportion of Indonesia's electricity needs. The country is estimated to have around 32 GW of geothermal energy potential, 32 GW of biomass, 75 GW of hydro, up to 1,200 GW of solar and up to 9 GW of wind (ADB, 2015). The government's National Energy Policy 2014 targets to increase the share of renewable energy in the primary energy mix to 23 per cent in 2025 (IEA, 2015). To develop this potential the government has implemented policies and support programs specifically targeted at renewable energy.

**Table 31. Renewable energy policy in Indonesia**

| YEAR | NAME | DESCRIPTION |
|---|---|---|
| 2002 | Ministry Regulation No. 1122K/30 Ministerial Regulation on Small Distributed Power Generation Using Renewable Energy | Established the principle that small-scale renewable generators could sell excess production to the grid |
| 2004 | Green Energy Policy (Ministerial Decree No. 2/2004) | Subnational renewable energy subsidies |
| 2005 | Blueprint for National Energy Implementation 2005-25 | Sectoral roadmaps and a target for 17 per cent renewable energy in primary energy by 2025 |
| 2006, 2009 | Ministerial Regulation No. 2/2006 on Medium-Scale Power Generation using Renewable Energy, and Ministerial Regulation No. 31/2009 | Obligation for national utility to buy power from independent power producers with plant capacities under 10 MW |
| 2012-2014 | MEMR Regulations No. 4/2012, 22/2012, 17/2013, 19/2013, 12/2014, 17/2014 | Feed-in tariffs (FiTs) for biomass, mini-hydro, geothermal, municipal solid waste and solar energy |
| 2013 | Auction system for utility-scale solar | Defines an auction program to award FiTs to utility-scale solar projects |
| 2014 | National Energy Policy 2014 | Target for 23 per cent renewable energy in primary energy by 2025 |

*Source: IEA, 2015.*

Indonesia published its first regulation to incentivize renewable energy in 2002 (Ministry Regulation No. 1122K/30 on Scattered-Small Power Generation Using Renewable Energy). This regulation allowed independent power producers (IPPs) to sell excess power from renewable generation to PT PLN. This was capped at a maximum of 1 MW at a price between 60 per cent and 80 per cent of the utility's generation cost, depending on the voltage level. Since then the government has issued several policies to regulate the market for renewable generators and the purchase price for electricity generated by renewable energy IPPs (IEA, 2016b).

In 2006, Ministerial Regulation No. 2/2006 on Medium-Scale Power Generation using Renewable Energy extended the renewable energy purchase obligation by PLN to projects up to 10 MW and defined the purchase contracts for 10 years.

In 2012 and 2013, FiTs were implemented for a wider range of renewable technologies. The FiTs focused on generators smaller than 10 MW and established different tariffs depending on the voltage connection level and the region. Remote regions such as Papua can receive as much as 1.6 times the standard rate. The regional variations are also technology dependent. For example, biomass in Bali applies a factor of 1.5, whereas mini-hydro on the same island applies a factor of 1. For hydro technologies, FiTs change over the 20-year length of the contract, offering a lower price after the ninth year.

The first FiTs for solar PV appeared in Ministerial Regulation No. 17/2013. This regulation defined a maximum price benchmark for solar projects at USD 0.25/kWh (official prices are set in USD), adding 0.05USD/kWh if the installation had at least 40 per cent of local content. The actual price

paid to solar PV projects is determined by an auction system. Successful projects are awarded 20-year Purchase Power Agreements (PPAs) at the agreed rate.

Table 32 presents the FiT rates as set out in the regulations, compared to PLN's average generation cost in 2015. For the purpose of this analysis it was considered that where the effective feed-in tariff rate is above the average generation cost there is an effective subsidy to the renewable energy generators. It can be observed that in some cases minimum FiTs are close to the average PLN generation cost, so it is possible that projects that are close to the minimum FiTs may not be receiving high levels of subsidies.

PLN's average cost is driven up by the use of some more expensive generation sources, including diesel and gas (with unit prices in 2014 of USD 22.7 cents/kWh and USD 21.43 cents/kWh). Hydropower from plants that have since paid of their capital investment, is reported to be the cheapest source of energy reducing the average cost. PLN's generation cost from hydropower in 2014 was USD 1.40 cents/kWh. In comparison, PLN's average generation cost from coal in 2014 was USD 4.10 cents/kWh.

**Table 32. Latest FiT for renewable energy in Indonesia, under 10 MW**

| | Max FiT end 2016 (USD cents/kWh) | Min FiT (USD cents/kWh) | Average PLN generation cost 2015 (USD cents/kWh)* |
|---|---|---|---|
| Mini-hydroelectric | 17.86 | 8.37 | 6.87 |
| Solar PV | 25.00 | 14.50 | |
| Geothermal** | 25.40 | 10.00 | |
| Biomass | 27.20 | 10.80 | |
| Biogas | 17.63 | 7.78 | |
| Wind | 13.41 | 9.26 | |

** Exchange rate used for 2015 : IDR 13,392 = USD 1.*

*** FiT value corresponding to the maximum ceiling price in 2015. End 2016, permits for new capacity developments were auctioned at ceiling bid prices of USD 15.9 cents/kWh, project-dependent (IEA, 2016a, 2016b; MEMR, 2015, 2015a, 2016f, 2016g).*

It should be noted that the government of Indonesia has acted to help reduce the cost of renewable energy in Indonesia. Regulation 12/2017 has been implemented to regulate the price of electricity purchased from various technologies including solar, wind, biomass, geothermal and other energy sources (Solar & Off-Grid Renewables Southeast Asia, 2017). The regulation sets the maximum price for renewable energy tariffs to ensure that they are set at or below local generation costs. In some cases, the exact price (up to the cap) will be set by auction, and in other cases set by other means. It is possible that subsidies for renewable energy may be completely eliminated with this shift. With this in mind, the following energy subsidy list should be considered in terms of how the sector has previously operated. While it is still too early to predict how the sector will behave under the new regime, history provides some perspective and allows for comparison against coal power in Indonesia.

## 5.1 Renewable Energy Subsidy Inventory

The inventory reveals several subsidies to renewable energy. In addition to previous regulations promoting renewable energy, there are several recent policies that may confer a subsidy to the industry. These come in the form of electricity purchase prices above generation cost, tax reductions, import duty exemptions and soft loans for geothermal projects. A summary is presented in Table 33. FiTs are considered a subsidy in cases where the FiT is higher than the average electricity generation cost of PLN. We consider that any new electricity generation project feeding the Indonesian grid would be remunerated at this PLN's average cost. Hence, if the FiT offers a higher price to incentivize the installation of renewable energy, it is considered a subsidy.

**Table 33. List of other incentives for renewable energy in Indonesia**

| TYPE OF SUBSIDY | NAME | REGULATIONS | DESCRIPTION |
|---|---|---|---|
| Market price support | Renewable FiTs | MEMR Regulations 4/2012, 22/2012, 17/2013, 19/2013, 12/2014, 17/2014 | System of feed-in tariffs providing fixed rates for the sale of electricity from renewable generators |
| Government revenue foregone | Income tax incentives | MoF Regulations 21/PMK.011/2010, 35/PMK.011/2010 (geothermal only), GR 1/2007 (as amended by GR 62/2008 and GR 52/2011, including all renewables) | Adjustments to income tax on energy development projects, including net income reduction, accelerated depreciation, dividends reduced for foreign investors and compensation for losses |
| Government revenue foregone | Income tax holidays | MoF Regulation 130/2011 (amended by 150/PMK.010/2015) | As part of "Pioneer Industries", exemption of CIT (Corporate Income tax) for 5–10 years and 50% reduction on CIT for two years after end the of the exemption This policy was set aside in 2015, removing renewable energies from the Pioneer Industries program. |
| Government revenue foregone | Import duties exemptions | MoF Regulations No.177/2007 (geothermal only), 154/PMK.011/2008 (amended by No.154/2012), 176 / PMK.011 / 2009 (amended by No.76/2012) | MoF Regulation No.177/2007 refers to the import of goods to be used in geothermal business activities where the business entity has received a geothermal work area (WKP), preliminary survey data or a business license, IUP. MoF Regulation 154/2008 refers to the import of capital goods ("machines, equipment and tools but not spare parts") for IPPs with a formal agreement with PLN. MoF Regulation No.176/2009 refers to the import of "machines, goods and materials for the establishment or development" of a facility to produce goods (which includes electricity) and limited services. |
| Government revenue foregone | Import VAT exemptions | MoF Regulations 24/PMK.011/2010, 27/2012 | No 27/2012 provides an Import VAT "borne by the Government" facility for geothermal projects in the exploration phase. No.21/PMK.011/2010 reiterates the incentives for power generation driven by renewable energy. |
| Direct or indirect transfers of funds or liabilities | Finance support to green investments | MoF Regulation 177/KMK.01/2010 PIP (Pusat Investasi Pemerintah, Indonesia investment institutions managed by the MoF) | Funding via Flexible Soft Loan and Convertible Debt Interest Rate: the average BI + 2 per cent (depending on risk). Period Returns: 5–10 years Grace Period: 1–3 years (depending on the future development of the project and the results of the feasibility assessment) |
| Direct or indirect transfers of funds or liabilities | Soft loans to projects stalled due to financing issues | MoF Regulation No.3/PMK/2012 (Geothermal Fund) | Provided loans against collateral only (survey and exploration services), ultimately resulting in a zero-disbursement rate |
| Direct or indirect transfers of funds or liabilities | Finance support to renewable energies | DKE Fund (Energy Resilience Fund) | Pool of funds to provide incentives and financing facilities for the development of renewable energy, oil and gas energy, supporting government's energy security objectives. Fund specifications are currently in the proposal phase. |

*PwC, 2013; IEA, 2016c; Ministry of Finance, 2014a; MEMR, 2016c.*

## 5.2 The Cost of Renewable Energy Subsidies

This section investigates the value of four renewable energy subsidies: feed-in tariffs (FiTs), the Geothermal Fund, the DKE fund and the corporate income tax exemptions awarded by the Pioneer Industries program to renewable energy technologies. In addition, there are a number of schemes aimed at providing support for the exploration, development and construction of geothermal projects, but it has not been possible to identify or quantify these as part of this project.

The major subsidies to promote the renewable energy industry are the subsidies provided through FiTs. Technologies considered for the estimations are: solar PV, mini-hydro (<10 MW), geothermal, biomass and onshore wind. Due to availability of FiT data, this analysis only includes renewable energy generators commissioned after 2010. The subsidies to projects commissioned before this date are not included. Table 33 summarizes the estimated subsidies, which will be further explained in the following sections.

**Table 34. Summary of renewable energy subsidies in Indonesia**

| | 2015 |
|---|---|
| Subsidies through FiTs | USD 126.4 million |
| Pioneer Industry Tax Exemptions | USD 6.4 million |
| Geothermal Fund | NQ |
| DKE Fund | NQ |
| Total | USD 132.8 million |

*NQ = Not Quantified. In both cases the reason is that no reimbursements have occurred by the time of publication of this report.*

It should be noted that the definition of subsidies requires that subsidies benefit a specific industry or activity. Some of the subsidies listed above may in fact be too broad to qualify as subsidies to renewable energy. For example, blanket income tax incentives may be available for all energy projects and not only renewable energy.

### 5.2.1 Feed-in Tariffs (FiTs)

To estimate the cost to the government of the renewable energy FiTs, a price-gap analysis was applied to compare a reference price for electricity generation and the value of the FiT paid to each generator type. The subsidy is equal to the difference between the reference price and the FiT price. The reference price was taken as PLN's average generation cost and the FiT was considered for each technology. If the FiT is below the reference price in a specific year or for a specific technology, we consider that there is no subsidy under those conditions.

FiTs in Indonesia vary according to location, since a region-dependent multiplying factor is applied. For this analysis, the multiplying factor corresponding to the location of most of the projects. In case there are several FiTs depending on other factors, such as voltage level, the arithmetic average of these FiTs was considered. In the case of solar, whose price was defined by auctions with a cap price of USD 25 cents/kWh (including local content) until 2016, the average price of these auctions was considered, according to Bloomberg calculations (BNEF, 2016). In all cases, the new added capacities per year were considered with the FiT fixed at the value corresponding to that year of addition and in the currency stated by the regulation (USD or IRP).

Based on these assumptions, the total subsidy through FiTs in 2015 is estimated to be USD 126 million, with a cumulative total of USD 162 million between 2010 and 2015 and a cost per unit of generated electricity of USD 0.5 cents per kWh, based on total generated renewable electricity in 2015 and the calculated subsidy in the same year.

FiT subsidies increased exponentially between 2010 and 2015, driven mostly by the decrease of PLN's average tariff in 2015 compared to previous years and by the USD/IDR exchange rate, which changed by almost 50 per cent between 2010 and 2015, in favour of the USD (to note that most FiT in Indonesia are set in USD/kWh). This rapid rate of change highlights the volatility of the costs and the fact that once established their cost may be driven by external factors that are beyond the control of the government. The variability of the exchange rate USD/IDR and the variation of PLN's average generation cost have a big impact on the level of FiTs, since they are mostly defined in USD. Consequently, renewable energies have not been subsidized for several years between 2010 and 2015, as Figure 3 shows. Figure 4 shows the share of the total subsidies between technologies, indicating that the technologies receiving the most subsidies are biomass (47 per cent), geothermal (42 per cent) and mini-hydro (9 per cent), due to the high installed volumes and generated electricity. According to our study, solar PV is getting the highest unit price per installation, at an average of USD 15 cents/kWh.

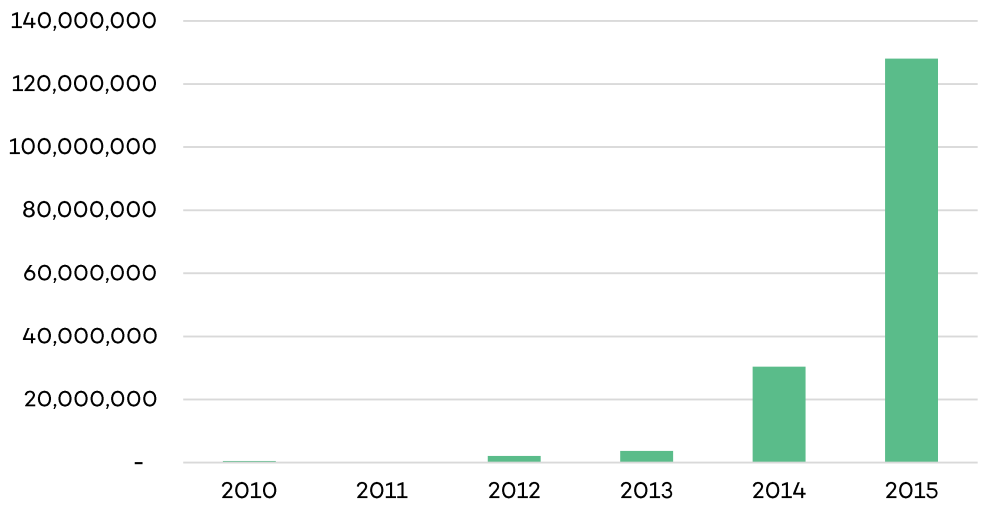


**Figure 3. Calculated FiT subsidy per year, in USD**

*Source: Authors' calculations.*

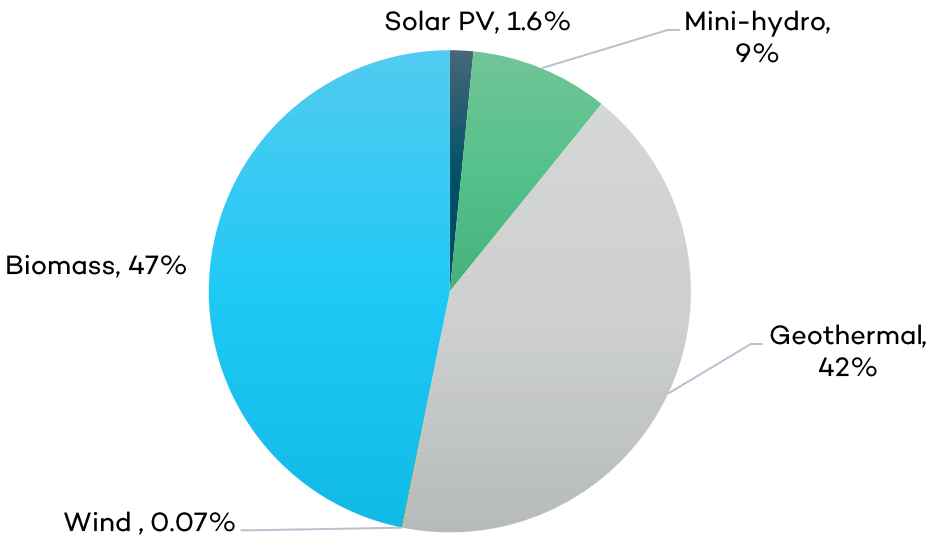


**Figure 4. Share of total FiT calculated subsidy in 2015 per technology**

*Source: Authors' calculations.*

### 5.2.2 Geothermal Fund

The Geothermal Fund created in 2012 set up a total value of USD 300 million to support geothermal exploration and production companies. However, ADB (2015) states that by September 2015, the operation details of the fund had not been defined and its resources remained undisbursed. Therefore, it is difficult to establish how much of this subsidy has been spent.

### 5.2.3 Pioneer Industry Tax Exemptions

The Ministry of Finance Regulation No.130/2011 included renewable energy as a Pioneer Industry until 2015, implying that renewable energy generators are exempt from the Corporate Income tax (CIT) for 5-10 years, followed by a 50 per cent per cent reduction on CIT for 2 years longer. Indonesian income tax for electricity generation follows the country's generic income tax defined by the Income Tax Law No.36/2008 (the 2008 Income Tax Law), valued at 25 per cent of taxable profits (PwC 2015). Assuming that all renewable projects operate with a profit margin of 10 per cent, the subsidy will be USD 6.4 million in 2015 and a cumulative total between 2012 and 2015 of USD 17.8 million. The resulting unit cost of this subsidy based on 2015 figures is USD 0.025 cents per kWh.

### 5.2.4 Energy Resilience Fund

The Energy Resilience Fund (DKE) was created in 2015 with the purpose of increasing Indonesia's energy security and the country's resilience. It consists on a pool of funds utilized to provide incentives and financing facilities for the development of oil, gas and new renewable energies and is planned to raise up to IDR 200 trillion by 2025. The specifications of the fund are still under development. The origin of the fund's potential revenues will be the state budget, fossil energy depletion premiums, grants, loans, fees for general services, return on investment and other legitimate sources. The amount designated to renewable energy will be devoted to:

1. Fund FiT payments, guaranteeing the feed-in tariffs to project developers.
2. Accelerate investments in renewable energy projects by providing product performance guarantees in the form of premium payments.
3. Support rural electrification, research and development in clean energy and energy efficiency programs, in the form of direct subsidies and loans.

Preliminary calculations by the Task Force for Accelerating the Development of New Renewable Energy and Energy Conservation (MEMR, 2016h) show that the total subsidy for the FiT gap payment, which can be facilitated by the DKE until 2019, is approximately IDR 1 trillion (USD 74 million). The premium payment required until 2019 amounts to IDR 1.6 trillion (118 USD million). In April 2016, the Plenary Cabinet Meeting approved the budget allocation of IDR 800 billion (USD 58 million) for clean energy, but no evidence has been found about the actual disbursement of these funds by the end of 2016.

# 6.0 Externalities From Coal and Renewable Energy

In addition to the direct costs that subsidies to coal and renewable energy generators imply to governments, there are large indirect social, economic and environmental costs and benefits to the population. Coal power generation has been described as the major public health challenge of the 21st century by the Director-General of the World Health Organization (WHO) due to the emissions that are associated with respiratory illness, acid rain, the contamination of water and food with mercury and persistent organic pollutants (POPs), such as dioxins and polycyclic aromatic chemicals (PAHs) (Health and Environment Alliance [HEAL], 2013).

In this study, the discussion of coal externalities is limited to the cost of air pollution and the social costs of carbon emissions. The externalities presented here do not include the impacts associated with the lifecycle of coal, including mining, transportation and waste disposal. Consequently, the approximations of the external cost will be underestimated.

The study's methodology for estimating the external costs from coal-fired electricity generation includes a review of the Indonesian and international literature on the impacts and costs of pollution from coal power plants. Second, based on the literature, current data and previous IISD methodologies, benchmark values are selected on a per-unit basis for the cost impact of air pollution and carbon emissions. Finally, extrapolating from these benchmarks, an overall estimate is produced for the total cost of externalities.

The externalities of renewable energies are mostly associated with the lifecycle of the technologies. The process of generating electricity with renewable energies, such as solar or wind, does not emit greenhouse or pollutant gases. However, all the activities associated with the manufacturing, distribution, operations and disposal of these technologies have an environmental impact that is represented on the lifecycle assessment. This report will present the literature's estimations of renewable technologies' environmental impact and will estimate their cost based on different scenarios for the price of $CO_2$.

## 6.1 Estimates of Externalities from Coal Generation in the Literature

Various organizations have attempted to estimate the total cost of externalities: these are summarized in Table 35. The following two sections present a more detailed look at the split between the costs of health and climate change effects.

**Table 35. Summary of externality estimations from various organizations**

| SOURCE OF ESTIMATES | WHAT'S INCLUDED? | COST OF EXTERNALITIES |
|---|---|---|
| Oil Change International (Westphal, Godinot, & Doukas, 2015) | External costs of coal generation in Indonesia (only plants financed by OECD*), including the social cost of pollution (diseases and deaths) and the global cost associated with climate change. It includes the impact of emissions from domestic power plants as well as emissions that may have been transported from other regions or countries. | USD 50/MWh–USD 190/MWh |
| Greenpeace Indonesia (Sundaryani, 2016) | Long-term health problems, environmental impacts such as water pollution, and the expected costs of dealing with the impact of climate change caused by $CO_2$ emissions from coal plants. | USD 100/MWh.<br>Applied to the 90 TWh of electricity that PLN produced from coal in 2014, the total cost is almost USD 9 billion. |
| IMF ("IMF Subsidy Database," 2015) | The total cost of externalities related to all energy sources (not just coal) in Indonesia, including: climate impacts, local air pollution, congestion, accidents, road damage. | USD 54 billion for all fuels in 2015. Made up of:<br>• Climate impacts (USD 20.13 billion)<br>• Local air pollution (USD 16.92 billion)<br>• Congestion (USD 6.10 billion)<br>• Accidents (USD 9.98 billion)<br>• Road damages (USD 0.59 billion).<br>The total post-tax subsidy attributed to coal including foregone consumption tax revenue and pre-tax subsidies is estimated to be USD 11.12 billion. |
| US Government regulatory impact analysis (Interagency Working Group on Social Cost of Carbon, 2015) | Monetized damages (social cost) associated with an incremental increase in carbon emissions in a given year. It includes changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. The values presented are the average of three different models and depend on the discount rate applied (minimum 2.5 per cent and maximum 5 per cent). | Between 11 and 56 USD per tonne of $CO_2$ equivalent in 2015 |

** It is not known whether OECD-financed coal plants are more efficient than the other existing plants. Yet they are estimated to represent a significant proportion (17.5 per cent) of the total coal generation in the country.*

## 6.2 Estimation of the Cost of Climate Change Impacts

The cost of climate change to society is hard to calculate, due to the wide range and uncertainty of associated impacts. This is especially true when limited to a single country such as Indonesia. There are a number of possible values to represent the cost of carbon emissions. One option is to use the value of carbon as traded on carbon markets. However, we believe the cost of carbon defined by international carbon markets undervalues the real cost, since these prices are driven by regulation and demand rather than any kind of assessment of the actual cost to society.

Approaches based on the social cost of carbon provide a more accurate assessment of the cost to society by giving an economic value to impacts such as to human health and ecosystems. The actual cost of the carbon emissions, in the form of sea level rise, extreme weather and ecosystem collapse will be distributed globally. The calculations presented here show the global cost resulting from coal combustion in Indonesia's power stations.

One international carbon price benchmark is the U.S. government's Interagency Working Group on Social Cost of Carbon, which estimates the cost of carbon based on (among other things) changes in net agricultural productivity, human health and property damages from increased flood risk and changes in the energy system. It estimates the sum of these effects to be between USD 11 to 56 per tonne of carbon in 2015, depending on the discount rate applied in the modelling (Interagency Working Group on Social Cost of Carbon, 2015). Applying these costs to the emissions from all of Indonesia's coal power plants provides a total cost of between USD 2.4 to 12.3 billion equivalent to USD 0.03/kWh and USD 0.14/kWh for coal-fired electricity generation.

Oil Change International (OCI) uses these U.S. government estimates to calculate the cost of climate change due to coal power plants in Indonesia financed by OECD countries. They give an estimate of between USD 763 million and USD 2.225 billion, using a social cost of carbon of USD 36/tCO2e in the lowest scenario and USD 105/tCO2e in the highest case (Westphal et al., 2015). These power plants represent 17.5 per cent of the total capacity and 22.3 per cent of the total generation in Indonesia in 2014. This equates to costs of carbon emissions per unit of electricity generation of USD 0.05 and 0.26/kWh of electricity generated. Extrapolating these costs to all coal plants in Indonesia, the total cost of climate change can be estimated to be between USD 7.9 and USD 23 billion.

According to the IEA, coal in Indonesia in 2012 was responsible for 27 per cent of total CO2 emissions (2012 share) (IEA, 2015). The IMF estimates that the cost of all Indonesian carbon emissions driven by fossil fuel use, not just coal, was USD 20.12 billion (Coady, Parry, Sears, & Shang, 2015). By combining the IMF's figure with the IEA's 27 per cent figure for the share of coal emissions, the cost of global warming due to coal in Indonesia is estimated as USD 5.5 billion, or USD 0.042/kWh in 2015.

Figure 5 places these estimates in context and shows that the average value from the U.S. government assessment is equal to the value from the IMF, and both of these are considerably lower than the estimate from OCI. For the purposes of this assessment, a value of USD 0.042 per kWh should be considered a reasonable estimate to be considered for further analysis.

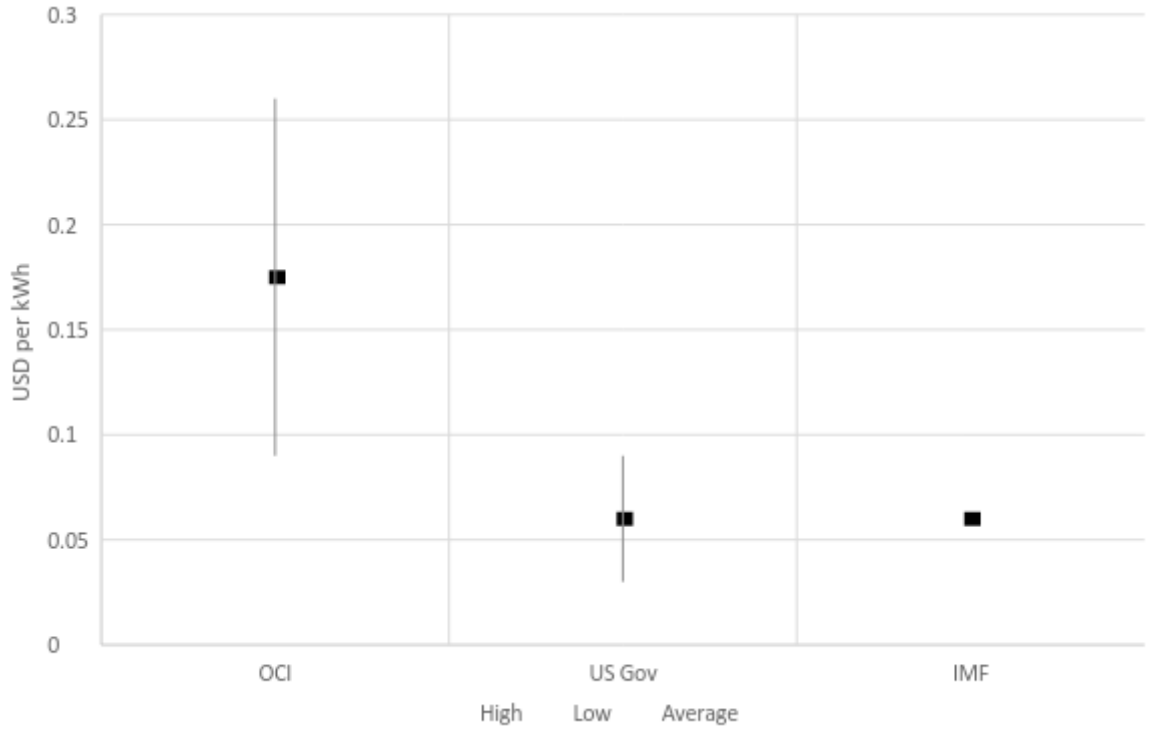


**Figure 5. Cost of carbon emissions from Indonesian coal plants on a per-unit basis (lines denote range of estimate and point shows mid-point)**

### 6.3 Health Costs of Air Pollution

Ambient air pollution that results from the combustion of hydrocarbons is linked to a wide range of negative health impacts. More specifically, harmful emissions from coal generators can include particulates, oxides of nitrogen (NOx), sulphur dioxide (SO2), ozone and heavy metals such as mercury.

Air pollutants are known to be hazardous to human health, affecting the respiratory, cardiovascular and nervous systems (Sourcewatch, n.d.). WHO observes that there is generally an inverse relationship between per capita gross national product (GNI) (Figure 6) and rates of death caused by particulates. This indicates that higher-income countries have generally developed regulatory regimes that reduce air pollution to acceptable levels. By particulate measure Indonesia is somewhere between a typical upper middle-income country and a typical lower middle-income country.

To monetize the health impacts of air pollution, we must first quantify the size of the problem in terms of disease burden e.g., attributable deaths or years of life lost. At a global level, air pollution is a major threat to health, being responsible for 1 in every 10 total deaths in 2013 (Institute for Health Metrics and Evaluation [IHME], 2016). In 2013, air pollution was the fourth-leading fatal health risk worldwide, resulting in 4.8 million premature deaths (IHME, 2016). In Indonesia, WHO estimates that a loss of 1,769,000 disability adjusted life years (DALYs) or 62,000 deaths were attributable to air pollution in 2012, making it a serious problem (WHO, 2016). While coal-fired electricity generation is a major source of air pollution, it is not the only one. Emissions from indoor air pollution caused by solid fuel cooking stove, transport and land clearance by burning are also considerable.

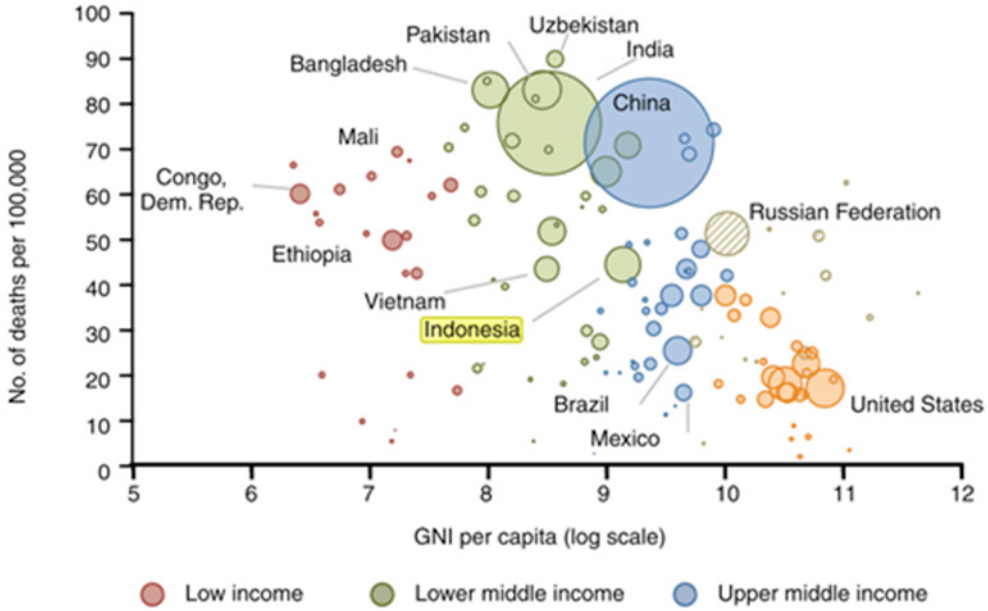


**Figure 6. Ambient PM2.5 death rate versus income per capita 2013**

*Source: IHME, 2016.*

*Note: Size of bubble corresponds to total number of deaths. GNI = Gross National Income; OECD = Organisation for Economic Co-operation and Development.*

Greenpeace (based on a study completed by Harvard University) places the social cost of coal-fired plants in Indonesia at 6,500 premature deaths a year in 2015. Its study estimates that each large (1,000 MW) coal plant is expected to result in the deaths of 600 Indonesians per year (Greenpeace, 2015a).

Calculating the direct cost of coal electricity generation on health is not easy. First, and beyond ethical concerns, it is not simple to value a human life. The cost to society could be taken to include the loss of earnings due to sickness, disabilities, health care costs and the long-term effects of the disease, among others.

The IHME report describes two main approaches for estimating mortality costs. First, a welfare-based approach monetizes the willingness to pay to avoid the increased fatality risk associated with pollution and second, an income-based approach that values the present value of foregone lifetime earnings. Both of these approaches are problematic from an ethical standpoint, as many people may feel that decisions to protect human life are too contentious to reduce to a calculation. Nevertheless, these methodologies are widely used to place the cost of action to protect public health in the context of the cost of inaction.

The ExternE project developed the Integrated Environmental Health Impact Assessment System (IEHIAS), and has collected data in Europe that has been used to estimate a "Value of a Statistical Life" (VSL) of EUR 1.1 million (USD 1.4 million) in 2010 Euros (IEHIAS, 2015). The Environmental Protection Agency (EPA) in the United States recommends a VSL of USD 7.4 million in 2006 dollars. If the EPA's value was applied to the estimated 6,500 deaths attributed to coal by Greenpeace, the total cost would be USD 48.1 billion. The IHME report presents a mean VSL from a survey of middle-income countries of USD 383,440 (IHME, 2016), a number virtually equivalent to the results derived when using a model developed by OECD for country-specific VSL (OECD, 2016). If this figure were applied to the Greenpeace data, the total cost would be USD 2.5 billion or 0.02 USD per kWh.[2]

[2] Assuming a total cost of USD 2.5 billion and a total generation from coal of 130,508 GWh (PLN).

The IHME report also includes an estimate for the cost of foregone labour output due to total pollution at USD 12 billion in 2013. It also calculates the total welfare losses at USD 125 billion in 2013. To take another approach, the IMF calculates the post-tax subsidies linked to local air pollution as USD 16.92 billion in 2015, including the effects of other sources of energy, such as oil and gas. as well as other polluting sources, such as using burning for land clearances. Considering that coal is one among several major sources of pollution, we can observe that the cost of air pollution attributed to coal combustion is likely to run to at least several billion dollars. Further analysis of the proportion of ambient air pollution from coal combustion would be needed to provide greater accuracy in this figure.

The case of Samarinda in Kalimantan also gives some indications of the health issues associated with the environmental impacts of depleted coalmines that have not been properly decommissioned. Several coal mining pits in Kalimantan and other areas in Indonesia have been abandoned without sufficient or proper reclamation activity, creating public health issues as the result of contaminated water and air surrounding the greater areas (Hardjanto, 2015). A study conducted by Restu Rinaldy, Suparmoko & Setyo (2013) in the coal mining region of Tambang Air Laya (TAL) estimates that the costs of upper respiratory tract infections (URTI, the most common respiratory disease in the region) at IDR 20,794 (USD 1.5) per person. These costs are covered by the Indonesian social health system (BPJS).

### 6.4 Summary of Coal's External Costs

The total costs of air pollution and carbon emissions vary according to the methodology used. However, from the calculations presented here and the figures present in the literature, a few observations can be made. First, the costs of air pollution and carbon emissions are significant and add to the cost of electricity generated from coal. Using the estimates presented in this section, the total external cost of coal-generated electricity is USD 6.1 cents per kWh. External costs of this magnitude invert the economics of coal expansion plans. The external costs of coal use should be considered in the policy-making process and, in light of the high costs to society, policy-makers should seek to reduce the reliance on coal electricity generation.

### 6.5 Estimation of Externalities Cost From Renewable Energies

Estimating the externalities of renewable energies based on their lifecycle assessment depends to a large degree on the energy mix of the manufacturing site location, the finished product logistics and local conditions affecting installation and plant operations. It has not been possible to find specific literature for Indonesia, so this analysis applies a generic lifecycle assessment (LCA) for renewable technologies.

Euroelectric (2011) estimated the carbon footprint of different electricity sources. Their analysis covered the financial assessment of technologies over a project lifetime, including LCA and risk analysis. The estimation of LCA for renewables is based on a review carried out by the US National Renewable Energy Laboratory (NREL), providing global estimations for both developing and developed countries.

According to Euroelectric (2011), the median greenhouse gas emissions ranges between 4 g $CO_2$eq/kWh for hydro power and 46 g $CO_2$eq/kWh for solar PV. The same study quantifies the corresponding impact of coal at 1,001 g $CO_2$eq/kWh.

Considering the U.S. government's Interagency Working Group on Social Cost of Carbon (Interagency Working Group on Social Cost of Carbon, 2015) and Indonesia's renewable energy

generated in 2014 (IEA, 2016a), the externality cost associated to renewable's LCA is USD 29 million (USD 0.11 ct/kWh) with a high $CO_2$ price scenario of 56 USD/tonnes of $CO_2$eq. Considering the low CO2 price scenario of 11 USD per tonnes of CO2eq, the corresponding estimation is USD 6 million. This equals a unit price of USD 0.02 cents/kWh.

# 7.0 Comparing the Costs of Coal and Renewable Energy

The total subsidies identified for coal and renewable energy are shown in Table 36 in both absolute and per-unit terms.

The figures show that the subsidy to the coal industry is roughly five times the subsidy to the renewable energy industry. This shows that in absolute terms the coal industry receives significantly more support than the renewable energy industry. More electricity is generated from coal than from renewable energy, so on a per-unit basis the subsidy to renewable energy is similar to the subsidy to coal.

**Table 36. Electricity generated and subsidy costs in 2015**

| | RENEWABLE ENERGY | COAL |
|---|---|---|
| | 2015 | 2015 |
| Electricity Generated (GWh) | 25,197 | 130,508 |
| Total Subsidy Costs (USD million) | 133 | 664 |
| Subsidy cost per unit (USD per kWh) | 0.0055 | 0.0049 |

Having estimated the level of subsidies to coal and renewables, it is reasonable to ask if these subsidies can be justified. There are several common justifications for energy subsidies that are often put forward by policy-makers. First, subsidies aim at promoting a particular industry and creating employment, subsidies to both coal and renewable energy create jobs in those sectors. Second, subsidies are a method of driving energy sector investment to meet government targets. Equally, subsidies to renewable energy and coal can both be justified by these criteria.

The key difference between subsidies to renewable energy and those to the coal industry is that renewable energy is associated with lower environmental and health externalities, while the coal industry is associated with high levels, as evaluated in Section 6. One method of building externalities into the decision-making process is to compare the external costs alongside the costs of subsidies and generation costs.

Figure 7 shows a comparison of the costs of coal and renewable energy, including an assessment of the monetary cost of environmental and health externalities based on the estimates presented in Section 6.

The estimated externalities of renewables have not been included in the graph, since the externality costs of coal do not include the lifecycle assessment (LCA), on which renewable's externalities have been calculated. However, and as discussed in Section 6.5, the LCA impact of coal is estimated at more than 20 times higher than that of renewable energies.

Figure 7 shows that the "true cost" of coal—including subsidies and externalities—is considerably greater than the cost of renewable energy. Put another way, subsidies that support the deployment of renewable energy may increase short-term financial costs, but also lead to the generation of electricity that effectively reduces air pollution and $CO_2$ emissions, reducing costs over the longer term.

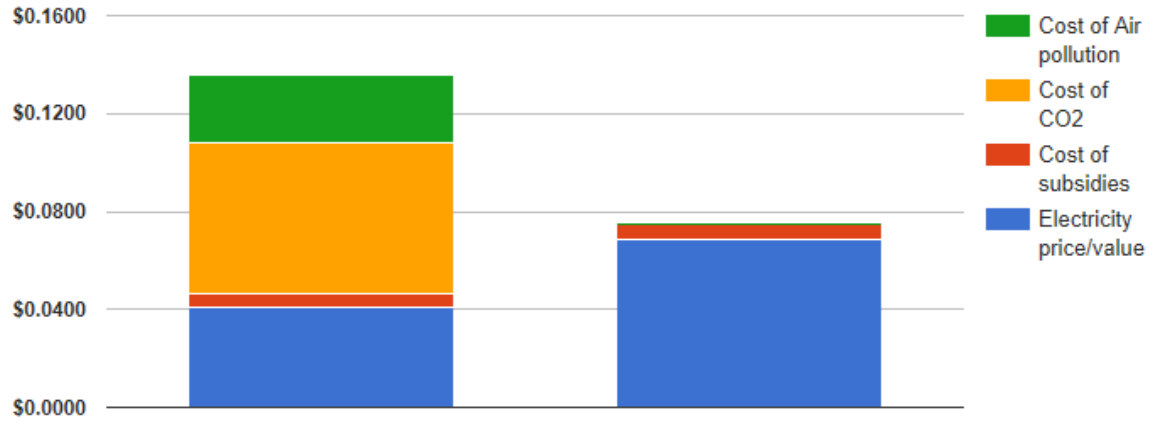


**Figure 7. Comparison between the costs of coal (left) and renewable energy (right) – cost per kWh**

*Source: Authors' calculations.*

One finding of this work is that energy policy should be reformed to reflect the true cost to society. In practice, this means that policies should be designed to avoid promoting technologies that have low financial costs but high environmental and social costs. This analysis suggests that the installed renewable energy generators are delivering lower-cost electricity when externalities are considered.

It also is important to note that the cost or value of electricity for coal and renewables in Figure 7 is different. In unbundled markets these values would be the same for all technologies and would be equal to the market price for electricity. In Indonesia, generators are paid based on power purchase agreements rather than market price. Because of this, the cost varies by technology.

The cost for electricity generated from coal is taken from PLN's estimates in 2015. For renewable energy, a reference price has been used that is equal to PLN's average power purchase price for all technologies. Based on this methodology, the part of the power price paid to renewable generators beyond the reference price is considered a subsidy. This study compares the costs of coal and renewables based on the difference between the corresponding final cost of generating electricity (including subsidies and externalities).

It should be noted that the process of assigning a monetary value to externalities such as air pollution and $CO_2$ emissions is a complex one. Methodologies for assigning value to the loss of human life associated with air pollution consider the economic activity lost. This approach indicates the value of human life is limited to our economic output. Many advocates would prefer to think of the impact on the environment and on health as important in its own right and prefer to talk about the thousands of lives lost to air pollution. Nevertheless, this analysis shows even on a purely economic basis there is a clear case to develop policies that favour renewable energy over coal.

Subsidies to coal are not responsible for driving all of the externalities associated with coal use. If all subsidies were removed tomorrow, coal would continue to be used—with the associated pollution emitted. However, if subsidies were removed, the financial viability of coal would not be sustained, and other energy sources would be more competitive, leading to a relative reduction in the share of coal in the electricity sector. In terms of policy options, it would be relatively straightforward for the government to decide to review all coal subsidy policies and modify those that are seen to be inefficient or not aligned with Indonesia's energy goals.

# 8.0 New Renewable Energy Price Comparison

The comparison in the preceding section shows the costs of renewable energy technologies compared to coal-fuelled generators currently in operation. This mix includes some generators that have long since recovered their capital costs. This section focuses on the trends for the costs of new renewable generation.

At a global level, the price of renewable energy generation, and in particular solar energy, have declined considerably in recent years. A comparison of historical levelized costs of generating electricity (LCOEs) reveals that the LCOE of renewable technologies has strongly decreased in recent years. Even disregarding subsidies, LCOEs for renewables are now very close to the level of coal's LCOE, as seen in Figure 8 (World Economic Forum, 2016). As a technologically mature technology, coal costs are not likely to decline significantly. This implies that over time the economic case for renewable energy is likely to improve further.

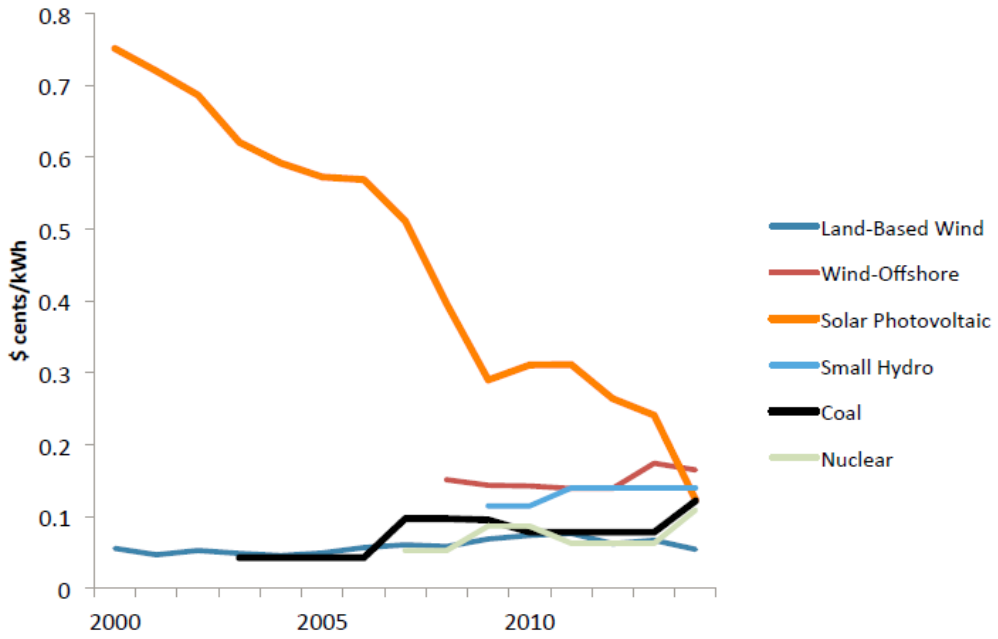


**Figure 8. Levelized cost of energy, world average.**

*Source: OpenEI, Transparent Cost Database (World Economic Forum, 2016)*

The increasing use of reverse auctions in countries across the world to discover competitive prices has led to record-breaking low prices for solar energy. Bids for solar PV have been received with a electricity cost as low as USD 29.9 per MWh in Dubai, EUR 74.1 per MWh in Germany and USD 72 per MWh in India (IEA, 2016c). These prices reflect the local costs of land and capital, which are in some cases close to zero so are not directly comparable with costs in Indonesia. However, the low prices indicate that in many parts of the world solar energy is already competitive. The deployment driven by this competitiveness will drive additional advances and further reduce prices in Indonesia.

Bloomberg New Energy Finance report that in Indonesia the LCOE of solar is in the range USD 100-275 per MWh, considerably higher than these recent auctions in other countries (BNEF, 2016). These levels are comparable to the FiT rates available in Indonesia (Yuliani, 2016).

However, the apparent availability of relatively high FiTs has not led to a boom in renewable energy in Indonesia. It is reported that while the current FiTs are considered attractive, the high costs of permitting and lengthy process for receiving power purchase agreements have been cited as barriers. One mini-hydro project was report to have waited four years to receive a PPA (Yuliani, 2016). Two other factors that may increase costs include the relatively low rate of renewable energy deployment, which has provided relatively few opportunities for learning by doing and the limited use of measures that encourage competitive bidding, for example through auctions. This indicates that there may be a significant opportunity to reduce costs if barriers to renewable energy are addressed.

# 9.0 Conclusion and Next Steps

Electricity generation remains a key issue for Indonesian policy-makers. Millions of households are still without access to electricity, and large investments are needed to supply reliable power for households and industries across the country.

By comparing the true costs of generating electricity from coal and renewable energy, this report aims to promote a debate about how Indonesia could power its future. The report shows that when externality costs are included, coal is no longer the most economical option for electricity generation.

In addition to looking at externality costs, the report also includes a detailed inventory of subsidies to coal and renewable energy, providing much-needed transparency around Indonesia's subsidy policies in this area. Identifying fossil fuel subsidies is a necessary first step toward a discussion of the performance of these subsidies, and their potential reform. On the renewables side, as Indonesia changes its process for procuring renewable energy in 2017, the comparison of the economic impacts of the previous process provides useful lessons for the future.

The inventory identified a total value of USD 946 million (IDR 12.4 trillion) in subsidies to coal in 2014 and USD 644 million (IDR 8.5 trillion) in subsidies in 2015. The inventory identifies 15 subsidies to coal and three subsidies to renewable energy estimated to be worth USD 133 million (IDR 1.76 trillion) in 2015, primarily through the FiT system. The report does not evaluate whether each of these subsidies are efficient or inefficient, but monetizes the subsidies whenever possible. For a number of subsidies, quantification was not possible due to a lack of data, in some cases because the programs have not yet started.

IISD recommends increasing transparency about these policies to provide a full picture of the value of subsidies to Indonesia's coal sector. IISD will continue its efforts to identify, estimate and evaluate subsidies to coal in Indonesia. It will also continue its engagement with the Government of Indonesia to advance fossil fuel subsidy reform and promote a more sustainable energy future, benefiting people and societies across the country.

## 9.1 Summary of Key Findings

- This report shows that the "true cost" of coal, including subsidies and externalities, is considerably greater than the cost of renewable energy.
- The report identifies 15 subsidies to Indonesia's coal industry. It was possible to quantify seven of these. In 2015, subsidies to coal production were estimated to be worth approximately IDR 8.5 trillion (USD 644 million). In 2014, this figure was estimated at IDR 12.4 trillion (USD 946 million). Due to a lack of data and inability to quantify all subsidies, current estimates for coal are considered in the lower range.
- Subsidies to coal are significantly larger than subsidies to renewables. In 2015, renewables were provided an equivalent of roughly USD 133 million in subsidies, a considerable increase from around USD 36 million in 2014.
- From 2010 to 2015, renewables received a cumulative total of USD 179 million. This is far less than the amount of subsidies provided for coal through the export tariff exemption alone, totalling USD 719.6 million from 2012 to 2015.
- The report demonstrates that subsidies to the coal industry are associated with significantly higher external costs than renewable energy. Subsidies to coal drive and lock in these externalities, whereas subsidies to renewable energy do not.
- The report provides strong evidence that from a "true cost" perspective, the overall goal of Indonesia's energy policy should be to increase the share of renewable energy while reducing the share of coal.

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