Supporting Energy Pricing Reform and Carbon Pricing Policies Through Crediting

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Executive Summary

With the successful conclusion of the Paris Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC), international carbon market mechanisms became a key element of the future, post-2020, international climate policy architecture.

Paris delivered a new UNFCCC-governed baseline and crediting mechanism, applicable both in developing and developed countries. Paris also recognized voluntary cooperative approaches that enable international transfer of mitigation outcomes to be accountable against countries' mitigation pledges (in the form of nationally determined contributions).

In both cases, the scope of mitigation activities is likely to go beyond the project-by-project level as in Clean Development Mechanism (CDM) and Joint Implementation (JI). Earlier discussions suggested that sectoral crediting approaches (or approaches using other aggregates, such as the level of a city), might emerge. Crediting of policies is clearly a further option, and the Paris agreement encourages results-based payments for policy approaches in the context of REDD+.

Policy crediting—i.e., the crediting of the emission reductions resulting from the implementation of a policy action or components of it—is a new concept. So far there exist no real case examples. Some work was done on regulatory policies (such as energy-efficiency standards, including under the CDM and with an aim to reforming the CDM beyond a project-level scope) both from a methodological side and through blueprinting of operational models. Similar approaches were developed for policies such as feed-in tariffs for renewable energy.

The potential crediting of implicit or explicit carbon pricing policies is uncharted territory. Anecdotally, the CDM played a major role in building capacity, awareness and interest in many countries to implement domestic carbon pricing schemes to provide their economies with a price signal. Crediting of carbon pricing policies might be a way to support countries further and on a higher scale in these efforts. It might also be possible to achieve much larger emission reductions and international carbon flows in crediting such policies than what CDM and JI have achieved.

This study examines the role that policy crediting might play in increasing the mitigation impact of energy pricing reform and carbon pricing policies (*pricing reform*[1]) This can either be through:

- *a policy being implemented that would not have been without crediting; or*
- *an existing policy or one that has been decided upon is made more stringent (i.e., that its mitigation impact is increased)*.

The literature on this topic is not very broad. However, extensive experience with the CDM and other project-based mechanisms provides useful references for baseline setting and associated monitoring, reporting and verification (MRV) of emission reductions. The literature review conducted in this study also looked at relevant experiences from results-based financing. Finally, the direct experience from pricing reform schemes shows a variety of mechanisms used to overcome barriers to implementation—which are often political as much as economic. While this experience looks at the reallocation of revenue from internal sources, the findings should be applicable to other (external) sources of finance.

The study developed four detailed case studies analyzing pricing reform undertaken in developing countries:[2]

1. *Morocco – energy subsidy reform*
2. *Indonesia – energy subsidy reform*
3. *Mexico – carbon tax*
4. *Beijing (China) – pilot emission trading scheme (ETS)*

[1] Here we use the general term "pricing reform" to cover carbon pricing approaches such as emissions trading systems (ETS) and carbon taxes, and removal of negative carbon prices (i.e., reductions of fossil fuel or energy subsidies). For description and examples of these pricing reform/policies, see e.g., International Monetary Fund (IMF) (2013) and World Bank (2015).

[2] These case studies were conducted on the basis of publicly available material. Elaborations on potential crediting approaches are purely hypothetical and for illustrative purpose.

While none of these cases featured external crediting, the detailed analysis of how they were designed, the expected savings/revenues, and their utilization provide valuable lessons to the (hypothetical) question of this study—could policy crediting increase the mitigation impact of pricing reforms? Main conclusions from the case studies have been drawn:

1. The *need to increase fiscal resources and/or to improve economic efficiency* was the principal reason for energy subsidy reform and an important driver for carbon taxation. For ETS, the fiscal consideration is also important once allowances are auctioned. Encouraging the transition to a cleaner and greener economy was also part of the policy rationale in all cases.
2. There were *significant political economy concerns with the impacts of higher costs on both the population and parts of industry in all cases*. The Mexico case saw a major reduction in stringency from the initial proposals, and subsidy reform in Indonesia and Morocco is proceeding on a gradual basis across fuels and electricity.
3. Other than the Beijing ETS (which is a pilot scheme), *the potential fiscal gain – the reduced cost of subsidies (in Indonesia and Morocco) and the revenue raised from the carbon tax (in Mexico) – from the "base" policy is large*: USD 15.5 billion, USD 3 billion and about USD 1 billion respectively.
4. It may seem an obvious point, but *the greenhouse gas (GHG) emission reductions realized are strongly dependent on what the fiscal resources are redirected to*. First order analysis undertaken for Morocco's energy subsidy reform by IISD using its Global Subsidies Initiative-Integrated Fiscal (GSI–IF) model shows that if 20 per cent of savings were redirected into energy efficiency and a further 10 per cent into renewable energy, the GHG reductions could nearly double. Analysis using other techniques that included feedbacks within the domestic economy and to the world economy may yield further insights into such things as impact on inflation and other short-term shocks and concerns around strategic or vulnerable sectors of the economy.
5. *The "carbon economics" ratios indicate that potential incremental revenue from policy crediting is low compared to fiscal gain from implementing the "base" policy without any external crediting support—implying that the inclusion of policy crediting would unlikely be a critical factor of policy decision/implementation in the three cases studied*. One question this study posed was whether or not revenue from credits could be used to compensate key stakeholders adversely impacted by the policy. The analysis shows that such compensation could be sourced from the "base policy" fiscal gain, which would also avoid public resistance to foreign influence in some cases. However, the conclusion could be different in other circumstances/cases. For instance, the carbon economics would improve where crediting is for complementary mitigation measures implemented in addition to energy price reform (crediting at the policy margin).
6. The analysis of the Indonesian case gave an example of what is considered a common issue across many countries: *it is not always straightforward to redirect ("hypothecate" or "earmark") fiscal savings into specific budgets or programs*; rather, savings will be returned to general government budgets and/or used to pay down government debt. Experience from subsidy reform in many countries[3] shows that alternative welfare systems are a key driver of energy subsidy reform, but that these systems (and the resources they need) tend to be developed in parallel with subsidy reform rather than through explicit links and fiscal redirection. Of note is also the possibility that access to external financial resources may not be key in all cases: Mexico and Morocco are already the world's leading receivers of climate finance, and some budget-holders in Indonesia struggle to spend their existing allocations.
7. The case studies support the view that *any pricing reform is always part of a wider policy context, and will interact with other policies and goals*. The pricing reform policies considered here aim to correct market failure to some extent. In the case of Mexico, some stakeholders and commentators raised a question as to how a carbon tax can be effectively implemented if subsidies to energy–in effect a negative carbon tax–are still in place.
8. One further issue brought up by the case studies concerns international influence. *There is growing nationalist sentiment in Indonesia, which would be likely to lead to resistance to policies believed to be funded or influenced from outside the country*. Conversely, it could also be argued that extra resources from outside a country could be construed positively.

[3] Asian Development Bank (ADB), (forthcoming).

Based on the case studies, three options for policy crediting are recommended for further consideration and in-depth assessment on a case-by-case basis:

- *Support emission reductions at the policy margin*. In the case of an emission trading system (ETS), a possible crediting approach is to purchase allowances from the market and therefore tighten the cap beyond the domestic policy reach—potentially pro rata to emission reductions achieved by the ETS in the past. On one hand, this would clearly deliver additional GHG reductions. The main implementation issue would likely be around whether the use of foreign funds to create scarcity and increase prices on the market would be welcomed, especially if prices for allowances were already relatively high. On the other hand, the effect is not different when different ETSs are linked (for which there are real-world examples). A similar approach to a carbon tax could consist in tax-exempt installations reaching a performance benchmark and in crediting emission reductions resulting from overachievement relative to the benchmark. Applying such an approach is more challenging in the case of an energy pricing reform, as the policy may not directly address individual installations. Energy pricing policies could be combined with supporting measures such as energy-efficiency programs in which case emission reductions attributable to these complementary measures, (i.e., net of the effect of the energy pricing reform itself) could be credited.
- *Support emission reductions within the policy instrument*. This is to provide financial support to additional GHG abatement in the sectors/entities affected by pricing reforms. This option—which could be applied to any of the three pricing reform policies considered—has a political benefit in that a part of the increase in government revenue is reallocated back to at least some of those affected by cost increases as a consequence of policy implementation. Whether the size of reallocation is large enough to drive increased mitigation impact on any significant scale is open to question.
- *Overcome barriers to effective policy implementation and operation*. This option aims to enhance the performance of a pricing reform policy by reducing compliance costs of participants through MRV support, by intervention in the market (e.g., increasing liquidity) in the case of ETS, or by increasing the capacity of participants in general. The approach appears most applicable to ETSs, although appropriate to all three pricing reform policies. Nevertheless, establishing causality between such support measures and emission reductions is very challenging. Support to implementation and operation may be similar in scale and scope to technical assistance programs that donor countries traditionally fund in developing countries.

The above-mentioned options are generic in nature, reflecting that crediting related to pricing reform has not been undertaken in practice, in the developing world or elsewhere. All crediting approaches assessed would therefore benefit from further work, to develop MRV for each pricing reform policy, to evaluate potential options with countries, and to better understand policy design and political economy challenges.

This study also assessed what are considered the two critical design and implementation issues for policy crediting:

1. Setting baselines (and the associated additionality and MRV implications); and
2. The political economy of reform.

Baselines, Additionality and Monitoring, Reporting and Verification (MRV)

There are at present no agreed standards or international agreements which allow for the estimation of GHG emission reductions from policy.[4]

- For *ETS*—a quantity-based policy—this is not significant: increased mitigation impact means a tightening of caps and, since MRV is a key component of ETS, cap stringency does not add extra MRV requirement compared to a less stringent "base policy" cap. Issues around carbon leakage from within the region covered by the ETS remain.
- As fiscal instruments, it is much more challenging to quantify GHG emission reductions from a *carbon tax or energy subsidy reform*. Ex ante, models are commonly used to estimate the impact of carbon taxes, and there

[4] Noting that IISD's Global Subsidies Initiative has developed, applied to 20 countries and is looking for further support and application, for a relatively simple approach for energy subsidy reform using its "GSI-IF" model (Merrill et al, 2015), and that the World Resources Institute (WRI) and others have proposed protocols for various policies. But established baselines and methodologies for policies remain far behind what has been established for projects through the CDM, Verified Carbon Standard (VCS), etc.

are some examples of models having been used for energy subsidy reform. Estimating elasticities—notably price elasticity of demand—is key to models, with empirical work indicating that short-term elasticities are lower than longer-term ones (where there is more opportunity for investment in new technologies, alternatives, etc.). Ex post, there are some examples of empirical work available in the literature. The challenges in both cases are to: (i) set a baseline for the counterfactual where the policy is not implemented/ is implemented without increased mitigation impact; and (ii) and then attribute any change to the increased mitigation impact as against other drivers of change (technological progress, changes in the economy, changes to prices and other economic variables, competitiveness with respect to other countries, etc.[5]). There is also likely to be a time lag in impact following a policy's introduction. It can certainly be concluded that whatever method is used for baseline and attribution will lead to uncertainties in the estimate of GHG emission reductions to at least some (and possibly to a high) extent. Approaches would also need to consider issues around the period within which credits should be recognized.[6]

The analysis presented concludes that understanding the GHG emission benefit from any given policy is uncertain, relying as it does on baseline, boundary, timing and other issues, including feedback in national and international economies. Crediting of policies against their GHG emission reductions—including developing methodologies which are as simple and cost-effective as possible—remains a highly interesting and rapidly developing area. The development of Intended Nationally Determined Contributions (INDCs)—which may effectively be a collection of NAMAs in some developing countries—is one current and concrete application where estimates of benefits are required. The area will profit from pilot schemes and from further study and debate. The team conducting this study has revised its views and insights continually throughout the study, and expects to continue to do so.

Political Economy

It is increasingly accepted that it is not simply the overall economic impact of energy subsidy reform (and other fiscal policy) that determines whether or not such policies are implemented. Rather, specific impacts on certain sectors of the economy, suppliers or parts of the population are key, notably when such sectors or parts hold or influence political power or are deemed "vulnerable" (or otherwise deserving of society's protection against adverse impacts).[7] Similar arguments can be applied to an ETS too, noting that its direct impacts are focused on industry and suppliers and therefore stokes fears over losses in competitiveness of certain economic sectors as well as another concern common to fiscal policies—concern around short-term economic shocks that could lead to changes in longer-term economic growth paths. For all pricing reform policies considered, the literature suggests that perception of the scale of impacts is generally higher than what would be expected (ex ante analysis) or was observed (ex post), and analysis indicates that the fiscal savings from policy reform is generally far higher than the costs of mitigating impacts to key sectors, suppliers or parts of the population.

The analysis of the case studies in Chapter 3 indicated that the value of carbon credits as a share of fiscal gain from base policy implementation would almost certainly be low. Using credits as a means to mitigate policy impacts to any more than a highly targeted group is therefore not possible, noting again that the level of fiscal savings from base policy implementation would already be sufficient to mitigate impacts if the host government wished to make such a transfer and had the means to hypothecate (including indirectly). This is a central part of the debate: could the additional income from credits overcome a barrier to policy implementation? Analysis from the case studies and beyond strongly indicates that there are barriers to policy implementation beyond demonstrating overall economic gain. Unsurprisingly—given that all policies considered cover pricing reform—it also identifies similar key stakeholder groups, noting that which of these are most important in any specific application will depend on the policy and country in question.[8]

[5] Noting also that fiscal policies alter the costs and effectiveness of other GHG-mitigation policies such as those covering energy efficiency and renewable energy. Here it is important not to double count emission impacts (and in some cases to therefore share reductions between fiscal and other policies). The "E+/E-" methodology within the UNFCCC was developed to update project baselines under the CDM in the case of policy changes and would be applicable for fiscal policy changes.

[6] This study notes that fiscal policy often targets transformational change, which tends to be a long-term process and would therefore ideally require crediting over a long period. This presents challenges: methodologically, it is easier to establish causality for change over shorter time periods; in terms of policy additionality, it can be argued that fiscal policies will be brought in over the long term anyway, i.e. it is more a question of 'when and how' than 'if'.

[7] Noting that the middle class is often a key political group, and policy implementation may require mitigation of impacts to its members, even if equity considerations would not support such action.

[8] The study uses the concept of "menu of options for discussions with countries" to take account of the specificities of implementability: it is not considered possible to identify options, or a menu of options, which would be applicable generically across all cases.

Next Steps and Recommendations

The case studies chosen, while providing examples of pricing reforms in developing countries, did not include any external crediting in their considerations or final design. In effect, all the analysis presented is hypothetical to at least some extent. This is exacerbated by the target of the potential mechanism being developing countries, while the main body of experience on pricing policies is in developed countries.

From a conceptual perspective, crediting at the policy margin looks the most promising, in particular in a pilot phase. Crediting on the full pricing reform policies seems to be more challenging and dependent on the circumstances. In-depth feasibility and identification of suitable policy crediting approaches is needed in specific contexts, through real-world testing/piloting and engagement with interested countries and other relevant stakeholders.

A more general case for policy crediting might emerge through the implementation of the Paris agreement: Countries with defined and committed targets/mitigation pledges might approach crediting of policies less from an offset logic but more on a principle of connecting domestic policies through an exchange of credits to increase efficiency. This interest in building connections is already visible in attempts to link ETSs but might be expanded to other implicit or explicit carbon pricing approaches as well. Crediting might then become a considered option in cases where policies and mitigation impacts are too different for more direct linking approaches.

Table of Contents

Chapter 1: Introduction

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Initial reviews of INDCs indicate that, taken as a whole, the commitments contained in them, when added to expected commitments from other countries that have yet to submit, will not be sufficient to meet an aim of limiting global warming to no more than a 2°C rise above the preindustrial level. The key issue in increasing the mitigation impact of commitments will be how to mobilize meaningful policies around the globe.

How can countries be encouraged to engage in increased mitigation? The strong reaction of developing countries to the incentives provided by the Clean Development Mechanism (CDM) shows that revenues from the sale of credits can be a very powerful driver to lower greenhouse gas emissions. While the CDM explicitly excluded crediting of mitigation policies (instead relying on crediting distinct projects), in the context of the negotiation of the Paris Agreement, proposals have emerged to provide emission credits to governments that introduce or strengthen greenhouse gas mitigation policies. In the context of Nationally Appropriate Mitigation options (NAMAs), developing countries expect international support for at least some of their mitigation policies. The financial part of support could be through direct transfers of public climate finance or revenues from market mechanisms.

In order to contribute to an increased scale of mitigation commensurate with the challenges, market mechanisms need to be reformed to provide revenues to developing countries that adopt their own mitigation policy instruments. For countries that have reached a certain level of development, a wide array of pricing reforms[9] is available to reduce air, water and soil pollution and related health costs and generate revenue streams, or reduce subsidies for fossil fuels.

There is a wide array of mitigation policies, but no single instrument that is equally well suited to all sectors of an economy. For example, an emission trading system (ETS) is appropriate for large emission sources while an emissions tax can help to reduce dispersed emissions from households and transport. Multiple mechanisms are used in industrialized countries, and emerging economies such as Mexico are considering an ETS in addition to its carbon tax (OECD, 2013).

This study will focus on the appropriateness of three types of policies: emissions trading, carbon taxation, and subsidy reform for crediting in the context of a new or expanded international market mechanism, or through bilateral purchase. Within each of these three, we will examine the potential for such crediting, which is most likely to be international but could also be from domestic sources, to assist or support developing countries to undertake reforms. Under which conditions can revenues from policy crediting help overcome barriers to pricing reform measures or support greater mitigation impacts where fledgling forms of such mechanisms already exist?

Pricing reforms are already gaining a strong foothold in developing countries. For this study, four countries have been selected as case studies: China, Indonesia, Mexico and Morocco (see Box 1.1). Both Mexico and China now have operational carbon pricing systems in the form of taxation and emissions trading respectively, while Indonesia and Morocco have made progress on fossil fuel subsidy reform. All four are members of the World Bank Group's Partnership for Market Readiness (PMR),[10] one piece of supporting evidence that points to a favourable outlook on the use of market-based mechanisms. Coverage, price (direct and relative), and mechanisms differ, but each country has benefited from international support to reforms. Global literature has covered these prominent cases well, identifying elements of international financial support, as well as how this has assisted implementation (ECOFYS & World Bank, 2014). Each of these countries is introduced in Box 1.1 and is covered in a case study in further detail in Chapter 3.

[9] Here we use the general term "pricing reform" to cover mechanisms such as carbon pricing approaches (i.e., emissions trading systems or taxes) and reductions of fossil fuel or energy subsidies.

[10] See https://www.thepmr.org/. China has benefitted from a partnership with the PMR on GHG mitigation; In Mexico the PMR supports an MRV Framework and NAMA tracking tool (PMR, 2013e); in Indonesia the PMR is supporting the piloting of an MRV framework (PMR, 2013d); in Morocco, the PMR is supporting pilot carbon market-based approaches in selected sectors as the national government has the goal to develop a domestic carbon market in the medium term (2018–2020) (PMR, 2013f).

Box 1.1. Introduction to the four case study countries

Beijing (China): Regional trading systems in China operate at a carbon price of up to USD 11 per tonne of carbon dioxide equivalent (CO_2e) based on the individual system. Overall, China is home to the second-largest carbon market in the world, covering 1,115 Megatonnes (Mt) CO2e. As the world's "foremost developer of CDM projects" (Environmental Defense Fund [EDF] & International Emissions Trading Association [IETA], 2014), China had extensive prior experience with crediting for project-based emissions reductions and generating a strong domestic GHG mitigation portfolio to draw upon in developing its system. In fact, the offsets system is based on CDM methodologies, and allows developers of CDM projects to switch over to the domestic credit system. China has benefited from international partnerships on GHG mitigation (e.g., with Australia and the EU) in building its trading systems. A national ETS is planned as part of the 13th five-year plan (2016–2020) (EDF & IETA, 2014)

Mexico: The carbon tax in Mexico has an upper (USD 4) and lower (USD 1) per-tonne CO_2e level of implementation. The tax covers 40 per cent of national emissions, but only for the emissions differential to natural gas. Mexico allows tax payers to use CERs from Mexican projects to pay the tax "in kind" at the current CER market price. Mexico has also discussed the potential for an ETS in the energy sector. These mitigation policies contribute to the National Strategy on Climate Change which ties a national target for 2020 of 30 percent below BAU to the condition of international financial support (International Carbon Action Partnership [ICAP], 2014).

Indonesia: In the late 2000s, Indonesia was running a national budgetary deficit in excess of 1 per cent while over 2 per cent of GDP was dedicated to fossil fuel subsidies (Beaton, Gerasimchuk, Laan, Lang, Vis-Dunbar, & Wooders, 2013). Attempts to reduce these subsidies have been a significant challenge for successive governments, and were only partially successful (Beaton & Lontoh, 2010). Cash transfers were used successfully to overcome social and political opposition to reform, and may indicate a potential window for international assistance. The new Widodo administration moved to reform subsidies to a range of fuels and electricity during its first few months in power (Lontoh & Beaton, 2015), taking advantage of the fall in world oil prices. Whether the reduction in subsidies can be maintained as and when oil prices rise is clearly unproven.

Morocco: Significant subsidies are in place in Morocco, particularly for liquefied petroleum gas (LPG) and diesel (Verme, El-Massnaoui, & Araar, 2014). These subsidies go back decades, but largely arose after a system of price indexation was suspended in the wake of high oil prices in the late 1990s. Total subsidies (including food products) peaked at 6.6 per cent of GDP in 2012; however, the reintroduction of partial price indexation in 2013, followed by full indexation in 2014, led to a significant reduction. On January 16, 2014, the government removed subsidies to gasoline and industrial fuels and reduced subsidies to diesel according to a predefined timeline. These reforms had some impact on the overall subsidy level but left some many of the most significant subsidies in place, including most of the diesel subsidies, subsidies to butane and petroleum products to the national power and water utility (ONEE). In Morocco, the PMR in the short-term (2013–2016) wants to define sectoral baselines, implement a national MRV system, select NAMAs for the establishment of crediting in 2016, design a national registry of emissions, and implement capacity building for market mechanisms. The hosting of COP 22 in 2016 is likely to give a strong incentive for Morocco to increase its climate change mitigation ambition in general. Morocco has explicitly included subsidy reform in the INDC it submitted to the UNFCCC in June 2015.

The goal of this study is to determine whether there is a role for crediting in pricing reform efforts as a way to assist government to increase their mitigation impact. This can either be through:

- **a policy being implemented that would not have been without crediting; or**
- **an existing policy or one that has been decided upon is made more stringent (i.e., that its mitigation impact is increased).**

Figure 1.1 shows the "base policy" and "with increased mitigation impact" cases. The "base policy" shows a "no-crediting situation." The "base policy" typically results in financial flows to the government, some of which can be redistributed to sectors and stakeholders that are more or less affected by the impacts of that policy. Any or all of the financial flows can be zero, including a "no existing Policy" case. In the second part of the diagram, we see "increased mitigation impact," resulting in higher impacts and potentially higher revenue recycling. If credits that external purchasers are willing to buy can be generated (subject to their MRV rules and other criteria), then the government can gain extra revenue, some or all of which can be recycled to sectors and stakeholders. Our research question is then to investigate the possible link between increased mitigation impact and credit (revenue).

We will not investigate who the "External Credit Purchaser" may be or their detailed requirements: we consider their principal purpose to be as a supplier of revenue external to the government implementing pricing reform.

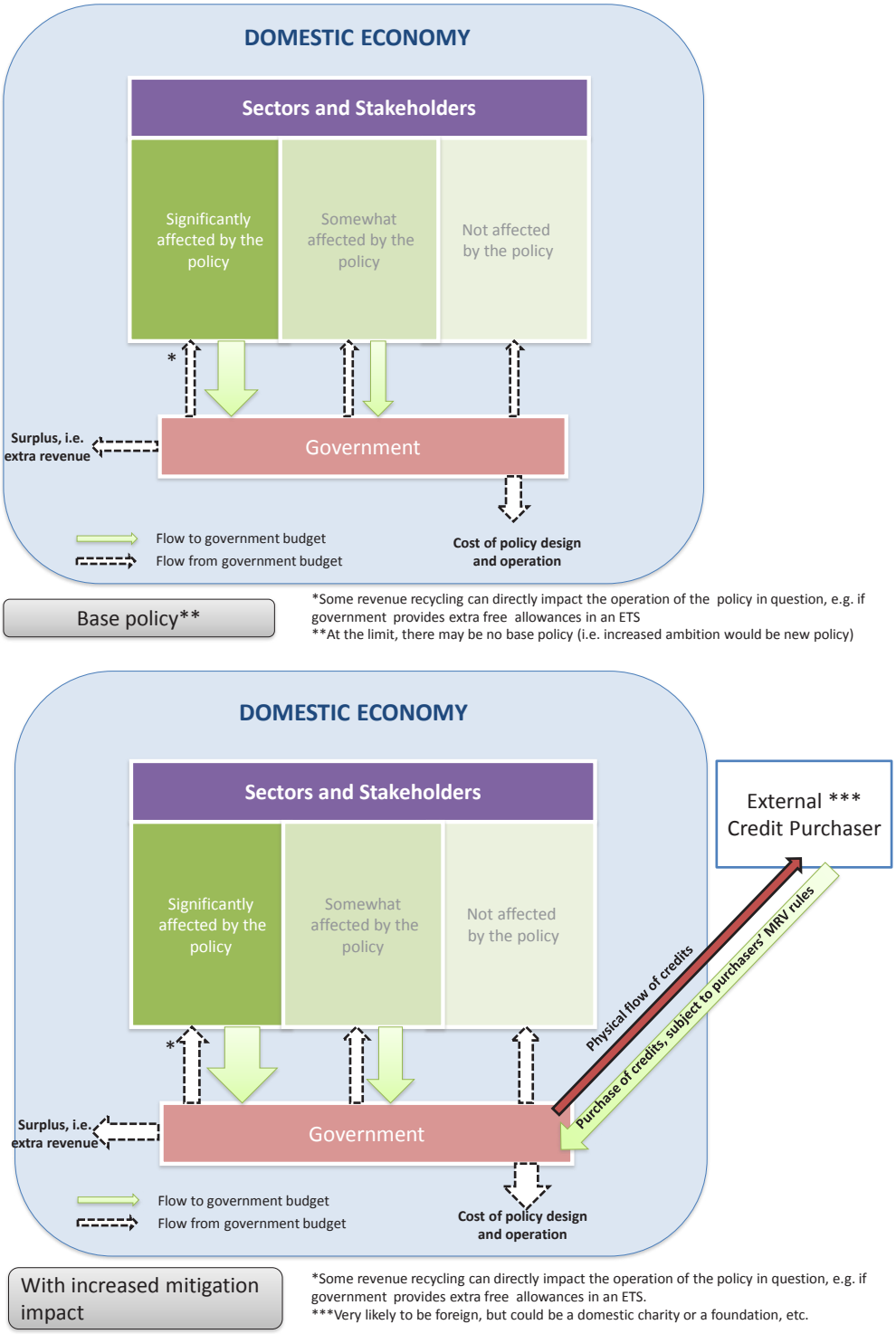


Figure 1.1. Framework for assessing the impacts of carbon crediting on pricing reform

Source: Author Diagram

How crediting revenues are used can potentially increase the policy mitigation impact. Box 1.2 details potential generic uses. The first two options are a return of revenue to the general government budget (option 1 in the Box) and a specific targeting of some or all of the revenue to overcoming barriers to acceptance. The third option sees revenues used to increase the abatement within the policy. Under the fourth, the policy is strengthened through improving its design or operation. Potentially linked to this option, the fifth sees direct intervention, with credits used to purchase outputs (notably ETS allowances). The final option sees a more indirect approach, with revenue partially or fully used to invest in mitigation activities more generally and/or to make such activities "cleaner" than current plans. Such investments can make the costs of energy lower, therefore mitigating to some extent the impact of higher prices resulting from pricing reform. Pricing reform policies are supportive of, and supported by, energy-focused policies that lower the cost of energy. But whether supporting such general mitigation activities would lead to increased mitigation impact within the pricing reform policy itself is the key issue being assessed by this study, and we will examine both this and whether (and how) increased mitigation impact could be attributed and measured in practice.

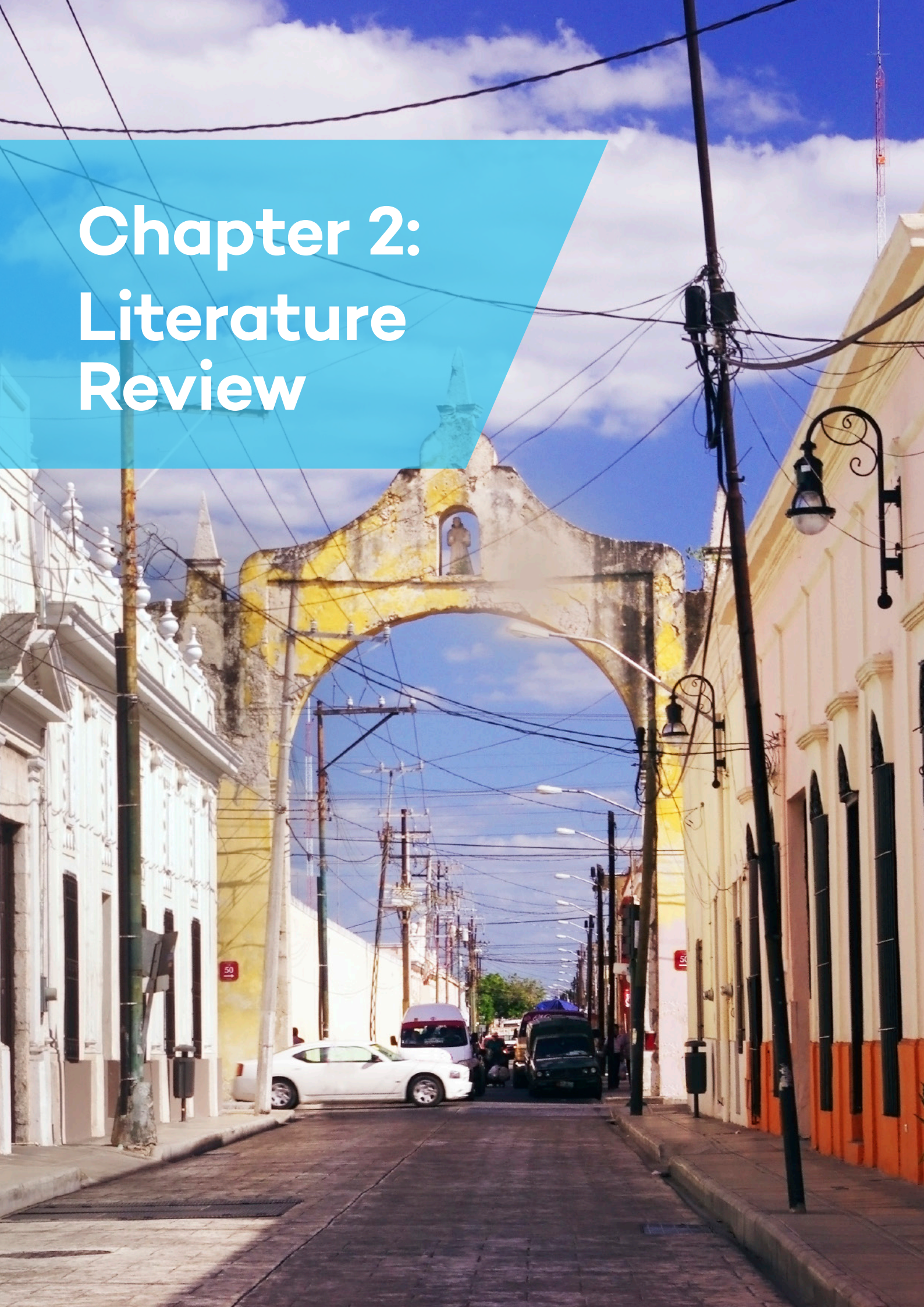
Box 1.2. Potential uses of crediting revenues

While environmental integrity is a necessary outcome of any crediting scheme, crediting in itself should be seen as a means of achieving emissions reductions by providing a financial incentive for mitigation. The flow of revenues from crediting influences stakeholder incentives and thus has implications for potential mitigation. In the short term, crediting revenues could be used to support pricing reform policy as follows:

1. Revenues accrue to the national government and are held in the national treasury, resulting in a fiscal benefit/incentive for policy introduction but provide no further incentive for abatement.
2. Revenues are used to overcome barriers to policy acceptance.
3. Revenues are used to support abatement within the instrument.
4. Revenues are used to overcome barriers to its effective implementation and operation, e.g., smoothing the price within an ETS, improving design through technical assistance.
5. Possibly also contributing to option 4, revenues are used directly to buy the product of the mechanism (notably allowances from an ETS).
6. Revenues are redirected to mitigation activities outside the scope of the instrument (e.g., to finance a renewable energy feed-in tariff or an energy-efficiency measure).

Note that there will be strong differences between the policy categories considered within this study regarding the utility and applicability of each of these generic options and there will different challenges regarding baselines, additionality and MRV issues. Examples of the mechanisms are shown in Section 2.4.

Whether policy mitigation can be increased depends largely on: (i) how the credits generated are used; and/or (ii) the "carbon economics" (the value of credits relative to the fiscal savings from the policy under consideration). This study focuses on analyzing against these two issues.



Chapter 2: Literature Review

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2.1 OVERVIEW AND SCOPE

Given the hesitation in international climate negotiation to consider crediting of mitigation policies, the literature on crediting for mitigation policies is not very extensive. Therefore, we also assess international support for implementing of carbon pricing policies such as results-based climate financing.

2.2 LITERATURE ON POLICY CREDITING

2.2.1 Policy Crediting Under the Kyoto Mechanisms – Joint Implementation (JI) and the Clean Development Mechanism (CDM)

Joint Implementation in its original form (Art. 4.2a of UNFCCC) can be interpreted as both policy and project-related. However, the pilot phase for "Activities Implemented Jointly" starting in 1995 clearly developed into the direction of a project-based crediting mechanism. When the CDM was set up under the Kyoto Protocol, various stakeholders proposed policy-based crediting, which was then primarily framed as scaling up the CDM to a sectoral level (Samaniego & Figueres, 2002). Possible approaches discussed on a conceptual level included:

- Figueres (2006) proposes a top-down sectoral CDM, "whereby governments would coordinate CDM projects on a broader level and integrate climate considerations into broader economic growth policies." She notes the perverse incentive against mitigation policy that CDM projects lead to (see discussion below), with examples from Latin America. Further noting that "the policy is the project" and that the baseline is what would have happened without the policy, she postulates that the government would either have to own the credits generated or act as a clearinghouse for the many (small) implementing units whose modified actions would result in lower GHG emissions.
- Ex ante intensity targets with emissions trading or countrywide "policies and measures" as a no-lose target (Bodansky, 2004).
- Another proposed distinction had been made between a standards-based versus an incentives-based mechanism (Barata & Helme, 2008).

The CDM Executive Board decided in 2005 not to allow policy crediting and has not altered this decision. The reason was that policy crediting was felt to run counter to the concept of "additionality" which requires that projects are not "business as-usual." Initially, CDM regulators thought that mitigation policies should be taken into account in the baseline as soon as they were introduced. If this approach would have been extended to all mitigation policies, the CDM would have become an obstacle to their introduction.[11] Thus, by March 2004 the CDM Executive Board had already decided that policies should not be taken into account in the baseline if this created perverse incentives to delay them. In November 2005, this approach was elaborated such that "national and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies" introduced after November 11, 2001, the so-called E- policies, which would lead to lower energy technologies and solutions being implemented, could be excluded from the baseline against which CDM projects were assessed. Thereafter, a large number of renewable energy projects driven by feed-in tariffs and other policies made it into the CDM. Thus the credit revenues did not accrue to the governments carrying the cost of the policy instruments, but enhanced the revenues of private sector entities.

In order to nevertheless allow crediting of widespread small activities triggered by a policy that would not be able to submit a set of individual CDM project applications due to prohibitively high transaction costs, the programmatic approach (Program of Activities or PoA), was introduced from 2006 onwards. Here it was explicitly stated that a PoA coordinator, e.g., the government could trigger multiple activities (i.e., projects) through a policy. One advantage of the PoA compared to the pure project approach was that an unlimited number of activities could be added to the PoA over a period of up to 28 years.

[11] Here mitigation policies would lower the baseline against which CDM projects were assessed, meaning that the projects would generate fewer credits and hence less revenue, and would be therefore less attractive to developers.

2.2.2 Crediting of Nationally Appropriate Mitigation Actions (NAMAs)

With the emergence of the concept of Nationally Appropriate Mitigation Actions (NAMAs) in 2007, the discussion started as to whether NAMA crediting should be allowed, on the basis of a proposal by South Korea (Republic of Korea, 2008). While it has not been clearly defined whether NAMAs should be mitigation policy instruments or a combination of programs or even single projects, the literature discussion on NAMA crediting has focused on crediting of policy instruments. This focus was enhanced by the sectoral crediting/trading mechanism proposal of the EU under the debate on new market mechanisms, which would allow generation of credits through mitigation policies covering an entire sector (IISD, 2009).

NAMA crediting is seen by some as a way to enhance global GHG mitigation (Olsen, Fenham, & Hinostroza, 2009) whereby international financing would harness additional mitigation in developing countries. (Michaelowa, 2013) notes the increasing scale as NAMAs move from projects to programs of activities to policies to a sectoral basis. Critics of traditional offset mechanisms see positive sides in NAMA crediting if the demand for NAMA credits does not reduce mitigation in developed countries (Nature Code & Carbon Market Watch, 2013).

2.2.3 Challenges and Potential Solutions for Policy Crediting

The critical issues regarding policy crediting stressed by almost all the literature are how to set the baseline and how to check whether a policy is additional or would have been introduced anyway in the near future.

As discussed in the CDM for over a decade, baseline and additionality determination can, but do not need to, go hand-in-hand. The CDM has developed heuristics on how to deal with baselines on a project-by-project level that has found general acceptance. These heuristics include a strong reliance on historical emissions levels (for retrofits), while for greenfield projects the emissions level of the most attractive alternative is usually chosen. Developing policy baselines is a much more contested field. The experience of emissions commitment setting of industrialized countries shows that frequently modelling approaches are used. In that context, the controversy simmers on whether top-down (general equilibrium) models, or bottom up (engineering) models are more appropriate; for example, the Danish Energy Agency et al. (2013) notes that baseline scenarios differ widely across countries and observes a lack of convergence of approaches.

The Center for Clean Air Policy (CCAP) (2011) stresses that policy credits should only be provided once additionality can be proven, based on whether a policy has an incremental cost, but does not provide a concrete proposal how this incremental cost would be determined. Rather, the authors assume that credits would be used to pay the incremental cost of the policy. Within this paper, the authors do not discuss how changes in the credit price due to shifts in supply and demand would alter this calculus.

At one extreme, Röser and de Vit (2012, p. 5) state bluntly that policy crediting is "unlikely to be feasible due to the difficulties of setting boundaries and baselines." Okubo Hayashi, & Michaelowa (2011) stress that compared to concrete emission reduction projects, assessment of the additionality of NAMAs is "difficult." At the other extreme, Michaelowa (2013) states the opposite: "Critics of NAMA crediting say that setting of robust baselines is impossible. This is not true, as defining national commitments is routinely done on the basis of similarly uncertain baselines," i.e., that it is possible to set baselines and calculate policy impacts and costs with reference to these. He advocates the use of marginal abatement cost as the basis for assessing additionality, with only NAMAs with positive costs being considered additional (see also Helme, 2010 for a rough version of this approach); policy instruments with negative marginal abatement costs should not be creditable, although Michaelowa does note that non-monetary barriers may prevent negative marginal abatement cost NAMAs from being taken up. Taken from the paper, Figure 2.1 proposes further that those NAMAs with very low marginal abatement costs as well as those with costs above the credit price should be candidates for direct financial support through grants from industrialized countries. Here, NAMAs with positive costs that remain below the credit price would be the ideal candidates for crediting.

Michaelowa notes that in order to be consistent, positive externalities such as reduction of public health management costs due to reduced air pollution would have to be taken into account, with governments adding these positive externalities to the value of the credits they receive when assessing the benefits and costs of NAMAs. Finally, he states that additionality determination of policies should also be taken into account to assess the stringency of national emissions commitments in general, not just for crediting purposes.

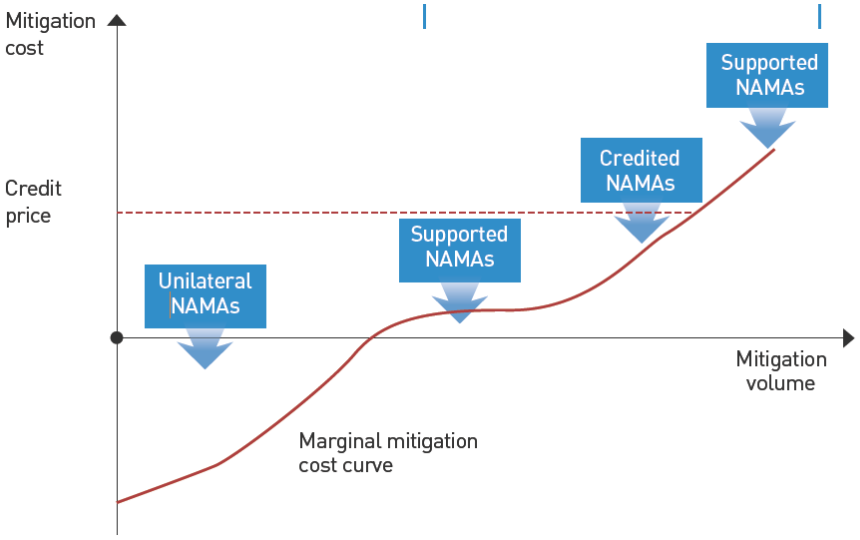


Figure 2.1. Marginal abatement cost of NAMAs and crediting appropriateness

Source: Michaelowa, 2013.

Another challenge to policy crediting is the question whether mitigation can be measured, reported and verified (MRVed). Okubo et al. (2011) discuss the varying degree of "MRVability" of different mitigation policies. Figure 2.2 summarizes their thinking, with "tradeable permits" considered the easiest type of policy to MRV, and "taxes and charges" and "subsidies and incentives" in the upper half of quantifiability.

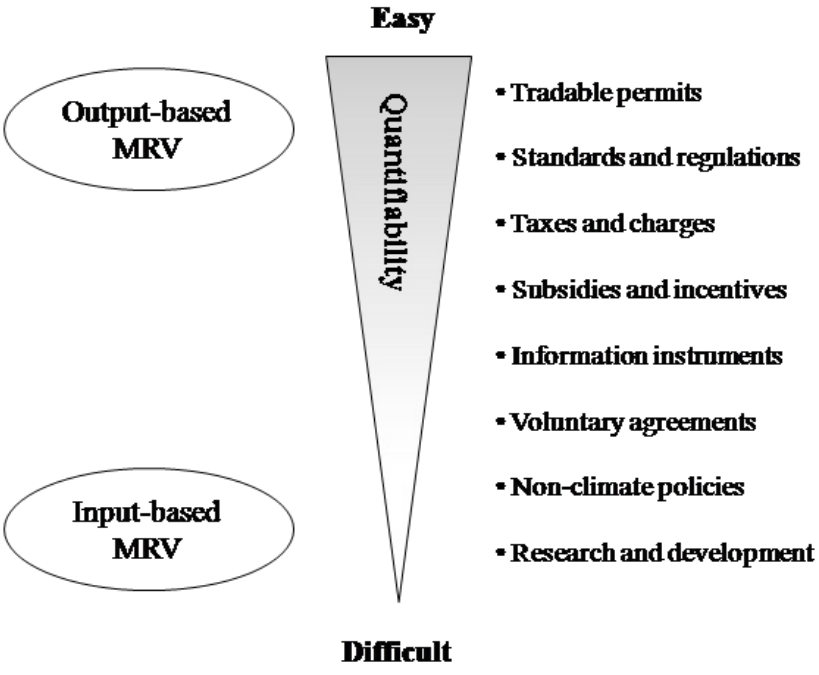


Figure 2.2. MRV-ability of mitigation policies

Source: Okubo et al., 2011.

Okubo et al. note that data availability in the host country can be a bottleneck, and that it is important to strike a balance between accuracy and usability of measurement guidance. Drawing from CDM experience, additionality could be assessed with analysis based on investment (credits must take the NAMA from being more expensive than at least one other alternative), barriers or common practice (the projects and policies that are commonly used in other jurisdictions). Drawing on case studies, feed-in tariffs for renewables are found to be readily amenable to MRV, with energy efficiency much less so. They conclude (p. 25) that "the stringency level of MRV and additionality demonstration will be crucial for the credibility and political viability of a NAMA crediting mechanism," i.e., that stringency levels could be lower if the political imperative is for a NAMA crediting mechanism with widespread applicability.

A further challenge for MRV is to "define procedures that are conservative and still provide incentives to embark on policies with long-term and indirect effects" (Okubo et al., 2014). For the MRVability of feed-in tariffs see Michaelowa & Hoch (2013); for that of sectoral crediting approaches and ETS systems (Sinha, 2012; Han, 2011).

In terms of measuring the impact of crediting and providing some of the necessary MRV framework needed, WRI has advocated the development of a guideline for estimating and reporting GHG mitigation and fluctuations resulting from policy action (Roch, Bhatia, Finnegan, Levin, & Mitra, 2014). It proposes an impact chain approach similar to that used by development agencies in assessing the effectiveness of development policy interventions. For assessment of mitigation benefits, besides a baseline and policy scenario a comparison group approach is proposed where a group or region affected by the policy is compared with an equivalent group or region not affected by the policy. While such an approach is attractive theoretically, there remain considerable practical difficulties around whether impacts specific to the NAMA's implementation could be identified in practice. Empirical testing of specific interventions is indicated, and it may be practical to instead consider a comparison of inputs as the basis for comparison (e.g., whether or not certain technologies or processes are in place).

2.3 RESULTS-BASED FINANCING AS A MODEL FOR POLICY CREDITING

Results-based finance (RBF) for mitigation policies could help build or strengthen existing national-level carbon pricing systems, and the same would be expected for subsidy reforms. This pay-for-performance climate finance model is embedded in the Green Climate Fund's (GCF's) Initial Results Management Framework (Green Climate Fund, 2014). It is also increasingly working its way into the UNFCCC negotiations (Schwager, 2014), and is a recommended approach to support development of pricing reforms in developing countries.

Results in RBF can go beyond just carbon reductions into areas like poverty reduction, education and other environmental benefits, much the way that the Gold Standard does in terms of existing carbon offset systems. WWF has noted this link as well, and takes it as the next logical step, noting that the Gold Standard is moving, "from certifying a tradeable [sic] asset to certifying an approach or a result" (Vellacott, 2014). The emphasis is less on mitigation and more on the broad range of non-mitigation benefits of the project. Efforts are already underway on monetizing these co-benefits, and in some cases the value of the co-benefits is far outstripping the value of carbon reduced alone (Kouchakji, 2014).

Crediting can become RBF if the financier takes the verified credits from the crediting scheme as an indicator for the results required for the financing commitment. Conversely, the achievement of results could be used as the benchmark against which credits are generated.

2.3.1 Best Practices and Lessons Learned From Results-Based Financing

With RBF as a potential model for crediting approaches, a quick look at some lessons and best practices can be informative. Mumssen, Johannes, & Jumar (2010) stress that countries may not have the upfront financial flows to operate under a true RBF model where credits have to be delivered in exchange for finance. Often a portion of financing paid upfront can help address pre-financing challenges, with the results required for this pre-financing to be validated and unlocking greater RBF-style funding over the longer term. They found that capacity to implement RBF schemes can be limited, notably in the countries where it is most needed. Capacity building, training and verification costs have to be built into approaches.

The German Development Institute (DIE) in the report *Results-Based Financing: Evidence From Performance-Based Financing in the Health Sector* (Grittner, 2013) identified that performance-based financing has tended to focus on outputs over outcomes, and quantity over quality. While that report focused on health issues, it can be an important lesson for GHG mitigation approaches to ensure that the scale of emission reductions is not a greater focus than ensuring additionality and persistence of policy instruments, and that the types of emissions reductions and pricing reforms being invested in are not simply the cheapest options, but ones that will have the strongest impact in the long term. Without rigorous impact evaluations, the credibility of the results would be doubtful. Bester (2012) identified a lack of a long-term track record showing the potential of RBF, and a resulting gap in results-based management.

The United Nations Development Group's (UNDG's) *Results-Based Management Handbook* (UNDG, 2011) stresses the need to "ensure that data systems are developed and information is collected on a regular basis." The ILO also touches on reporting under a results-based model, with the following elements relevant for policy crediting approaches:

- Achievements accompanied with indicators of success
- Actual results vs. expected results
- Actual results vs. baseline scenarios

Drawing from a real-world example of successful RBF in the health sector in Rwanda (Rusa & Fritsche, 2007) some best practice suggestions emerge. The Ministry of Health saw results-based financing as a way to improve quality of care, motivate the workforce, and combat some negative effects of previous input-based schemes. Key to success of this approach shift was a rigorous intervention study and "rollout plan" that included clear tasks and timelines for implementation that could be measured against. Strong leadership from the implementing agency was also necessary to ensure that results were met as planned. It was also determined that without a results-based approach (one that included strong oversight and management of service providers to deliver results), success would not have been achieved, as more input-focused approaches in the past had not delivered to the extent of the performance-based model that entailed such strong management and oversight.

2.4 USING CREDITING REVENUES TO OVERCOME BARRIERS TO PRICING REFORM

While there are no existing models to draw from for policy crediting being used to support pricing reforms, there are extensive options for using crediting revenues to assist in implementation of pricing reforms. Each is unique to the local circumstances of the jurisdiction in question, but some basic options include[12]:

- Using revenues to offset ancillary business and personal taxes to lower the compliance burden on affected stakeholders–British Columbia (BC) Carbon Tax (BC Ministry of Finance, n.d.).
- Assistance for workers to transition from subsidized fossil fuel sectors–France (Laan, Beaton, & Presta, 2010).
- Free allocation of ETS allowances (essentially foregoing potential revenue) for electricity generators – eight member states EU ETS (European Commission, 2015), Switzerland Emissions Trading Scheme (ECOFYS & World Bank, 2014).
- Using Revenues to fund Green Investment–Hungary EU ETS (Esch, 2013).
- Direct cash transfers to low-income groups–Malaysia subsidy reform (Bridel & Lontoh, 2014).
- Conditional cash transfers–Brazil, Mexico, Colombia (Laan, Beaton, & Presta, 2010).
- Earmarking revenues for industrial innovation & efficiency measures and technologies–Czech Republic EU ETS (Esch, 2013).
- Using revenues to provide support for compliance entities to transition to cleaner technologies–Alberta SGER (Climate Change Emissions Management Corporation [CCEMC], 2014).

[12] Further evidence and options are presented and analyzed within Sections 4.2–4.4, which explore the three policy categories considered.

- "State aid compensation in Germany, the UK, the Netherlands, Spain and Belgium"–EU ETS (ECOFYS & World Bank, 2014).
- Holding back credits for the purpose of free allocation/ emergency reserves available for allocation in the event of price shocks–Québec cap-and-trade (ICAP, 2015b), Korea Emissions Trading System (ICAP, 2015d).

The central point being that while these methods to assist implementation through use of carbon revenues (and/or by foregoing revenue) to overcome barriers or stakeholder opposition are all internal to the pricing reform system, they could certainly be replicated with a system where crediting revenues came from an external source. The case studies examine pricing reforms in China, Indonesia, Morocco and Mexico. The main benefit of additional revenues from outside the system would be that the levels of compensation or assistance could be greater, thus allowing compliance entities to bear the price associated with a system geared at greater mitigation impact.

Chapter 3: Case Studies

Chapter 3: Case Studies

Case studies are now presented to examine the considerations on whether crediting could lead to increased mitigation impact, with reference to the framework shown in Figure 1.1. Each case study follows a common format:

1. Context
2. The policy or reform which was undertaken (all are actual cases, none used external crediting)
3. Emission reductions (including, where appropriate, an assessment of costs and benefits of the policy or reform)
4. Political economy and stakeholder analysis (including revenue recycling)
5. Potential role of crediting in increasing mitigation impact

Conclusions taken from the case studies as a whole are drawn in Section 3.5, which includes a summary table of the case studies (Table 3.13).

3.1 MOROCCO – ENERGY SUBSIDY REFORM

This case study discusses the history of fossil fuel subsidy reform in Morocco in general, before focusing on one key element: subsidies to fossil fuels used for electricity generation.

3.1.1 Context

Energy in Morocco is dominated by energy imports, which the International Energy Agency (IEA) calculates constitute 90 per cent of the energy mix (IEA, 2014). Coal and oil are procured from world markets, while gas imports mainly come from Algeria. Increasing the supply of domestically produced energy including renewable energy and domestic oil and gas is a priority for the kingdom.

The electricity grid is well developed, providing electricity to an estimated 98 per cent of the population. Since 2000, total electricity production has approximately doubled to over 25 terawatt-hours (TWh) with the vast majority supplied from coal, gas and oil (Figure 3.1). In recent years wind energy has begun to make a significant contribution. Despite significant potential and a policy focus on solar energy, this has yet to provide a significant proportion of the electricity supply. Electricity is also imported, notably via an interconnector to Spain which has been in place since 2005 (IEA, 2014).

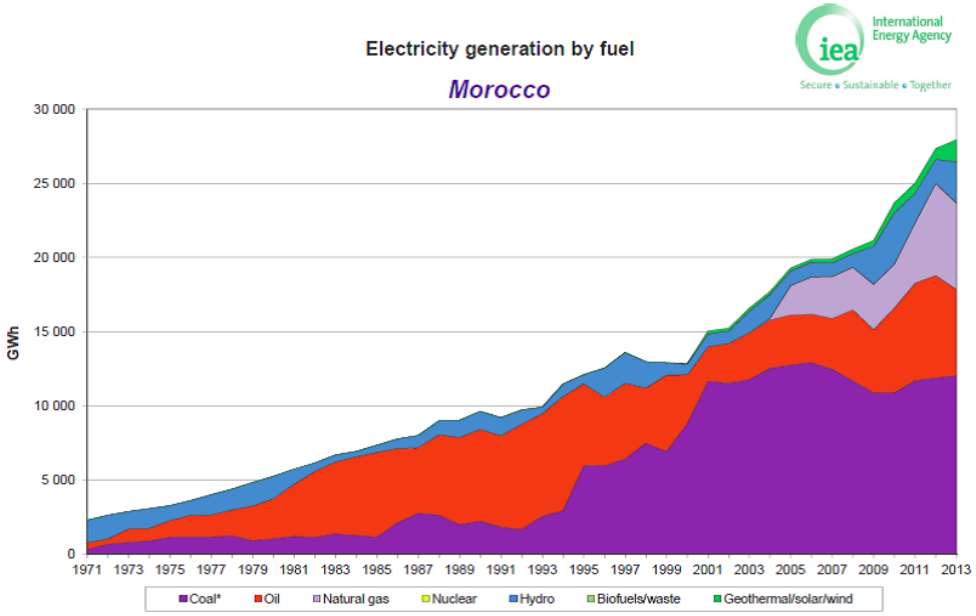


Figure 3.1. The electricity mix in Morocco

Source: IEA, 2015.

Throughout the last decade subsidies have been provided for petroleum products, including diesel, petrol, butane gas (LPG) and petroleum-based fuels for power generation; and food substances including sugar and flour. Despite being the main fuel for thermal power stations, coal does not receive subsidies. The cost of subsidies was estimated by the *Cour des Comptes* to be equal to around 12.6 per cent of all government expenditures between 2005 and 2012, compared to 3.4 per cent in the period from 2001 to 2009 (Cour des Comptes, 2014). In 2012 petroleum products received the largest share of subsidies (85.7 per cent); comprised of diesel (39 per cent), gasoline (2 per cent), butane gas (28 per cent), industrial fuel (4 per cent), "normal" power generation fuel for the national utility (ONEE) (8 per cent) and "special" power generation fuel for ONEE (5 per cent), The remainder of the subsidy bill was for sugar (9 per cent) and flour (5 per cent) (Cour des Comptes, 2014). The progression of subsidies over time is shown in Table 3.1 below.

An external estimate for energy subsidies is available for 2011 from the IMF. According to the IMF pre-tax subsidies are estimated to be USD 658 million, and post-tax subsidies[13] are estimated to be USD 5.7 billion (GSI, 2014). In the same year the official government subsidy estimate for petroleum products was DH 43.4 billion (USD 4.37 billion),[14] seven times higher than the IMF estimate.

3.1.2 Subsidy Reforms

From 1995 to 2000 the prices of liquid petroleum products were indexed to international market prices. In September 2000 indexation was suspended, as it became politically difficult to sustain due to high international prices (Verme et al., 2014). In the absence of indexation the gap between national and international prices grew, eventually leading to subsidy costs of 6.6 per cent of GDP in 2012.

The justification for the subsidies provided on basic food products; petroleum products including gasoline, diesel, fuel oil and LPG; was to ensure price stability, consumer purchasing power, and the promotion of selected industrial sectors.

International prices have been through several periods of rapid price rises, which have had a profound impact on energy policy in Morocco. During the period between 2000 and 2013, the price of liquid petroleum products experienced a number of ad hoc price rises and falls, with oil prices reaching a high of USD 144 per barrel in 2008. In the first half of this period, these shocks were amplified in Morocco by a weakening of the exchange rate (which has remained at around 8.5 DH to the dollar since 2007). In 2013 a system of partial indexation was reintroduced on petroleum products. In the electricity sector, the price of fuels supplied to the national energy and water utility (the *Office nationale de l'électricité et de l'eau*, or ONEE) was excluded from indexation system, so subsidies remained unreformed in this sector. Butane gas was also excluded from the system.

In January 2014 the *Cour des Comptes* published a review of the Moroccan subsidy system and made a series of proposals for reform (Cour des Comptes, 2014). On January 16, 2014, the government removed subsidies (which are defined by the Finance Law) to gasoline and industrial fuels and reduced subsidies to diesel according to a predefined timeline. These reforms had some impact on the overall subsidy level but left many of the most significant subsidies in place, including most of the diesel subsidies, subsidies to butane and petroleum products to ONEE. In 2014 the total allocation was 41.65 billion DH[15] of which 36.65 billion (USD 3.843 billion) was allocated to petroleum products. The historical costs of subsidies are shown in Table 3.1 below.

[13] IMF's post-tax estimates include external costs, notably from GHG emissions.
[14] As of mid-2011, 1 Moroccan Dirham (DH) was equal to 0.1009 US dollars.
[15] As of February 17, 2015 1 Moroccan Dirham (DH) was equal to 0.105 US dollars.

Table 3.1. Subsidy costs by product (in million DH)

Year	Petroleum products	Sugar	Flour	Total
2009	7,417	2,649	2,175	12,241
2010	24,282	3,263	2,467	30,012
2011	43,499	4,998	3,366	51,863
2012	48,237	5,027	3,000	56,264
2013	38,800	3,600	2,000	44,400
2014	36,650	3,000	2,000	41,650

Source: Cour des Comptes, 2014.

The electricity sector is primarily affected by subsidies on the petroleum products that ONEE uses as fuels. In 2013 the fuel provided to ONEE was subsidized by around 5.1 billion DH, representing around 13 per cent of the total subsidy cost. The cost of subsidies for fuel to ONEE was estimated to be 154 per cent of the sale price,[16] highlighting the gap between international prices and the prices paid by ONEE's generators. In addition, as a publicly owned company, losses incurred by ONEE will eventually have to be covered by public funds: ONEE is reported to have made losses every year since 2008 due to regulated tariffs below cost-recovery levels. To address this, a price rise of 5 per cent on retail tariffs was reported in January 2014 and a rise of 2.9 per cent to 6.1 per cent was announced in July 2014. These rises do not apply to those consuming less than 100 kWh per month (Laaboudi, 2014; Bladi.net, 2014). The goal of these increased was to improve the financial situation of ONEE. In addition, a number of direct payments are reported to have been made to ONEE since 2009, including a grant for "recapitalization of the Office" in 2012 of 1 billion DH (Lahbabi, 2014). ONEE use two types of petroleum-derived fuel for the operation of its power stations. These are classified as "normal" fuel and "special" fuel. Both of these are classified under "petroleum products" in Table 3.2. There are no subsidies for coal or other fuels. Special fuel was introduced to the system of subsidies in 2009.

The increasing fuel subsidies to ONEE have been driven both by world prices and by increase in demand for electricity. This demand led to a program of investment, starting in 2006, which has placed pressure on the finances of ONEE: this pressure has subsequently been used to justify further subsidies. The evolution of subsidies to fuel for ONEE is shown in Table 3.2.

Table 3.2. Consumption and subsidies to ONEE fuel

Label	Product	2008	2009	2010	2011	2012	2013
Consumption in thousand tonnes	Normal fuel ONEE	578	887	1,096	1,052	1,041	1,017
	Special Fuel ONEE	-	67	186	592	581	303
Subsidies in million DH	Normal fuel ONEE	1,127	986	2,331	3,643	4,313	3,650
	Special Fuel ONEE	0	131	526	2,676	2,883	1,500
Total Subsidies ONEE		1,127	1,117	2,857	6,319	7,196	5,150

Source: Cour des Comptes, 2014.

3.1.3 Emission Reductions From the Policy or Reform

According to an analysis published by the Ministry of Energy, Mines, and Water and the Environment, total national emissions were estimated to be 75.04 million tonnes CO_2e in 2004 (Ministry of Energy, Mines, and Water and the Environment, 2014). The energy sector is estimated to be responsible for 52 per cent of the total.

[16] That is, ONEE was paying around 40 per cent of the free market price.

The Global Subsidies Initiative-Integrated Fiscal (GSI–IF) Model for Morocco[17] found that if all fossil fuel subsidies were removed:

- The impact on CO_2e emissions would be a reduction of approximately 1.6 per cent in energy-related emissions in 2020.
    - This result is only illustrative and is driven by the elasticities derived from econometric relationships derived from historical data specific to Morocco, and from the share of the fuel price which is made up by subsidies (which is relatively low in Morocco). Of note also is that fuel prices in GSI–IF follow 10-year historical trends (see Box 3.1): current (2015) fuel prices are considerably lower, with many commentators expecting them to remain this way for years to come: lower fuel prices would imply lower subsidies and therefore lower reductions on GHG emissions.
- Furthermore, if 20 per cent of the savings from subsidy reform were reinvested in energy-efficiency programs and 10 per cent in renewable energy projects, CO_2e emissions in 2020 would fall by a further 1 per cent and 0.5 per cent respectively.
- A range of 1.6–3.08 per cent reduction would be expected (Merrill, Bassi, Bridle, Christensen, 2015).
- Compared to 2020, projected energy-related emissions of 74.82 $MtCO_2e$; this would represent 1.2–2.3 $MtCO_2e$ of savings.

Box 3.1. Major Assumptions in the GSI-IF Model, source (Merrill, et al., 2015)

- Exogenous inputs:
    - The future growth of GDP, currently based on the IMF World Economic Outlook.
    - The future growth of population, currently based on the UN World Population Prospects database (medium variant).
    - Future energy prices, currently assumed to follow their 10-year historical trends concerning fossil fuels (coal, petroleum and natural gas); biofuels and waste energy price is assumed to remain constant in real terms; and the electricity generation cost is assumed to be directly influenced by the price of the energy sources used to generate electricity.
    - Baseline energy efficiency, currently projected to improve by 1.5 per cent every year.
- Final energy consumption is estimated considering (1) indicated demand (including the effect of GDP, population and energy efficiency); (2) the price effect; and (3) the substitution effect. Items (1) and (2) are used to estimate *demand for energy services*.
- The potential for fuel substitution is represented by the ratio of an energy price over the national weighted average energy price. This implies that an energy source will become more attractive if its price increases less than others when subsidies are removed.
- It is assumed that price effects require a 1-year delay to influence energy consumption (noting that this has no impact on the 2020 results produced by the model).

3.1.4 Political Economy and Stakeholder Analysis

The following section considers the impact of subsidies to fossil fuels for electricity generation and their reform on a number of key stakeholders, and their positions on reform.

Government

From the perspective of the government, reforms are driven by the need to reduce the cost to the public budget while protecting vulnerable groups from increasing prices. In the electricity sector, the need to improve the financial stability of ONEE is also a serious consideration. In January 2014 Mohamed El Ouafa, the minister of General Affairs and Governance expressed these sentiments, announcing increases in electricity tariffs but

[17] The key assumptions underpinning the model are given in Box 3.1. Further details and references supporting assumptions (for example on what a 1-year delay in the impact of price changes was assumed) are available on request from IISD-GSI.

indicating that they would not affect those consuming less than 100 kWh per month while noting that ONEE suffered from serious problems (Laaboudi, 2014).

The government has a clear interest in reforming subsidies, yet its ability to realize this objective is contingent on popular support. Prime Minister Abdelilah Benkirane has been reported to have embarked on a comprehensive communications plan to convince the public of the need for reform. Nizar Baraka, Morocco's minister of General Affairs and Governance was quoted as saying "The prime minister explained it to the people, continuously" (Daragahi, 2015).

Within government, different ministries may have competing and contradictory objectives. In the context of energy pricing, Morocco has attempted to address this by forming an Inter-ministerial Commission including the following Ministries:

- Ministry of Governance and General Affairs (MAGG)
- Ministry of Energy, Mines, Water and Environment
- Ministry of Interior
- Ministry of the Economy and Finance
- Ministry of Agriculture and Fishing
- Ministry of Industry
- Planning Authority (*Haut-Commissariat au Plan*, or HCP).

Electricity Sector Companies

The electricity system in Morocco is structured around a publicly owned company, the ONEE. The company operates hydropower, wind and thermal power plants. In addition, there are three Independent Power Producers (IPPs): Jorf Lasfar Energy Company, operating a coal plant; Energie Electricque de Tahaddart, operating a combined cycle plant; and Compagnie Éolienne du Détroit, operating a wind park. Fuel subsidies are provided to ONEE, but the other generators are not reported to receive subsidies on their fuel. This means that other generators would find it difficult to compete with ONEE's generation cost, but it also means that further development of IPP capacity will not add directly to the cost of fuel subsidies.

As stated above, the unsustainable cost of subsidies between 2009 and 2012 created pressure for reform. This is a clear driver for the government and for organizations with an interest in the financial sustainability of the electricity sector, including the IPPs and developers of energy projects.

As a public company dependent on government policy, the fortunes of the ONEE are intrinsically linked to the debate on electricity sector subsidies. ONEE receives a subsidized rate for the fuel used in its power stations and receives grants for specific programs of investment (Lahbabi, 2014). Operational losses made by ONEE will either lead to the degradation of the service as operations and maintenance expenditure is reduced or will need to be covered by other sources (including direct payments from the government). Subsidies to consumers in the form of regulated prices for electricity act to prevent ONEE from recovering its costs. Unsurprisingly, further reforms leading to increases in electricity tariffs resulting in more revenue for ONEE would likely be strongly supported but increases in the prices charged to ONEE generators for fuels would almost certainly be resisted.

Morocco has stated its objective of increasing competition in the electricity sector through the development of IPPs and attracting foreign investment in the sector. These actors will eventually be in competition with existing ONEE generators. Currently, ONEE generators enjoy a preferential position due to its subsidized fuel costs. Other generators would likely support a levelling of the playing field through the extension of subsidies to all generators or the removal of subsidies to ONEE.

Potential electricity sector investors and developers desire the best possible terms to maximize their returns. This is likely to extend to efforts to negotiate additional subsidies in the form of measures that reduce project risk, such as sovereign guarantees and the provision of permits, land and infrastructure at below-market rates. Companies

engaged in contracts with ONEE have an interest in the overall stability of the sector, and, in the long term, unsustainable levels of subsidy and persistent losses will eventually erode that stability.

Businesses

The major business sectors may have competing interests. Energy-intensive industries generally have the greatest interest in maintaining low prices. Industries that are struggling to maintain global competitiveness may also feel particular pressure to lower operating costs. The largest sectors in the Moroccan economy are:

1. Food and Agriculture
2. Chemicals
3. Textile and Leather
4. Mechanics and Metallurgy
5. Electricity and Electronics

Source: Royaume du Maroc, 2013.

Different electricity tariffs are applicable for different types of users. As of the data available from mid-2014, tariffs charged to business users are believed to be below the levels for ONEE's cost recovery. Businesses have a direct interest in keeping down their operational costs and therefore can be expected to oppose price increases—including the removal of subsidies. The influence of various business groups on the political process is relative to the strategic importance of the industry to the national economy, the number of direct and indirect jobs it supports and the financial resource available for engaging with the political process.

Electricity Consumers and Civil Society

In the short run and without compensation, the main direct losers from the reform are electricity users who consume more than 100 kWh per month. The minister of General Affairs and Governance in July 2014 is reported to have explained that out of the total of 7.5 million households, 2.7 million would see increases in prices ranging from 2.9 per cent to 6.1 per cent, which would raise 14 billion DH (Bladi.net, 2014). The minister stated that the reason for the increase was to address a deficit of 45 billion DH in the accounts of ONEE.

A 2014 estimate published by the World Bank projected that only around 15 per cent of the total subsidies in Morocco, not just those for electricity, benefited the poorest quintile of society (Verme et al., 2014). One source (Alaoui, 2015) reported that the President of the Competition Council Abdelali Benamour estimated that 80 per cent of subsidies were collected by the richest 20 per cent of households.

However, since popular support is contingent on perception rather than reality, the media plays an important role in shaping public opinion. A survey of online media sources indicates that politicians are attempting to make the case for reform and presenting a number of clear messages. A number of illustrative quotes are presented below:

- "Rate increases of these necessities will be gradual and will not affect the socially disadvantaged, whose consumption does not exceed 100 kWh per month." – Mohamed El Ouafa, ministre chargé des Affaires générales et de la Gouvernance[18]
- "The system is not efficient for supporting the living standards of the poorest." – Nizar Baraka, ministre de l'Economie[19]
- "The government has undertaken for the first time an accurate targeting of the most needy" – Mohamed El Ouafa, ministre chargé des Affaires générales et de la Gouvernance[20]
- Q: The Compensation Fund, which subsidizes food commodities and energy, it will be reformed by the government this year?

  A: Yes. We have no choice! – Nizar Baraka, ministre de l'Economie[21]

[18] http://www.bladi.net/electricite-eau-cheres-maroc.html
[19] http://www.usinenouvelle.com/article/reforme-des-subventions-aux-carburants-au-maroc-les-bons-conseils-du-fmi.N199258
[20] http://www.aujourdhui.ma/maroc/economie/onee-fini-le-fuel-subventionne-110310#.VNlZsULvaX_
[21] http://www.usinenouvelle.com/article/un-cadre-macroeconomique-plus-stable-au-maroc-en-2013-promet-nizar-baraka.N192085

3.1.5 The Potential Role of Crediting

Economists generally agree that subsidies are costly, create wasteful consumption and distort energy markets. However, protection for vulnerable groups, the need to maintain political stability and the lobbying of special interests can place insurmountable barriers to reform. The modelling work undertaken by IISD in 2015 (Merrill, et al., 2015) indicates that fossil fuel subsidy reform would lead to a reduction in emissions compared to a business-as-usual scenario. Crediting these reductions and allowing the credits to be sold on international markets could create an incentive to reform, but there are some challenges and pitfalls to consider when envisaging how such a system might work in practice. Based on IISD's figures quoted above, emissions reductions from the reform of all fossil fuel subsidies (i.e., those supplied to electricity generators and all other consumers of fossil fuels) could amount to 1.63 per cent to 3.08 per cent of Morocco's emissions in 2020. The value of these reductions at an assumed market value of USD 10/tCO_2e is of the order of USD 20 million.[22] In the context of subsidies costs reaching several billion dollars, it is unlikely that revenues from carbon credits would materially affect the economic case for reform. However, the political context for reform could be improved if revenues from carbon credits were channelled into mitigation measures for groups adversely affected by reform, or spent on public goods with high political impact. Key implementation issues include determining a baseline against which the emissions reduction can be estimated; verifying and monitoring reductions; ensuring transparency and trust in the system; and establishing whether the reforms are more ambitious than business-as-usual (i.e., are additional) and therefore deserve credits. To ensure that crediting rewards genuine emissions reductions, there must be a transparent and robust MRV process. Morocco does not have a domestic emissions trading system or equivalent mechanism with the associated processes and institutions to implement MRV of emissions reductions; in any case, policy-based crediting is a more difficult proposition (see discussion in Section 2.2.3). The duration of the crediting period is also an important factor; once subsidies have been removed, how long is it reasonable for these reductions to receive credits? More research is needed to establish a suitable timescale for crediting and to establish an agreed methodology that can estimate reductions and provide confidence in the system.

Subsidy reform is already high on the agenda in Morocco. Beyond fossil fuel subsidies to electricity generators, Morocco has included butane (LPG) replacement by solar water pumps within its INDC as a subsidy reform measure.[23] It is actively exploring other subsidy reforms within the context of its INDC and energy policy more generally. Increased mitigation impact can therefore be framed as increasing the speed of reform or, although this may not be amenable to policy crediting, to redirecting fiscal savings into actions which themselves increase GHG emission reductions. Regarding electricity, the need to strengthen the finances of ONEE is a priority and, given also the government's target to expand renewable electricity, savings could be used to bolster investment in renewable energy through a variety of mechanisms—from direct investments (grants) to credits (for example along the lines of the CDM) to feed-in tariffs and policy interventions. A key issue is whether the amount of money available from crediting—which could be on the order of USD 20 million per year depending on which subsidies are reformed and the value of credits—would lead to sufficiently large incremental investment in new renewable generation to have political value. This seems unlikely, but would depend to some extent on what weight the political process could put onto the increased renewable electricity generation.

Of high relevance to crediting is that Morocco is the world's second-highest recipient of climate finance and that there are many funds in Morocco—there may not be any space for more funds (i.e., there is already sufficient external support).

In conclusion, there is an opportunity to realize emission reductions by reforming fossil fuel subsidies in Morocco. The potential revenues from crediting such reductions are unlikely to change the overall economic case for reform. However, it is possible that a policy crediting could be designed and undertaken to increase mitigation, based on the crediting at the policy margin approach (i.e., crediting of complementary mitigation actions, net of energy subsidies reform). The MRV of emissions reductions are a particular challenge for Morocco, one which would need to be addressed for crediting to work. The development of the institutional capacity to monitor and verify

[22] Based on total projected GHG emissions for Morocco of 75.84 million tonnes CO_2e in 2020 and an assumed market value of USD 10 per tonne.

[23] See Morocco's INDC submission available at http://www4.unfccc.int/submissions/INDC/Published%20Documents/Morocco/1/Morocco%20INDC%20submitted%20to%20UNFCCC%20-%205%20june%202015.pdf. IISD supported Morocco in the development of its INDC.

emissions—along with the establishment of methodologies to quantify emissions reductions and certify—will be necessary for the development of carbon crediting in Morocco. Such technical assistance and capacity building may give Moroccan policy-makers the confidence to increase ambition by enacting a new policy or by widening its scope (for example by including more sectors or activities).

3.2 INDONESIA – ENERGY SUBSIDY REFORM

3.2.1 Context

Indonesia was the world's largest exporter of coal by weight in 2012 and the fourth-largest exporter of liquid natural gas (LNG) in 2013. Indonesia's declining oil production and rising domestic demand resulted in higher levels of petroleum imports and resulted in the country's exit from OPEC in 2009 (EIA, 2014).

Table 3.3. Indonesia Production & Consumption of Fossil Fuels (2012)

	Oil (thousand barrels per day)	Natural gas (billion cubic feet)	Coal (million short tonnes)	Total Primary Energy (quadrillion Btu)
Production	942	2559	488	16.28
Consumption	1635	1328	66	6.42
Net Import (-) / Export (+)	-693	1230	421	

Source: EIA (n.d.; accessed May 2013)

Indonesia's energy subsidies represent a significant fiscal burden. The graph below presents the total fuel subsidy expenditure and as percentage of GDP in Indonesia over the years (Lontoh, Clarke , & Beaton, 2014).

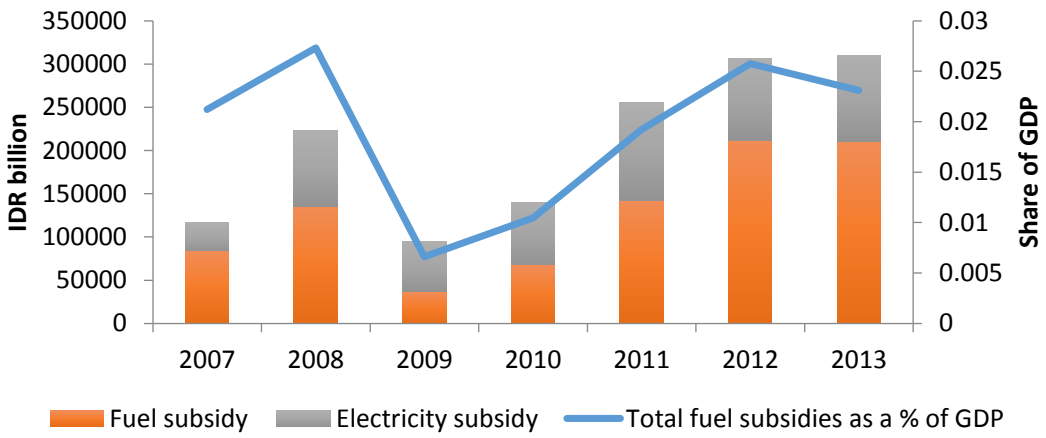


Figure 3.2. Total Fuel Subsidy Expenditure in Absolute Spending (IDR Billion) and as share of GDP

In fiscal year 2013, the Indonesian government allocated IDR 199.9 trillion (USD 18 billion) of the government budget to petroleum product subsidies and IDR 100.0 trillion (USD 9 billion) to electricity subsidies. This amounted to a total of IDR 299.8 trillion (USD 27 billion) of government spending on energy subsidies in 2013, equal to around 2.5 per cent of GDP and 25 per cent of total government expenditure (Lontoh et al., 2014). However, Indonesia is moving toward the reduction of fuel subsidies through price increases associated with social protection measures.

3.2.2 Subsidy Reforms

President Joko Widodo, elected in 2014, clearly signalled his ambition to reform some of Indonesia's largest and most inefficient fossil fuel subsidies, and in November 2014 introduced a significant price increase for gasoline and diesel. However, with falling world oil prices, the prices of gasoline and diesel were reduced in January 2015. The recent reform measures undertaken by the Indonesian government are (Lontoh & Beaton, 2015):

- **Gasoline & diesel:** The removal of subsidies on gasoline, which is to be sold at market prices (although distribution costs outside central Indonesia remain subsidized) and introduction of a "fixed" subsidy on diesel. Diesel will be sold at IDR 1,000 below the market price.
- **Electricity tariffs:** Subsidy reforms are ongoing. For selected user categories tariffs were increased at various stages in 2014 and in January 2015.
- **Kerosene & LPG:** Subsidies remain unchanged for kerosene and 3-kg-cylinder LPG, while state-owned energy company Pertamina has established a schedule to increase prices of 12-kg-cylinder LPG to market levels (which may now have been achieved through falling prices).

The near future will see two tests for authorities. First, oil price rebound: can they maintain rational and equitable cost-reflective energy pricing, or at least maintain the smaller price differentials that have recently been created, once world crude prices begin to rise again? Second, reallocation: can they show that subsidy savings can be better used to promote the well-being of Indonesians and their development? The latest figures in the proposal for the Revised State Budget shows an anticipated decline in fuel subsidy expenditure of IDR 194.2 trillion (USD 15.5 billion) for 2015 (Lontoh & Beaton, 2015). A detailed synthesis has yet to emerge on exactly how the government will propose to reallocate the savings from subsidy expenditure. Latest reports indicate plans to inject IDR 67.86 trillion (USD 5.4 billion) into state-owned enterprises for infrastructure (Lontoh & Beaton, 2015).

The new Indonesian government is setting a *National Development Mid-Term Plan* (RPJMN) 2015–2019 to serve as the country's development agenda for the next five years. The plan identifies Indonesia's need to expand its domestic electricity generation capacity by some 35,000 MW, but this raises concerns over the possible social and environmental consequences of reallocating subsidy savings to support this plan, as future expansion plans involve a large increase in coal-based electricity generation. Indonesia also has ambitious targets about GHG emission reductions and renewable energy development.

3.2.3 Emission Reductions From the Policy or Reform

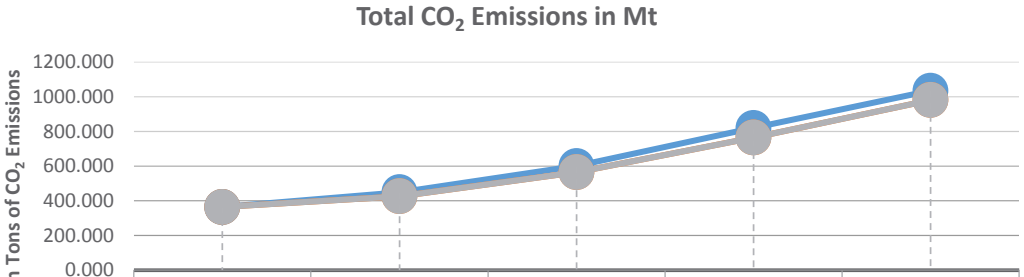
In a recent study managed by the Global Subsidies Initiative for ADB on "Assessment and Implications of Rationalizing and Phasing out Fossil Fuel Subsidies" (ADB, forthcoming), impact analysis of reforms across the entire economy was conducted using the MARKAL (Market Allocation) linear programming model. MARKAL models were used to project impacts on energy supply and assess the impact of subsidy[24] removal. Two reform scenarios were considered.

- Linear Subsidy Removal (LIN): A gradual removal of the subsidies over seven years starting 2015.
- Sudden Subsidy Removal – Big Bang Scenario (BB): A complete removal of the subsidies in 2015.

Using an Indonesia model, MARKAL projected that the impact of fossil fuel subsidy removal on CO_2 emissions would be noticeable, reaching a 5 per cent to 7 per cent reduction between 2015 and 2030 (see Figure 3.4; based on a 2010 starting date). There was relatively small difference between the two scenarios from the model, which is largely because the majority of subsidies would be removed by 2020 under both scenarios and because of model operation—real-world impacts may be more nuanced. The reductions are significantly larger than those projected for Morocco in Chapter 3.1, explained simply by the relative size of Indonesian subsidies (as a share of fuel price) being significantly higher than those in Morocco. This result is very much in line with other estimates:

[24] Subsidy inventory for Indonesia included largely consumer subsidies for petroleum, coal and natural gas. Also, the producer subsidy for electricity was quantified. Total quantified subsidies in Indonesia were USD 36,210 million in 2012 (ADB, 2015 (forthcoming).

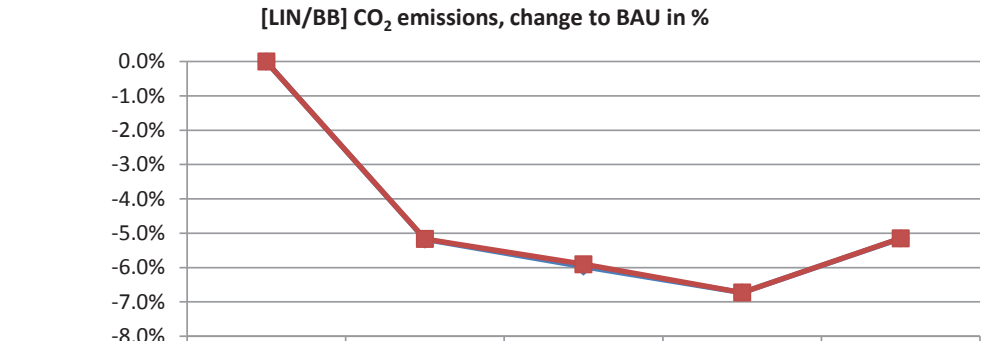
- ADB, (forthcoming): reduction of 5 per cent to 7 per cent in national CO_2 emissions in 2015–2030 (2010 starting date).
- Merrill, L. et al (2015): reduction of 6.97 per cent in national CO_2 emissions in 2020 (2013 starting date).
    - Reduction of a further 3.66 per cent in national CO_2 emissions in 2020 (2013 starting date) if 10 per cent of savings were reallocated to energy-efficiency investments.
- Yusuf (2010) projected that reforming fuel and electricity subsidies in Indonesia would lead to GHG reductions in national CO_2 emissions of 5.79 per cent and 0.92 per cent, respectively in 2020 (from a 2005 baseline).



	2010	2015	2020	2025	2030
BAU	364.706	449.846	600.567	819.788	1034.510
LIN	364.705	426.552	564.699	764.614	981.229
BB	364.705	426.593	565.119	764.624	981.250

Figure 3.3. Projected GHG emissions in Indonesia and impact of energy subsidy reform

Source: Adapted from analysis conducted in ADB (forthcoming).



	2010	2015	2020	2025	2030
{LIN} - {BAU}	0.0%	-5.2%	-6.0%	-6.7%	-5.2%
{BB} - {BAU}	0.0%	-5.2%	-5.9%	-6.7%	-5.1%

Figure 3.4. Projected impact on greenhouse gas emission, Indonesia (% Change relative to baseline)

Source: Adapted from analysis conducted in ADB (forthcoming).

3.2.4 Political Economy and Stakeholder Analysis

Political Economy Narrative

Indonesia has subsidized fuel since the country's independence in 1949 (Beaton & Lontoh, 2010). Efforts have been taken over the years to reform fuel subsidies, but government has historically set and adjusted domestic fuel and electricity prices in an ad hoc way, generally determined by fiscal pressures. The table below provides detail of the drivers and barriers for subsidy reform at present in Indonesia.

Table 3.4. Current Drivers of subsidy reform in Indonesia

Drivers	Description
Political	
Strong leadership under Joko Widodo	Elected in 2014, clearly signalled his ambition to reform some of Indonesia's largest and most inefficient fossil fuel subsidies.
Participation in several international forums and cooperation with other governments	Indonesia is a member of the G-20 and APEC, both of which committed to reform fossil fuel subsidies in 2009. Indonesia is also actively involved in many climate change forums, opening opportunities for conceptual support and multilateral cooperation to support its national climate change project.
Economic	
Fiscal incentives	Reduce subsidy expenditure and maintain fiscal deficit under 3 per cent and also reduce slowdown in economic growth.
Prevent "Crowding out" of developmental expenditure	Investing subsidy savings into infrastructure that promotes economic growth and social assistance policies that can be used to counteract increases in the costs of living.
Declining oil reserves	Declining production, growing energy demands necessitated imports and with escalating oil prices since the mid-2000s, led to extreme budgetary pressure.
Energy crisis	Low electrification rate, about 73 per cent in 2012.
Weakening exchange rate	To combat import bills and subsidy expenditure increase due to weakening of Indonesia's exchange rate.
Technological	
Develop alternative transport fuels	To develop more efficient alternatives like gas-based transport fuels CNG and LGV in the Java–Bali region.
Cultural	
Growing awareness	Despite low awareness about the facts behind fossil fuel subsidies (see "Barriers" below), communication efforts by government and others have shifted the attitudes of some from opposing to supporting subsidy reform.

Sources: Authors' analysis, drawing on Lontoh, et al., 2014; Lontoh & Beaton, 2014; Lontoh & Beaton, 2015; Pradiptyo, Wirotomo, Adisasmita, & Permana, 2015; EIA, 2014.

Table 3.5. Barriers to subsidy reform in Indonesia

Barriers	Description
Political	
Lack of consistent messaging from key government ministries	Government has not been very successful in convincing the public of the need for fuel subsidy (gasoline, diesel etc.) reform, and informing how reform will be carried out.
Populist measures	People do not favour high energy prices, and opposition parties use this to their advantage and prevent any price increase to happen.
Weak coalition	The ruling coalition in Indonesia is currently in a minority position, making it difficult to pass controversial legislation. There may be significant divisions between its members or even within parties.
Economic	
Resistance from interest groups	Groups like the coal sector and investors in coal power plant projects are likely to oppose reform, as their profits may be squeezed by limiting their exports, and they may have to supply the domestic market at low prices.
Prevent shocks to the economy	Avoid adverse impact on inflation, exchange rate etc. from rising fuel prices.
Technological	
Poor Infrastructure	Indonesia does not have good transport infrastructure and the country has not been able to attract huge investment funding for development and growth.

Barriers	Description
Cultural	
Lack of outreach and consultation	Lack of government outreach and consultation on subsidy reform led to erosion of public support.
Belief that consumers have a right to cheap fuel	Sense that, as an historical producer of fossil fuels, citizens should share in this wealth through access to low-cost fuel.
Reforms orientation	People are apprehensive about liberalized economic policies. This is reflected at the Constitutional level: Article 33 states that "sectors of production which are important for the country and affect the life of the people shall be under the powers of the State" and "the land, the waters and the natural resources within shall be under the powers of the State and shall be used to the greatest benefit of the people". These clauses have been brought to the Constitutional Court in Indonesia to oppose policies that involve the introduction of competitive markets.
Nationalism	Strong nationalism in Indonesia creates skepticism about anything that would increase the role of foreign companies and their involvement in Indonesia's development and growth, e.g. in the downstream oil sector.
Lack of awareness	Lack of popular understanding about the true cost of fuel production and generation of electricity.

Sources: Authors' analysis, drawing on Lontoh et al., 2014; Pradiptyo, Wirotomo, Adisasmita, & Permana, 2015.

Stakeholder Mapping

There are several stakeholders that favor fossil fuel subsidy reforms and others concerned about the reform process. The table below details out the various stakeholders including government, political groupings, policy-makers, industry, consumers etc. and their position on fossil fuel subsidy reforms.

Table 3.6. Stakeholders in subsidy reform in Indonesia

Stakeholder	Description	Position on policy or reform
Government		
President	President does not require parliamentary approval in order to increase fuel prices. However, controls do exist over the how any savings related to fuel subsidy reform can be reallocated.	President Joko Widodo is very supportive of fossil fuel subsidy reforms and has already initiated fuel pricing reforms for gasoline, diesel etc.
Parliament	Plays a significant role in determining the viability of fuel price increase. Fuel prices are determined along with national budget, which is reviewed and debated by parliament. If President decides to raise prices, Parliament must still sign off on any plans to reallocate savings if above a certain level of budgetary detail.	Supports fuel subsidy reforms.
Ministry of Finance • Fiscal Policy Office • Directorate-General for the budget	Prepares annual state budget on behalf of government, including the amount set aside for energy subsidies.	Long supported fuel subsidy reforms and has played a combined coordinating role and technical role in government plans. It also plays a key role in allocating funds to compensation measures.
Coordinating Ministry for Economy	Its main role is to bring together proposals for fuel subsidy reform and present these to the cabinet.	Supports reforms by providing help in deciding trade-offs of fuel subsidy reforms.
Ministry of Energy & Mineral Resources • DG of Oil & Natural Gas	Submits technical suggestions for subsidy reduction and has led task forces on communications about subsidy reform.	Provides support to reforms especially in the oil and gas sector.
Dewan Energi Nasional (National Energy Council)	Focus is on the macro level, nationwide policy.	Not closely involved in detailed planning for specific price reforms, but it can contribute toward medium- to longer-term strategy on pricing.

Stakeholder	Description	Position on policy or reform
Bappenas	Assess options for providing public services as compensation for fuel subsidy reform, such as health, education and food, as well as playing a role in proposing infrastructural spending. Also evaluated cash transfers for the very poor and micro-credit for the "near poor."	Carried out programs to ensure low-income earners are protected from fuel price increases.
BPH Migas	Play a significant role in policies that attempt to reduce fuel demand and thereby reduce subsidy spending.	Implemented reforms to reduce oil product subsidies.
TNP2K	An inter-ministerial body tasked with coordinating social welfare policy across different Ministries in Indonesia.	Developed the compensation measures used to complement fuel subsidy reforms in July 2013 and November 2014.
Ministry of Communication & Information Technology	Plays an important role in the government's communications related to subsidy reform policies.	Support reforms by expanding community access to information.
Political Groupings		
The Ruling Coalition (The Great Indonesia Coalition) – allied parties with Jokowi (PDI-P, Nasdem, PKB, Hanura)	The ruling coalition in Indonesia is currently in a minority position, making it difficult to pass controversial legislation. There may be significant divisions between its members or even within parties.	Support removal of fossil fuel subsidy gradually.
The Balancing position – Democrats (PD)	The party of ex-President Yudhoyono has to date declared it will play a "neutral" or "balancing" position.	Support for better targeting of subsidies.
All Others – Red & White Coalition (Gerindra, Golkar, PKS, PAN)	The opposition in Indonesia holds majority over parliament though there may be significant divisions between its members.	The fuel subsidy is a fiscal instrument to help the people, but it needs to be improved in order to accomplish its goal. Government should totally restructure the fuel subsidy system.
Business		
Military establishment	Military is subtly blended among Indonesian business players and political actors, and as such different individuals within the military are more likely to be aligned with the interests of these other actors.	Does not appear to have any shared opinion on the issue of energy subsidies.
State-owned energy companies • Pertamina • Perusahaan	Pertamina holds a dominant position as a seller of transport fuels in Indonesia. Perusahaan is the largest natural gas transportation and distribution company in Indonesia.	Pertamina has made numerous statements in support of fuel price increases, but has done little to open up downstream oil market to competition, despite this becoming legally possible in Oil and Gas Law 2001.
Oil & gas traders	Business interests in sustaining subsidies.	Push hard against policy change.
Consumers & Civil Society		
Student groups	Typically lead protests against fuel price increases.	In recent years the opposition from students has been reduced, due to growing awareness about fuel subsidy issues.
NGOs	NGOs working in areas of public policy, research and academic institutions, and grassroots community groups.	Depending on their political alignment, NGOs can be placed anywhere on a spectrum from support to opposition to reform.
Universities and academic research institutes	Work on issues related to mining, energy, energy security, sustainable development, environmental issues etc.	Have a long-standing position in support of reform.
Others		
International Organizations – World Bank, ADB, IMF, GIZ, USAID etc.	Played a significant role in funding and supporting technical preparation behind price increases.	Support fuel subsidy reform.

Sources: Authors' analysis, drawing on Braithwaite, et al., 2012; Lontoh & Beaton, 2014.

GHG emission reductions from full consumer subsidy reform (fossil fuels and electricity) were estimated in Section 3.3.3 to be from 5 per cent to 7 per cent. Some other benefits are shown in Table 3.7; the more widespread benefits of subsidy reform were shown in the Morocco case study in Section 3.1.3: there is general agreement, notably among economists, that subsidies are costly, create wasteful consumption and distort energy markets.

Table 3.7. Benefits of reform

Drivers	Description of the benefit	Quantitative estimate of the benefit
Fiscal Incentive	Reduction in subsidy burden in 2015 due to removal of subsidy on gasoline and fixed subsidy on diesel (Indonesian State Budget).	IDR 195 trillion (USD 15.5 billion)
Prevent 'Crowding out' of developmental expenditure	Increase in the proposed budget for infrastructure in 2015 (Sambijantoro, 2015). The link here is fiscal space: subsidy reform has liberated large amounts, which can then be spent on other priorities.	IDR 100 trillion (USD 7.2 billion)
Fiscal Incentive	Complete removal of all fossil fuel subsidies in 2012 (22 per cent price increase in prices for all petroleum fuels, 9 per cent increase for electricity) (ADB, forthcoming).	GDP impacts dependent on reallocation, between -2.7 per cent and +1.0 per cent in short term, -0.09 per cent and +0.27 per cent in long term. [Long term always positive, short-term impacts depend on how savings are reallocated].

Sources: Lontoh & Beaton, 2015; Sambijantoro, 2015; ADB, forthcoming.

3.2.5 The Potential Role of Crediting in Reform

In most countries, including Indonesia, the reform of consumer subsidies for fossil fuels is a policy change that governments have a strong incentive to pursue regardless of its environmental merits: reducing fiscal liabilities; freeing up expenditure for other priorities; and improving the efficiency of social welfare systems. Of the two major risks to governments from consumer subsidy reform, social impacts can be addressed with a portion of the subsidy savings—it is very difficult to imagine that political risks could be swayed by international finance in any significant manner.

There is a growing mistrust in Indonesia of international actors dealing with domestic Indonesian issues, and reform arrangements with liberalizing markets are one of the most sensitive areas. It is clearly possible that any externally funded crediting could therefore be construed negatively; at the minimum, concerns would need to be explored in details with national policy-makers prior to any external attempt to influence policy. Within this context, and noting that the scale of credits would be small relative to the fiscal savings from subsidy reform, it is difficult to imagine that external purchasers of credits could have any influence on how Indonesia chose to recycle revenue from subsidy reform. Nevertheless, from the conceptual perspective, it is possible that a policy crediting operation could be designed and undertaken to increase mitigation, based on the crediting at the policy margin approach (i.e., crediting of complementary mitigation actions, net of energy subsidies reform).

3.3 MEXICO – CARBON TAX

Mexico is the first Non-Annex I country to have introduced a carbon tax. However, the level and coverage of the tax were weakened considerably in the legislative process. This case study asks whether policy crediting could help to increase tax levels and/or coverage.

3.3.1 Context

It should be stressed that the carbon tax in Mexico did not come about as "stand-alone" climate policy, but was embedded in a broader fiscal reform package. In September 2013, President Enrique Peña Nieto submitted to the Mexican Congress a bill aligned with Mexico's National Development Plan 2013–2018, in particular with two of its five comprehensive goals for the six-year term of the current Administration: "An Inclusive Mexico" and "A Prosperous Mexico." These goals aim to promote the protection of the citizens' social rights and foster sustained

productivity growth. According to the executive branch of government, one of the main goals of the fiscal reform was to promote growth and stability to strengthen the financial capacity of Mexico. Based on this premise, the Federal Revenue Law mandated that the Special Tax on Production and Services Law (LIEPS, for its initials in Spanish) expand the base of existing taxes and incorporate new ones (Presidencia de la República, 2014). Among the new taxes was the creation of the carbon tax on fossil fuel use. In October 2013, Congress approved the fiscal reform package proposed by the President. This approach, which aimed to increase tax revenues, ensured that some carbon tax would see the light of the day but did not prevent changes in its design. The carbon tax came into effect in January 2014 and applies to fossil fuel sales and imports by manufacturers, producers and importers. True to its aim, no recycling of revenue is done.

3.3.2 The Carbon Tax Policy

The carbon tax underwent several changes from its initial design before it was approved in order to counter criticism regarding its potential impacts on industrial competitiveness. Initially, the tax was to be levied on the carbon content of all fossil fuels—including natural gas—with a uniform implicit carbon price of MXN 70.68/tCO_2 (USD 5.7/tCO_2). IPCC default values were used to determine the carbon content of fuels, thus defining the specific tax rates of the fossil fuels covered under the tax (Mario Molina Center [MMC] 2013). The initially proposed tax level was a weighted average price of carbon credits in different international markets between October 2012 and June 2013. Given the low price of some fuels, the tax as initially proposed would have increased the price of certain fuels by as much as 20 per cent. If the long-term price elasticity were 0.4, fuel demand and related greenhouse gas emissions would have fallen by 8 per cent.

Parliamentarians feared that such a steep increase in fuel prices could adversely affect the competitiveness of national producers and in turn cause prices for other goods and services to increase (Rodríguez, 2013). Therefore, congress limited the tax to 3 per cent of the fuel sales price—which led essentially to a massive reduction of the tax on coal products. Congress also decided that rather than taxing the full carbon content of each fuel, only additional emissions generated relative to a natural gas baseline were subject to the tax. Natural gas is thus exempted from the tax, and a new rate was set at MXN 39.8/tCO_2 (USD 3.21/tCO_2) (Torres, 2014). New estimates for each fossil fuel are shown in Table 3.8. These changes led to a reduction of expected revenues from the original estimates by 28 per cent to MXN 14,641 million (USD 974 million) (Robles, 2013).

The reform also included a compensation mechanism in which taxpayers may use carbon credits (Certified Emissions Reductions, CERs) from Mexico-based Clean Development Mechanism projects at a value equivalent to the market price of the credits at the time of paying the tax. The Ministry of Finance (SHCP, for its initials in Spanish) has not yet reached a consensus with interested groups on how to proceed with carbon offsets. A regulation on this matter specifying the use of CERs is still pending to be published (World Bank, 2014).

The carbon tax aims to promote the use of low-carbon fuels. As natural gas is not subject to the tax, this could encourage fuel switching from high-carbon fossil fuels such as oil or coal, and likewise reduce local air pollution. This tax contributes to achieve Mexican environmental commitments content in the General Law on Climate Change and Mexico's Climate Change National Strategy Vision 10-20-40, whose goal is reducing GHG emissions below business-as-usual by 30 per cent by 2020 and 50 per cent by 2050. The strategy also requires that 35 per cent of the electricity generated in the country will come from renewable energy sources by 2024. (SEMARNAT) The carbon tax and participation in the carbon markets are key economic mechanisms considered in both the implementation of a low-emission development strategy for the country in order to boost the conversion to clean energy and Mexico's Special Climate Change Program 2014-2018 (PECC, for its initials in Spanish).

Table 3.8. Fossil fuels and the carbon tax (MXN$)

Fossil Fuel	General Formula	Carbon Content in Mexico*	Tax		
			Initial proposal	Final Proposal (LIEPS)	Difference (%)
Natural Gas	CH_4	0.526 kgC/m^3	11.94 c/m3	0	
Propane	C_3H_8	0.458 kgC/m^3	10.50 c/1	5.91 c/1	43.7
Butane	C_4H_{10}	0.458 kgC/m^3	12.86 c/1	7.76 c/1	39.7
Gas (regular and premium	Mix_{prom} C_8H_{18}	0.619 kgC/m^3	16.21 c/1	10.38 c/1	36.0
Jet fuel	Mix_{alta} C_8H_{18}	0.690 kgC/m^3	16.21 c/1	10.38 c/1	36.0
Turbosine and other kerosene	Mix_{baja} $C_{12}H_{26}$	0.710 kgC/m^3	18.71 c/1	12.40 c/1	33.7
Diesel	$C_{12}H_{26}$ - $C_{12}H_{26}$	0.722 kgC/m^3	19.17 c/1	12.59 c/1	34.3
Fuel oil (heavy and regular 15)	$C_{30}Hm$ - $C_{70}H_m$	0.813 kgC/m^3	20.74 c/1	13.45 c/1	35.1
Oil coke	$>C_{70}H_m$	0.900 kcC/m^3	189.85 $/ton	15.60 $/ton	91.8
Mineral carbon	$C_{137}H_{97}$ - $C_{240}H_{90}$	0.825 kgC/m^3	178.33 $/ton	27.56 $/ton	84.6

**Based on chemical analysis from PEMEX fuels*

Source: Ministry of Environment (SEMARNAT), n.d.

3.3.3 Emission Reductions From the Policy or Reform

The Mario Molina Center (MMC), an independent think tank, developed the carbon tax proposal for the Ministry of Finance. They developed GHG emission factors and criteria pollutants by type of fuel per unit of volume and mass. MMC reviewed national and international sources to review ranges of typical carbon content in fuels sold in Mexico, such as natural gas, LP gas, diesel, fuel oil coal and coke, and proposed to use oxidation fractions recommended by the IPCC (MMC, 2013).

According to estimates by SEMARNAT (2014) the weakening of the tax compared to the original proposal led to a fall in estimated mitigation from 5.8 million t CO_2 if the original proposals had been enacted to 1.6 million t CO_2 as enacted.[25]

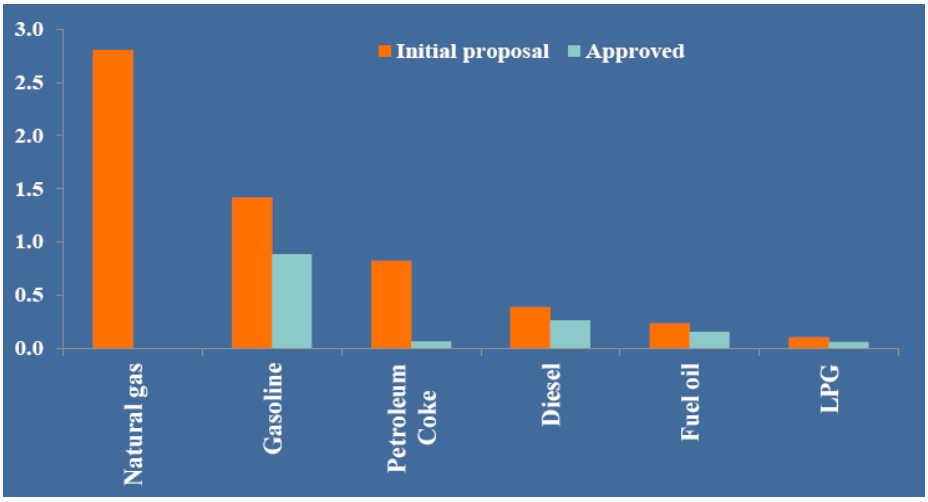


Figure 3.5. Expected mitigation from Mexican carbon tax (million t CO_2 p.a.)

Source: SEMARNAT, 2014.

[25] For a detailed assessment see Belausteguigoitia, 2014.

3.3.4 Political Economy and Stakeholder Analysis

In 2012, Mexico elected a new Administration, creating the momentum to introduce significant structural changes. The Ministry of Finance analyzed the current tax system and considered restructuring it. It asked different ministries to provide proposals to implement new taxes. At the beginning, the Ministry of the Environment (SEMARNAT, for its initials in Spanish) played a key role since it provided different options to be considered for the implementation of green taxes. Two initiatives were accepted, one of which was the carbon tax from fossil fuel use. The most significant factors that allowed implementation of the carbon tax are shown in the following table.

Table 3.9. Drivers of reform in the Mexico Carbon tax

Drivers	Description
Political	
New Administration	The change in political party in the presidential election in 2012 gave the opportunity to enact structural reforms in the country.
Undeveloped environmental fiscal policy	Mexico's environmental fiscal policy analysis was not comprehensive, and the idea of establishing an economic instrument was in a very early stage a few years ago.
Economic	
Increase tax collection	The main objective of the reform was to increase the collection of taxes as part of government strategies and close loopholes and exceptions (Wilson & Valenzuela, 2014).
Shift preferences underway	It is expected that the current carbon tax will not have a significant impact in the short term but it will increase gradually. The first increment has been published in the Official Gazette of the Federation on January 2015.
Environmental	
Align fiscal reform and environmental goals	The carbon tax aligns with Mexico's Climate Change National Strategy to cut emissions by 30 per cent by 2020 and 50 per cent by 2050 and is one of the economic mechanisms considered in the implementation of a low-emission development strategy for the country.
Environmental issues incorporated into the national policy	Mexico lags behind other OECD members related to implemented green taxes (Centro de Estudios de las Finanzas Públicas [CEFP], 2015).
Technological	
Develop alternative sources of energy	The carbon tax aims to promote the use of cleaner fuels. It is expected that the adoption of clean energy technologies will be promoted also by the implementation of the energy reform that can help to overcome barriers.
Cultural	
Public awareness	The implementation of a green tax is the first step to raise awareness among population on the consumption of fossil fuels. The carbon tax is passed on to final consumers; however, with the current tax rate a significant change in consumer behaviour is not expected.

After receiving the green tax proposals from SEMARNAT, the Ministry of Finance selected the most politically feasible options that were technically easy to collect. However, there were still some barriers for the carbon tax implementation as shown in Table 3.10.

Table 3.10. Barriers to reform in the Mexico carbon tax

Barriers	Description
Political	
Contrary to political pledges	The President had in his election campaign pledged to cut the cost of electricity. (Alire & Barrera, 2013) A carbon tax would likely increase the cost of electricity and gasoline. The recently implemented energy reform aims to reduce electricity costs.
Economic	
Compromise companies' competitiveness	Mexico is one of the few developing countries that has implemented a carbon tax. Companies criticized that their commercial competitiveness was at stake since other countries could produce at lower cost (Morales, 2014).
Environmental	
Tax rate insufficient for shift to alternative sources of energy	Producers of clean energy consider that the tax rate is not sufficiently high to discourage the use of fossil fuels and promote a shift to alternative sources.
Unclear benefits from the tax	Mexico does not have legislation that allows assigning the collected taxes to a specific purpose. Citizens will have to pay more but it is not clear how the collected money will contribute to advancing climate change mitigation.
Cultural	
Consumer price sensitivity	Increase in fossil fuel costs will be passed on final consumers.
Lack of awareness	The word "tax" is generally not well received. In addition, Mexico subsidizes the cost of energy, so consumers are not used to paying responsibly for fuel purchase and use.

The following table shows the stakeholder analysis including the key governmental and private sector stakeholders' interests and actions in the implementation of the carbon tax.

Table 3.11. Stakeholders in the Mexico carbon tax

Stakeholder	Description	Position on policy or reform
Government		
President	President submitted the fiscal reform to the Congress for approval.	Supports the carbon tax included in the fiscal reform as part of his new Administration structural changes.
Lower House and Senate	Modified original bill, including changes in tax rate, revenues and addition of optional paying with CERs.	Supports the carbon tax, but weakened its design taking into account concerns of powerful stakeholders.
Ministry of Finance	Analyzed tax scheme and called for proposals from different ministries to include new taxes.	Supports the fiscal reform strategy that broadens the tax base, including the new carbon tax on fossil fuels use.
Ministry of Environment	Played a key role at the beginning proposing different options for implementing green taxes.	Provides support to implement green taxes and encourage the shift to cleaner fuels.
State-owned companies		
• PEMEX (Petróleos Mexicanos) • CFE (Comisión Federal de Electricidad)	Biggest consumers of fossil fuels. PEMEX leads the strategic management of Mexico's hydrocarbon industry. CFE generates, transmits and distributes electricity across Mexico. About 70 per cent of electricity generation is produced from fossil fuels. (Center for Energy Economics [CEE], 2013)	Does not appear to have a defined position on the carbon tax since tax rate has been passed on to the final consumers (e.g., current gasoline prices include the carbon tax).
Private sector		
Industrial Sector	Key concern is loss of competitiveness. Mexican industry pays more for electricity than their Asian and U.S. competitors. (CNN 2013)	Does not support the original carbon tax.
CESPEDES - CCE	Mexico's main business lobby. It is the Mexican Chapter of the WBCSD and part of the CCE (Mexican Business Coordinating Council).	Does not support the original carbon tax. Made several statements highlighting that carbon tax was designed mainly to collect taxes not to improve environmental conditions. They also remarked that subsidies on gasoline are still greater than carbon tax.

Stakeholder	Description	Position on policy or reform
Consumers & Civil Society		
General population	Carbon Tax applied only to *manufacturers, producers and importers of fossil fuels*: consumers are not directly impacted by the tax. However, fossil fuel-intensive sectors will pass tax on to the end users increasing prices of goods and services.	The fiscal reform brought consumers' attention mainly to changes that affected directly their welfare. Carbon tax was perceived to have an indirect impact.

3.3.5 The Potential role of Crediting

At the current tax level, the expected mitigation level of 1.6 million t CO_2 would not generate substantial crediting revenues. Assuming a credit price of USD 5, this would generate approximately USD 8 million, which is quite insignificant compared to the expected revenues from the tax itself. For example, for 2014, the expected carbon tax revenue was MXN 14,641 million (USD 974 million) (DOF, 2014). These numbers show that crediting at a price of USD 5 would generate little revenue and would clearly not allow to fully compensate all—or even many selected—stakeholders for their perceived losses from a high carbon tax.

However, crediting could play an indirect role in supporting the carbon tax, both in its implementation as well as its future ambition. As stated previously, the expected tax revenue was MXN 14,641 million (USD 974 million) in 2014; however, according to the Ministry of Finance, actual carbon tax collection in 2014 was MXN 9,196 million (USD 612.6 million)—approximately USD 360 million lower than expected (SHCP, 2014).

One of the factors that led to the weakening of the ambition of the carbon tax was the decision to exclude natural gas. Had natural gas been included, the tax would have covered 40 per cent of Mexico's greenhouse gas emissions. There is a possibility that natural gas could be included in future amendments to the tax policy which would further increase mitigation (World Bank, 2014). However, given that natural gas currently fuels about half of Mexico's electricity generation, future inclusion under the fossil fuel tax could be both politically and socially contentious.

Policy crediting could also play a role. For example, it could be used for social safety net programs that directly compensate those who would be most affected by electricity price hikes. On the other hand, it could attempt to encourage the development of non-fossil fuel-based electricity generation and thereby also limit the impact of the tax on end user prices in the long term. This could be through supporting RE directly (e.g., through loans or feed-in tariff premiums) or could also be indirect support (e.g., capacity building for Mexico's ongoing efforts at electricity sector reform to facilitate market entry for renewable players or foster more competitive pricing). Another way to achieve coverage of natural gas would be to introduce a full offsetting program for taxpayers from natural gas, where for example one CER is accepted in lieu of paying tax for 1 t CO_2. This program would not lead to tax burdens and would at the same time provide incentives for mitigation. Alternatively, policy crediting could be designed based on the tax-exemption threshold, following the principle of crediting at the policy margin. More specifically, it is possible to credit emission reductions as a result of tax-exempt installations reaching a performance benchmark or overachievement relative to the benchmark.

It is interesting to consider how the conditions that international crediting sources could ask for may act as a lever for increased ambition. Three possibilities are put forward:

1. In a note to Parliament, the Mexican President stated that part of the goal of the tax, aside from fiscal reform, is to reduce the use of fossil fuels and raise awareness of CO_2 emissions. This reasoning has led to criticism of Mexico's ongoing subsidization of fossil fuels: the simultaneous subsidization and taxing of fuels sends a mixed and inefficient signal. International crediting could bring the debate on subsidy removal further into the spotlight if it demanded that crediting was conditional on Mexico reforming its fossil fuel subsidies to at least some extent.

2. Credits would be generated against GHG emission reductions, which are not fully consistent with the tax rates applied to individual fuels (for example the rate charged on coal is considerably lower than its relative carbon content compared to other fuels). If the Mexican government wished to maximize external crediting revenues, it would be incentivized to make its relative tax rates on fuels move toward their relative carbon content.
3. Introduction of a new tax, based on energy or any other basis, is a policy change that governments normally have a very hard time achieving regardless of the environmental or social merits of the revenues. Introduction of the tax may be facilitated if crediting matched tax revenues and visibly led to social improvements. Again, it is clear that the acceptability as well as the GHG impacts of the tax introduction will depend upon how revenues are allocated. International purchasers could attempt to stipulate where some or all of their purchased revenues should be used, for example within energy-efficiency or renewable energy programs.

3.4 BEIJING – EMISSIONS TRADING SYSTEMS (ETSs)

3.4.1 Context

The Chinese government is currently running several local-level emissions trading systems (ETSs) as pilots in advance of the planned creation of a national ETS. These pilot ETSs are all slightly different, but are expected to have a significant influence over the design of the national system. We have thus decided to focus on a single pilot as a case study. We have decided to select the Beijing carbon market as a case study for this project for the following reasons:

- The market is relatively high-profile compared to many of its peers (such as the Guangdong and Hubei carbon markets), so that more information is available in the media and published reports.
- The Beijing market, alongside the Shanghai and Shenzhen markets, is one of the longer running pilots, and it is anticipated by the World Bank (2014) that the Beijing market experience will have a significant influence over the design of the national scheme.
- The Beijing market is performing relatively well, maintaining a strong carbon price, particularly against its peers such as the Shanghai market. As of Jan 2015, carbon prices in the Beijing market were double that of the Shanghai market. This creates a stronger signal for investment, and consequently the market may have had a more positive investment impact.
- Initial scanning of available literature suggests a greater degree of research has been focused on the Beijing and Shanghai markets than their peers.
- The Beijing ETS is generally considered to be more robust than the other pilots due to greater transparency and verification of emissions by third parties, as against self-certification.

Currently, the future nationwide ETS is still being designed, and therefore details of its design are limited and unconfirmed; it is thus difficult to assess exactly what form it will take or the potential role of crediting. The individual pilots, particularly Beijing, have therefore been considered in this case study. However, information regarding the national scheme has been taken into account when considering the prospect of crediting to encourage increased ETS mitigation impact later in this case study.

3.4.2 The Beijing ETS

In this case study we have examined the role crediting could play in incentivizing increased mitigation impact in the current ETS pilots and the national system, by drawing particularly on experience with the Beijing ETS. By crediting, we are referring to the possibility that additional emissions reductions beyond those planned as business-as-usual under the policy could be converted into credits that are sold internationally. The value of those credits would provide the incentive to increase the mitigation impact in the ETS and could be used to directly address the barriers to that increased mitigation impact. The crediting is thus at the level of the policy and not individual

projects falling under the policy. The revenues would therefore typically accrue to government and consideration is needed as to how they are then distributed (which could be to the regulated installations) to address the barriers to increased mitigation impact. These issues are discussed later in the case study.

The NDRC launched seven ETS pilot programs across China in 2013 following an official announcement of their development in 2011 as part of the National 12th Five-Year Plan (2011–2015). All carbon markets are currently open for business (Ecofys & World Bank, 2014).

On November 28, 2013, Beijing was the third Chinese pilot region, after Shenzhen and Shanghai, to start its ETS. The pilot covers about 40 per cent of the city's total GHG emissions, including both direct and indirect emissions from electricity providers, the heating sector, manufacturers and major public buildings (ICAP, 2015c).

Enterprises emitting more than 10,000 tonnes of CO_2 annually, both direct and indirect, are covered, and companies consuming more than 2,000 tonnes of standard coal annually in the municipal area have the option of participating voluntarily (Environomist, 2014). Sectors covered include iron and steel, cement, petrochemical, heating, power, facility and public building sectors. The final list of regulated companies is determined by an initial verification, which determines the allowances that will be allocated (Environomist, 2014). The baseline year for the Beijing ETS is 2009–2011.

The Beijing market will be managed by the Beijing Environmental Exchange, which provides the platform and facilities for the scheme. Beijing has implemented an approach for managing verification institutes, specifically a certification process for the institutes and their staff. These institutes provide third-party verification of participating companies' emissions. Emissions years are calendar years (the trading period for the Beijing ETS is three years, from 2013 until 2015), with companies reporting verified emissions by the 30th of April each year, and surrendering allowances in June (Environomist, 2014).

As the capital, Beijing has a high profile. It is envisaged by the World Bank that as a result, the design and lessons learned from the Beijing ETS could feed directly into the national scheme. The scheme itself, however, covers a reduced power sector as heavy industries relocated outside of the boundaries of the system in advance of the 2008 Olympic Games in order to improve air quality in the city. As such there is potentially less scope for significant emissions savings going forward (Hope, 2014).

Emissions trading is still a relatively new concept in China and until recently there has been relatively little experience of these schemes. During the initial set up of these schemes, many have struggled to get moving, with extremely limited trading and companies struggling to understand how the scheme works or comply with its requirements (Economist Intelligence Unit [EIU], 2013).

3.4.3 Emission Reductions From the Policy or Reform

The aim of the Beijing scheme is to achieve an 18 per cent reduction in carbon intensity compared to 2009–2011 (EIU, 2013). This is in line with the city's carbon intensity target, although no official statement on the absolute level of the cap has been found.[26] As such it is not directly comparable to the EU ETS and other schemes that seek to achieve absolute emissions reductions. Unlike other schemes in China where participants self-certify their emissions, the Beijing ETS does have a third-party verification system to increase its robustness. Over the course of the Beijing ETS's lifetime, it should therefore be possible to reliably establish its effectiveness in reducing emissions.

As of October 17, 2014, the Beijing market has traded a cumulative amount of 1,070,000 tonnes CO_2/RMB 42,540,000 through exchanges and 990,000 tonnes/RMB 59,620,000 RMB by agreement, since trading began (Wang, 2014).

The effectiveness of the scheme is hard to assess against its first year of operations. The Beijing Development and Reform Commission (DRC), however, has stated that carbon dioxide emissions from Beijing's major polluters

[26] PMR Technical note, A Survey of the MRV Systems for China's ETS Pilots, SinoCarbon, July 2014

fell 4.5 per cent in 2013 as the scheme cut compliance costs for firms (presumably as firms who could mitigate emissions cheaply were able to increase mitigation actions and sell their surplus to others whose mitigation costs were higher), with the average cost of cutting emissions falling by 2.5 per cent as a result of the platform. No firm figure in terms of how many tonnes of CO_2 were emitted or number of carbon permits issued were given, however ("Beijing says," 2014).

3.4.4 Political Economy and Stakeholder Analysis

China has been making strides in developing and implementing a range of climate change policy measures which, while not setting absolute emissions reduction targets, are seeking to make improvements in relative terms. These policies are closely aligned to overall energy-efficiency and economic development goals, following a central-planning, top-down "command and control" approach. Emissions trading systems are seen as a key tool in achieving this (Wang, Li, & Zhang, 2011).

Its experience with pilot ETSs in China has helped the government understand their feasibility, including for a nationwide ETS and some of its requirements, such as the verification of emissions data of enterprises and the need for capacity building activities at different levels (Wang, 2014).

Most ETS systems around the world have been created in mature market economies. China's market economy is still developing, however, with command and control policy structures and inclinations that do not necessarily fully align with market-based approaches. This economic backdrop, combined with a less mature market conditions in the country in general, thus creates some institutional barriers to the development of the ETS markets in China (Lo, 2013). These are outlined in more detail below, but include underdeveloped legislation necessary for effectively supporting the markets at present, weak basic statistics data required for the scheme's operation, limited market trading, a lack of professional staff and no available policies on tax and foreign exchange for ETS (Wang, 2014).

The main stakeholders for the ETS pilots are:

- The National Development and Reform Commission (NDRC) which has designed and overseen the implementation of the ETS pilots, and is overseeing the creation of the National ETS.
- The Reform Leading Office of the Party, which is supervising the implementation of the ETS.
- The State Council, which is responsible for drafting laws regarding the ETS.
- The People's Congress, which has been asked to start drafting responses to the ETS.
- Power and electricity industries.
- Large businesses and some smaller businesses.

There are also several business associations and networks that have started to form to provide support to participants in the different ETS pilots.

3.4.5 The Potential Role of Crediting

In this section we consider the issues related to using policy crediting to incentivize the increased mitigation impact of Chinese ETSs through the generation of revenues that are used to address barriers to that increased impact. We break the section down into three parts. First, we consider whether the Beijing ETS could have been more ambitious. Second, we consider whether the institutional and governance arrangements for the ETSs are likely to support the level of robustness required by international buyers of credits. Third, we consider the barriers to increased mitigation impacts in China and whether the revenues from crediting could be used to overcome these. Since China has ETSs (including Beijing, which is the focus of this case study) and commitments to implementing a national system, the focus here is on increasing mitigation impact rather than on introducing the policy.

Mitigation Impact Within the Beijing ETS

The level of mitigation impact in the pilot is in line with the 18 per cent intensity target for Beijing. An important question for this study is whether the target could have been more ambitious. The following are relevant:

- The system was intended as a pilot, and consequently its value extended far beyond the emissions reductions it achieved – testing systems and processes, capacity building and so on. Therefore there would have been lower political interest in adopting a tougher target, in response to international discussions around a crediting approach postulated in this report, since the pilots will deliver these other non-emissions benefits anyway.
- The target is in line with a separately established obligation for Beijing to achieve a carbon intensity improvement. Any increased mitigation impact would take it out of line with that framework and would be inconsistent with the approach adopted in other cities and provinces in China.
- The level of 18 per cent intensity improvement is not on its face unambitious. The city target would have been set on the basis of perceived abatement potential, although the rationale is not easily publicly accessible. Increased mitigation impact could result in much higher abatement costs, or—since the target is relatively short-term and more substantial abatement investment takes time—a shift in production away from Beijing.

These factors taken together suggest that an increase in mitigation impact for the pilot would have been very unlikely.

If increased mitigation impact were to be considered for Beijing, it is likely it would have been expressed or derived in relation to target carbon intensity improvements, and again for the 2013–2015 period, since that is the basis for the current targets. It would be speculation to suggest a specific figure, although given the short-term nature of the target period and the significance of the existing target in line with an 18 per cent intensity improvement, it seems unlikely that anything more than moderate single digit percentage intensity improvements over the current target could have been possible.

Host Country Perspective

In this section we consider the barriers to adoption of increased mitigation impacts in Beijing and China ETSs, and the extent to which crediting revenues could be used to overcome these barriers.

Cost of Increased Mitigation Impact

Increasing the mitigation impacts in Beijing would require additional investment in abatement that goes beyond that currently planned. The cost of that investment is not easy to quantify, as there is little information in the public domain on the costs of abatement in Beijing from a bottom-up technology cost curve perspective. The carbon market has suffered from poor liquidity, and at this early stage the prices of the limited trades do not necessarily give a strong indication of the cost of abatement. At the current level of mitigation impact the carbon price in Beijing has been up to 52RBM/tCO_2 (USD 8/tCO_2) (Commodities Now, 2014).

As described earlier in this report, the cost of increased mitigation impact will be the cost of undertaking the extra abatement. Since the credits will correspond to the level of increased mitigation impact the revenues from credits would be sufficient in principle to meet this cost if the unit price of credits is greater than the unit cost of the abatement necessary to meet the higher target. In order of magnitude terms, therefore, a substantial increase in mitigation impact above current levels is likely to require revenue from crediting significantly higher than ~USD 8/tCO_2.

As for how to overcome the cost barrier, the primary ETS cost mitigation measure is to allocate allowances for free. Most allowances have been issued for free in Beijing and the national-level Market Readiness Proposal (PMR, 2013c) identified strong political resistance from enterprises facing abatement costs, and thus the preference for free allocation over auctioning. In an increased mitigation impact scenario, therefore, the allocation of allowances for free would help overcome this barrier, at the expense of the revenues that would otherwise accrue to the treasury.

Province/City-Level Distributional Aspects

An important element of the structure of energy and climate change targets in China is the disaggregation of national mitigation impact to province- and city-level targets. By cascading down targets to the level of provinces and cities, China can achieve change across its large economy by placing obligations where there is greatest control while also, if desired, allowing for a differentiated approach recognizing the differing states of economic development across the country. As described in the MRP, China's approach to climate change mitigation involves control targets for provinces and cities. Its options for a future ETS include the division of national targets to province level with provinces having various degrees of autonomy as to how they are then applied to enterprises.

The role of provinces and cities in this way means that an increase in mitigation impact for ETS in Beijing would not necessarily be consistent with its contribution to the national objective, since it could extend the targeted savings beyond what is required by the national government. From the policy crediting approach the increased mitigation impact in Beijing should be additional overall, so no corresponding relaxation should apply elsewhere in China. Therefore, a tougher target adopted by Beijing would mean a tougher target for China as a whole, and there would need to be institutional arrangements to enact this increased mitigation impact at national level.

This is an inherently political issue, so it is far less clear (than, say, for enterprise compensation) whether the value of credits for increased mitigation impact could be sufficient to address this point about the implications for increased mitigation impact in Beijing on the national targets. There would be difficulties in that the revenues would accrue to the Beijing government, but action to address additionality nationally requires central government action.

The National Perspective

The above discussion considers the barriers to extended mitigation impact for the Beijing ETS. However, Beijing will become part of a national system, so it is important to also consider how crediting could work at the national level. An important barrier would be cost, and a mitigation measure would be free allocation for enterprises. As noted above, however, even with free allocation to the enterprises, they must still bear the costs of abatement, which could be significant.

As mentioned above, it has not been possible to form a view on abatement costs from a bottom-up technical perspective. However, there have been recent studies on the shadow price of carbon in China, employing panel data techniques for production-based approaches. For instance, it has been estimated that the increase in marginal abatement cost over 2005 levels to achieve a reduction in carbon intensity of 40 per cent–45 per cent would be 559–623 CHN/tCO_2 (Du, Hanley, & Wei, 2015). This equates to a cost of around USD 85/tCO_2. This is a lot higher than the price that could be provided by credits in the short- to medium-term (based on current traded carbon credits and allowances) and is not a particularly useful reference price for a discussion around pilot and nascent ETS markets.

3.5 CONCLUSIONS FROM THE CASE STUDIES

Table 3.13 summarizes the findings from the case studies, the main conclusions drawn being:

1. The need to *increase fiscal resources and/or to improve economic efficiency* was the principal reason for energy subsidy reform and an important driver for carbon taxation. For ETS, fiscal consideration is also important once allowances are auctioned. Encouraging the transition to a cleaner and greener economy was also part of the policy rationale in all cases.
2. There were *significant political economy concerns with the impacts of higher costs on both the population and parts of industry in all cases*. The Mexico case saw a major reduction in stringency from the initial proposals, and subsidy reform in Indonesia and Morocco is proceeding on a gradual basis across fuels and electricity.
3. Other than the Beijing ETS (which is a pilot scheme), the *potential fiscal gain—the reduced cost of subsidies (in Indonesia and Morocco) and the revenue raised from the carbon tax (in Mexico)—from the "base" policy is large*: USD 15.5 billion, USD 3.8 billion and about USD 1 billion respectively.

4. From the four case studies, *an official estimate of GHG reductions was found only for Mexico*, based on an ex ante assessment. Independent estimates—from IISD and academic institutions—have been referenced for the Morocco and Indonesia cases. No estimates were found for the Beijing ETS.
5. It may seem an obvious point, but *the GHG emission reductions realized are strongly dependent on what the fiscal resources are redirected to*. First order analysis undertaken for Morocco's energy subsidy reform by IISD using its GSI–IF model shows that if 20 per cent of savings were redirected into energy efficiency and a further 10 per cent into renewable energy, the GHG reductions could nearly double. Analysis using other techniques that included feedbacks within the domestic economy and to the world economy may yield further insights, for example around impact on inflation and other short-term shocks and concerns around strategic or vulnerable sectors of the economy.
6. Using the available estimates of GHG reductions and multiplying these by an indicative figure of USD 10/tCO_2 gives an indication of the potential value of carbon credits. The "carbon economics" for the three case studies where there are GHG reduction estimates are very revealing: *credits are less than 1 per cent (Morocco) and around 2.5 per cent (Mexico and Indonesia) of total fiscal gain of the policy*. The value of carbon credits assumed is a key assumption. Sensitivities to this value are shown in Table 3.12 below.

Table 3.12. "Carbon economics": Value of carbon credits as a share of fiscal gain from base policy implementation, from three case studies considered

Value of carbon credits ($/t$CO_2$)	Morocco Energy Subsidy Reform	Indonesia Energy Subsidy Reform	Mexico Carbon Tax
5	0.15-0.3%	1.7%	1.3%
10	0.3-0.6%	2.3%	2.6%
20	0.6-1.2%	4.6%	5.2%
40	1.2-2.4%	9.2%	10.4%

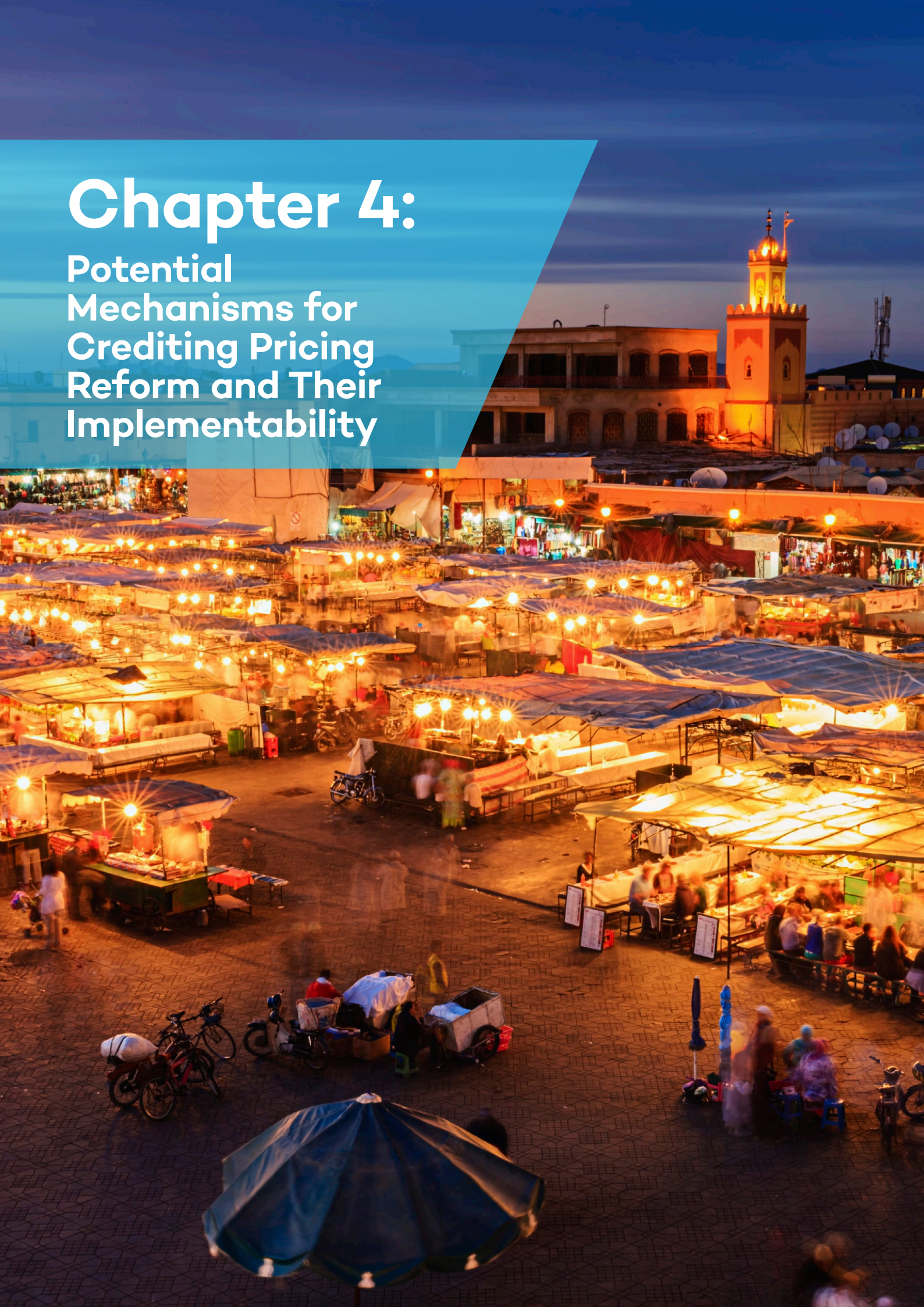
7. *The "carbon economics" ratios indicate that potential incremental revenue from policy crediting is very low compared to fiscal gain from implementing the "base" policy without any external crediting support— implying that the inclusion of policy crediting would unlikely be a critical factor of policy decision/implementation in the three cases studied*. One question this study posed was whether or not revenue from credits could be used to compensate key stakeholders adversely impacted by the policy. The analysis shows that such compensation could be sourced from the "base policy" fiscal gain, which would also avoid public resistance to foreign influence in some cases.
8. The analysis of the Indonesian case gave an example of what is considered a common issue across many countries: *it is not always straightforward to redirect ("hypothecate" or "earmark") fiscal savings into specific budgets or programs*; rather, savings will be returned to general government budgets and/or used to pay down government debt. Experience from subsidy reform in many countries (ADB, forthcoming) shows that alternative welfare systems are a key driver of energy subsidy reform, but that these systems and the resources they need tend to be developed in parallel with subsidy reform rather than through explicit links and fiscal redirection. Of note is also the possibility that access to external financial resources may not be key in all cases: Mexico and Morocco are already the world's leading receivers of climate finance, and some budget-holders in Indonesia struggle to spend their existing allocations.
9. The case studies support the view that *any pricing reform is always both part of a wider policy context, and will interact with other policies and goals*. The pricing reform policies considered aim to correct market failure to some extent. In the case of Mexico, some stakeholders and commentators raised a question as to how a carbon tax can be effectively implemented if subsidies to energy—in effect a negative carbon tax—are still in place.
10. One further issue brought up by the case studies concerns international influence. *There is growing nationalist sentiment in Indonesia, which would be likely to lead to resistance to policies believed to be funded or influenced from outside the country.* Conversely, it could also be argued that extra resources from outside a country could be construed positively.

Table 3.13. Summary of the Four Pricing Reform Case Studies

Case Study Country		Morocco	Indonesia	Mexico	Beijing (China)
Policy Type		Energy Subsidy Reform	Energy Subsidy Reform	Carbon Tax	ETS (Emissions Trading Scheme)
Case Study Overview		Ongoing reduction of subsidies to fossil fuels including for electricity generation and electricity consumption	Ongoing reduction of subsidies to fossil fuels including for electricity generation and electricity consumption	Carbon tax on fossil fuel sales and imports by manufacturers, producers and importers. No revenue recycling	One of several pilot schemes in China. Covers 40% of city's direct and indirect emissions
Drivers of Policy Implementation		Public finances; financial stability of public electricity utility (ONEE); increasing power generation competition	New administration in 2014; ongoing increase of net oil imports; public finances and fiscal deficit; other funding priorities including infrastructure development; need for major expansion of electricity generation capacity	New administration in 2013; strengthen the financial capacity of Mexico; support an Inclusive Mexico and a Prosperous Mexico; promote low-carbon fuels; raise awareness of global warming	Increased energy efficiency; support for economic development goals; testing of ETS to learn lessons nationally
Political Economy Issues		Concerns about price increases to poor households but recognition that the current system is inefficient at supporting them; industry concerns of price rises; mixed Ministerial positions	Consumers are used to low and fixed energy prices, from when Indonesia was a major oil exporter; increasing nationalist and populist sentiment; weak transport infrastructure; minority government and complex Administration; fuel distribution supports significant corruption	Longstanding culture of subsidized fuels and electricity to public and industry; Industry & Commerce against original proposals, which were strongly watered down	China is exploring a range of mechanisms such as ETS which are hoped will be more efficient than command-and-control. Pilots generate learning around implementation issues. Strong opposition from enterprises facing abatement costs
Policy Impacts	Revenue raised/ savings (USD)	USD 3.843 billion subsidies to petroleum products in 2014	USD 15.5 billion of energy subsidy expenditure projected for 2015	USD 974 million tax revenue per year projected, USD 612 m collected in 2014	No figures available
	GHG reductions ($MtCO_2$)	1.2-2.3 (2004 baseline, all energy subsidies removed)	35 in 2020 (all energy subsidies removed)	1.6	No clear absolute goal. 18% emission intensity reduction compared to 2009-11
	Estimation or Measurement of Impacts	GSI-IF model (ex ante)	IISD (using MARKAL); Yusuf et al. (2010)	Government (Semarnat, 2014)	Beijing DRC stated a reduction of 4.5% in GHG emissions in 2013
	Value of credits at USD 10/tCO_2 (USD)	USD12-23m	USD 350m	USD 16m	No figures available
	Value of credits as share of Revenue (%)	0.3-0.6%	2.3%	2.6% (of tax collected in 2014)	No figures available
Potential for Increased Policy Impact	Scale	Redirection of savings into GHG mitigation options leads to savings at high end of identified range	Redirection of savings into GHG mitigation options would lead to higher GHG reductions	Extension of the tax to natural gas would significantly increase scheme coverage and revenue. Not clear that crediting would have any material impact on increased scale	Little opportunity to increase the ambition of a pilot scheme. Some studies indicate abatement costs are relatively high in Beijing
	Possible mechanism(s)	MRV support; redirection of part of savings into GHG mitigation options	Redirection of part of savings into GHG mitigation options, e.g. revolving fund for investment in GHG mitigation, potentially through ESCOs. Investment in energy access	MRV support; mitigation for selected consumers; redirection of savings into energy efficiency and/or renewables	Support provision of free allowances to enterprises (allowing Beijing to collect more revenue from the ETS)
	Revenue raised/ savings (USD million m)	Redirection of savings into GHG mitigation options leads to savings at high end of identified range	Redirection of savings into GHG mitigation options would lead to higher GHG reductions	Difficult to propose that crediting would have a material impact on increasing ambition	Little opportunity to increase the ambition of a pilot scheme. Some studies indicate abatement costs are relatively high in Beijing
	GHG reductions ($MtCO_2$)				
	Value of credits at USD 10/tCO_2 (USD)				
Other Implementation Considerations		Morocco is the world's second highest recipient of Climate Finance and therefore could already be sufficient external support	Increasing national sentiment is leading to a higher level of distrust in international schemes and suggestions. Already a challenge for many budget holders to spend their existing budgets	Mexico continues to subsidise fossil fuels, which gives the opposite impact to the carbon tax. International donors may prioritise GHG reductions higher than Mexico	Need to improve capacity to implement and participate in the scheme. Potential credit buyers may have concerns around integrity of emissions reductions, system stability and longevity and wider sustainability impacts of reductions

Chapter 4:

Potential Mechanisms for Crediting Pricing Reform and Their Implementability



Chapter 4: Potential Mechanisms for Crediting Pricing Reform and Their Implementability

This section provides a conceptual discussion of the generic models for crediting in support of the implementation of the three pricing reform policies: ETS, carbon tax and fuel subsidy reform. It concludes by recommending which mechanisms could be taken forward, for example through further conversations with potential host country governments. The case studies have been supported by a wider analysis of the literature (academic, "grey"[27] and from experience of reforms of varying degrees of success).

4.1 KEY DESIGN AND IMPLEMENTATION ISSUES: BASELINES AND THE POLITICAL ECONOMY; THE PERSPECTIVE OF POTENTIAL CREDIT PURCHASERS

This section looks at two issues that are key to crediting design and which are common across the policies: baselines for crediting policies (Section 4.1.1); and the political economy of introducing mitigation policies at the national level (Section 4.1.2). Full analysis and discussion of these issues is included in Annex A and Annex B respectively. While not a focus of the study, the perspectives of potential credit purchasers are discussed in Section 4.1.3. Sections 4.2, 4.3 and 4.4 on the policy categories draw heavily on these analyses.

4.1.1 Baselines, Additionality and MRV

There are at present no agreed standards or international agreements that allow for the estimation of GHG emission reductions from policy.[28]

- For ETS—a quantity-based policy—this presents little issue: increased mitigation impact means a tightening of caps and, since MRV is a key component of ETS, cap stringency does not add extra MRV requirements compared to a less stringent "base policy" cap. Issues around carbon leakage from within the region covered by the ETS remain.
- As fiscal instruments, it is much more challenging to quantify GHG emission reductions from a *carbon tax or energy subsidy reform*. Ex ante, models are commonly used to estimate the impact of carbon taxes, and there are some examples of models having been used for energy subsidy reform. Estimating elasticities—notably price elasticity of demand—is key to models, with empirical work indicating that short-term elasticities are lower than longer-term ones (where there is more opportunity for investment in new technologies, alternatives, etc.). Ex post, there are some examples of empirical work available in the literature. The challenges in both cases are to both (i) set a baseline for the counterfactual where the policy is not implemented or is implemented without increased mitigation impact; and (ii) to then attribute any change to the increased mitigation impact as against other drivers of change (technological progress, changes in the economy, changes to prices and other economic variables, competitiveness with respect to other countries, etc.[29]). There is also likely to be a time lag in impact following a policy's introduction. It can certainly be concluded that whatever method is used for baseline and attribution will lead to uncertainties in the estimate of GHG emission reductions to at least some—and possibly to a high—extent. Experience has shown that setting baselines in practice often suffers from information asymmetry, where the sectors being regulated are more expert and hold more information than the regulating entity (typically a part of a government) and that governments tend, for this and other reasons, to set baselines for reductions on a

[27] From Wikipedia (https://en.wikipedia.org/wiki/Grey_literature): "*Grey literature (or gray literature) is a type of information or research output produced by organisations, outside of commercial or academic publishing and distribution channels. Common grey literature publication types include reports (annual, research, technical, project, etc.), working papers, government documents, and evaluations. Organisations that produce grey literature include government departments and agencies, civil society or non-governmental organisations, academic centres and departments, and private companies and consultants. Grey literature may be made available to the public, or distributed privately within an organisation or group, and often lacks systematic means of distribution and collection. The standard of quality, review and production can also vary considerably. Grey literature is therefore often difficult to discover, access, and evaluate.*"

[28] Noting that IISD's Global Subsidies Initiative is developing, and looking to gain support for, a relatively simple approach for energy subsidy reform using its "GSI-IF" model, and that the WRI and others have proposed protocols for various policies. But established baselines and methodologies for policies remain far behind what has been established for projects through the CDM, VCS, etc.

[29] Noting also that fiscal policies alter the costs and effectiveness of other GHG mitigation policies such as those covering energy efficiency and renewable energy. Here it is important not to double count emission impacts (and in some cases to therefore share reductions between fiscal and other policies). The "E+/E-" methodology within the UNFCCC was developed to update project baselines under the CDM in the case of policy changes and would be applicable for fiscal policy changes.

conservative basis (i.e., discounting some potential emission reductions for fear of setting baselines that would take account of business-as-usual improvements). Experience also shows that it is easier to estimate emission reductions from schemes that cover whole economies or sectors than from those which cover the economy (or sectors within it) only partially. A further complicating factor would be if a sector or activity is only partially covered by a fiscal instrument—there may be unequal incentives on different actors in the sector and leakage of actions between those actors covered by the instrument and those who are not. One simple approach is to leave questions regarding baselines and additionality to the purchaser of any credits. This would mean credits generated potentially being assessed on very different bases between schemes and jurisdictions, and the non-compatibility in credits generated would make their comparison and trade problematic outside a simple bilateral deal between a credit seller and a buyer who set the rules for purchase. More standardized approaches would also need to consider issues around the period within which credits should be recognized.[30]

The analysis presented concludes that understanding the GHG emission benefit from any given policy is uncertain, relying as it does on baseline, additionality, boundary, timing and other issues, including feedbacks in the national and international economies. Crediting of policies against their GHG emission reductions—including developing methodologies that are as simple and cost-effective as possible—remains a highly interesting and rapidly developing area. The development of INDCs—which may effectively be a collection of NAMAs in some developing countries—is one current and concrete application where estimates of benefits are required. The area will benefit from pilot schemes and from further study and debate. The team conducting this study has revised its views and insights continually throughout the study, and expects to continue to do so.

4.1.2 Political Economy

It is increasingly accepted that it is not simply the overall economic impact of energy subsidy reform (and other fiscal policy) that determines whether or not such policies are implemented. Rather, specific impacts on certain sectors of the economy, suppliers or parts of the population are key, notably when such sectors or parts hold or influence political power or are deemed "vulnerable" (or otherwise deserving of society's protection against adverse impacts).[31] Similar arguments can be applied to an ETS too, noting that its direct impacts are focused on industry and suppliers and therefore stokes fears over losses in competitiveness of certain economic sectors as well as another concern common to fiscal policies: concern around short-term economic shocks that could lead to changes in longer-term economic growth paths. For all pricing reform policies considered, the literature suggests that perception of the scale of impacts is generally higher than what would be expected (ex ante analysis) or was observed (ex post), and analysis indicates that the fiscal savings from policy reform is generally far higher than the costs of mitigating impacts to key sectors, suppliers or parts of the population.

The analysis of the case studies in Chapter 3 indicated that the value of carbon credits as a share of fiscal gain from base policy implementation would almost certainly be low. Using credits as a means to mitigate policy impacts to any more than a highly targeted group is therefore not possible, noting again that the level of fiscal savings from base policy implementation would already be sufficient to mitigate impacts if the host government wished to make such a transfer and had the means to hypothecate (including indirectly). This is a central part of the debate: could the additional income from credits overcome a barrier to policy implementation, and therefore demonstrate its additionality in terms of increased mitigation impact? Analysis from the case studies and beyond strongly indicates that there are barriers to policy implementation beyond demonstrating overall economic gain. Unsurprisingly—given that all policies considered cover pricing reform—it also identifies similar key stakeholder groups, noting that which of these are most important in any specific application will depend on the policy and country in question.[32]

[30] This study notes that fiscal policy often targets transformational change, which tends to be a long-term process and would therefore ideally require crediting over a long period. This presents challenges: methodologically, it is easier to establish causality for change over shorter time periods; in terms of policy additionality, it can be argued that fiscal policies will be brought in over the long term anyway, i.e. it is more a question of "when and how" than "if."

[31] Noting that the middle class is often a key political group, and policy implementation may require mitigation of impacts to them, even if equity considerations would not support such action.

[32] The study uses the concept of "menu of options for discussions with countries" to take account of the specificities of implementability: it is not considered possible to identify options, or a menu of options, that would be applicable generically across all cases.

4.1.3 Considerations of the External Credit Purchaser

Many of the criteria that could be applied for crediting of policies have been identified in historical discussions on policy crediting (see also Michaelowa, 2013) and their application on possible approaches for policy crediting. General criteria are shown in Box 4.1. We note that it is up to the purchaser to determine MRV, although they must take account of the system that they sell credits into if this is their plan. If they do not aim to sell into an international or otherwise standardized market, they could in theory have the freedom to "tie in" policies, offer political assistance, etc.

Box 4.1: **Criteria for assessing the appropriateness of crediting**

There is a knowledge base of criteria developed over many years and is generally accepted, but that may be interpreted differently by various stakeholders:

- **Environmental integrity:** The overarching criterion for crediting is the general environmental integrity of the emissions credits. Thus, emission reductions shall be real, measurable, and long-term. There shall not be double counting of reductions. The principle of measurability has led to the emergence of the concept of MRV, where verification is ideally done by independent third parties.
- **Appropriate baselines:** Baselines for crediting need to follow the principles of conservativeness, transparency, consistency and robustness. While standardized approaches initially were thought to generally fulfill these criteria, they have proven less convincing in practice.
- **Additionality:** Emissions reductions shall only be credited if they are additional to business-as-usual. The implementation of this eligibility principle has been challenging, especially under the CDM (see Michaelowa, 2009) but also in domestic offset systems.
- **Supporting up-scaled mitigation:** More recently, further criteria have been added in the context of the debate on new market mechanisms under the UNFCCC. These mechanisms should lead to a net decrease and/or avoidance of global GHG emissions, i.e., go beyond crediting. They should stimulate mitigation across broad segments of the economy and complement other means of support for NAMAs.
- **Governance and Accountability:** Approaches should be based on good governance and robust market functioning and regulation. Accountability can be guaranteed on the international or domestic /host country government level and strengthened through accreditation of auditors.

Box 4.2 highlights how these considerations are relevant to specific aspects of ETS design and implementation.

Box 4.2: **Consideration of Credit Purchasers – ETS**

- **Environmental integrity:** This relates to the robustness of the MRV system. It covered methodological aspects such as the extent of use of specific (rather than general) emission factors, de minimis rules, tiers approaches to uncertainty, use of an appropriate mix of measurement and calculation approaches. It also covers the incentives to comply and therefore the penalty system, regulatory oversight and the underpinning legal framework. Lastly is the extent of independence of the verification processes.
- **Appropriate baselines:** This is intimately linked to the quality of the ETS cap and concerns the scope of baseline data (applicability to ETS sectors, degree of coverage, number of baseline years, whether it was verified) and then the basis for the cap (such as the split of effort between ETS and non-ETS sectors, any use of business-as-usual modelling to determine ambition—and the assumptions underpinning that model).
- **Additionality:** For cap-and-trade this relates to the quality of the cap, since the whole installation/enterprise accounting method does not require a project-based justification for additionality. For project-based offset systems, then, considerations are the level of other policy support, degree of standardization (methods and data) and independence of additionality justifications.
- **Supporting up-scaled mitigation:** This relates to the scope of sectors covered. Cap-and-trade should scale actions across all covered sectors, but would more normally focus on industrial sectors.
- **Governance and accountability:** Related to the above point on environmental integrity, further considerations are oversight, access to and transparency of the domestic allowance market.

To the Beijing case study analysis (Section 3.4), we add the following analysis of credit buyers' perspectives.

Integrity of Emissions Reductions

A major challenge for the Chinese ETS pilots and the national system (when established) will be to ensure there is sufficient transparency and enforcement of the rules, including that emissions are verified and non-compliance is properly penalized. The majority of the ETS pilots, with the exception of Beijing, rely on self-verification of emissions, and penalties for non-compliance are very low. It has been commented by observers that emissions trading rules are not clearly articulated, information management and disclosure systems are somewhat weak, and there is the perception of some corruption among participants (ICAP, 2014). Fines are only applied on the first offence—currently the Beijing market applies a penalty of 3-5 times the average market price (Wang, 2014).

The MRV systems for the Chinese pilots as a whole are relatively weak, relying on self-verification of emissions by participating companies with only very limited inspection by environmental agencies (ICAP, 2014). Beijing is the exception, as a more sophisticated verification system has been implemented as part of the ETS, which involves third-party verification institutions to provide greater robustness (Environomist, 2014). All these factors would affect the integrity of any credits of remission reductions from increased policy mitigation impact.

Determining Crediting Quantities

The nature of target setting in the ETS is important in considering how an increase in policy mitigation impact could be credited. In an absolute emissions cap system, allowances (credits) exiting the system must be replaced by additional GHG savings to ensure that the target is met. Currently most pilots have an absolute cap, though Shenzhen has a carbon intensity-based cap, in line with China's 40–45 per cent carbon intensity reduction target by 2020. In this system, savings in intensity would need to be converted into absolute credits that would have meaning in an absolute cap system elsewhere, if they are to be traded. This could potentially be achieved in a number of ways, such as through multiplying a production value for the installation whose carbon intensity has improved, but it is complex.

System Stability/Longevity

Buyers of credits will want to know that the supply is reliable. This raises a few issues, specifically how long the policy crediting system will be in place (the pilots are inherently time-limited and will likely be replaced or subsumed into a national system) and whether investors can be confident that the system will be free from government interference. At present, there is no clarity over the duration of the pilots or subsequent ETS, which may make it difficult to create sufficient confidence for significant investment in energy saving/carbon reduction measures.

Sustainability

As with the issue of additionality, there have been historic concerns over the sustainability of some CDM projects in China (and elsewhere), in particular the sustainability of large hydro projects. Sustainability standards have been employed to try to address this. The sustainability of savings credited will be important to international buyers (governments and ETSs, as evidenced by restrictions applied to CERs under EU ETS) and may be of particular interest for credits generated from policy action in the electricity sector in China. It may therefore be important that in crediting additional mitigation impact under China ETS some consideration is given to wider sustainability impacts (Haya & Parekh, 2011).

4.2 ETS

4.2.1 Introduction

Crediting could be used to directly encourage mitigation impact regarding emissions trading by either incentivizing a country to adopt an ETS where there isn't already one in place, or encouraging a tightening of the cap in an ETS that is already in place. In both cases, the revenues received from the sale of credits accrued under the ETS would need to be sufficiently large to address the barriers to the ETS being introduced or to the cap being tightened.

We consider a third option, in which crediting revenues are used to strengthen the operation of an existing ETS and thereby help establish it as the vehicle for achieving increased future mitigation impact, without directly requiring an increase in the cap as a condition of these crediting revenues.

Finally we consider a direct, final option: that allowances are purchased from the ETS.

4.2.2 Baseline, Additionality and MRV

Where crediting is used to encourage the introduction of an ETS, it would normally be given to the difference between the baseline and the cap, unless the cap is higher than the baseline (in which case there would be over-allocation in the scheme). Figure 4.1 illustrates the basic design of this scheme, with a baseline set using CGE modelling (though other methods could be used). Where crediting was used to encourage the cap in an existing scheme to be tightened, the equivalent approach would be for credits to be given for the difference between the original cap and the proposed tighter cap. However, it is also worth noting that credits need not be given for the full difference (between the baseline and the cap, or between the original and new caps). The decision could be made that crediting will only be offered for part of that difference. This could be because it is politically appropriate to seek a level of domestic action beyond which savings can be credited.

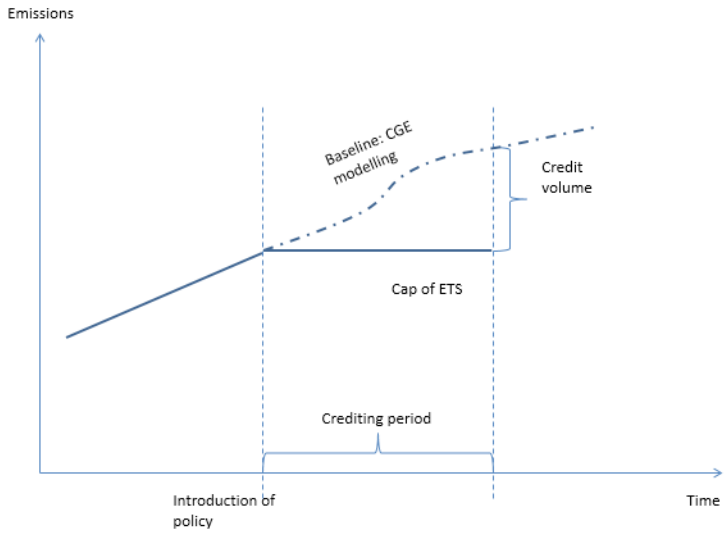


Figure 4.1. A typical option for crediting under an ETS (with baseline set in this case by CGE modelling)

By definition, an emissions trading system requires a robust MRV system, to ensure market confidence in the allowances that are being traded. It is expected that the MRV of GHG reductions from ETS crediting would build on the existing installation-based MRV and the additional costs should be marginal.

4.2.3 How Crediting Could Increase Policy Mitigation Impact

The table below sets out some common barriers to introducing an ETS or tightening an ETS cap and how these different barriers might potentially be addressed.

Table 4.1. Barriers to ETS introduction or tightening

Barrier	Design option
Industrial opposition against ETS due to potential damage to companies' competitiveness	Free allocation of allowances
	Redirect revenues to strengthen industries that would benefit from an ETS (e.g., renewable energy industries)
Price triggered by ETS unable to trigger long-term mitigation	Targeted subsidies of low-carbon technologies; investment plans from private sector to obtain financing support
	Revenues used to buy ETS credits, to be banked in a reserve or cancelled, and therefore can be used to stabilize price
High transaction costs of ETS	Financing of MRV; verifier paid by the govt.

We now consider how crediting might address the main barriers to the successful implementation of an ETS. The concept is that credits would be generated by a new ETS in relation to its results or increased mitigation impact. The effect that this has in overcoming barriers to implementing a new ETS or extending the mitigation impact of an existing one will depend on how the revenues from the sale of credits are used (assuming that the revenues accrue to the government). There are several possible approaches:

1. The revenues could simply be held by the national treasury, in which case there is no abatement incentive or effect on ETS design but instead just a fiscal benefit for the country.
2. They could be spent on abatement outside the ETS, and thereby leverage additional GHG savings. But again this would not directly address barriers to ETS implementation.
3. The revenues could be spent on overcoming the barriers to acceptance of the ETS—which means factors affecting the costs of participation, rather than the costs of abatement itself. There are many such barriers identified in the table above, including net cost impacts (effect of allowance costs on competitiveness) and transaction/administration costs (such as verifier costs).
4. The revenues could be spent supporting abatement within the ETS. In this respect there are two options:
    a. Support particular technologies to deliver a desired outcome in terms of the mix of abatement options that are employed to meet the cap. While this may have attractions—for example in encouraging renewables deployment—under a capped framework such interventions would increase the system cost of compliance. This increases the overall cost of abatement and delivers nothing additional.
    b. Address barriers to abatement investment that arise from limitations in the ETS, e.g., uncertainty over the long-term persistence of the system and the associated regulatory risks. Complementary measures could fund the development of nascent industries in clean technologies, underwrite long-term investment in capital-intensive infrastructure, and support the development of new technologies (and thereby bring down their costs). These options provider cheaper long-term abatement and thereby provide the potential for more ambitious long-term targets, as well as delivering wider socioeconomic benefits.

Option 1 is the least likely to be appropriate, as it is not likely that this use of revenues would be a sufficient spur to addressing resistance from stakeholders to introducing or tightening an ETS. The same problem applies to option 2, although at least here the revenues would be used for mitigation purposes, albeit outside the ETS. Approach 4(b) is likely to be of most benefit to countries thinking of adopting or tightening an ETS, since it directly addresses barriers to the achievement of abatement. This could involve supplementary approaches, such as funding grants to emerging technologies or government schemes to underwrite price guarantees for low-carbon abatement. Alternatively, it could fund measures within the ETS such as a price stability reserve/floor price. Option 3 can be important in overcoming barriers to the acceptance of an ETS through the distribution of revenues to mitigate participant costs.

Evidently the impact of crediting, and whether or not it is sufficient to tip the balance in favour of introducing an ETS (or tightening an existing cap), would depend on the revenues generated and how they were used. As above, our recommendation would be that the revenues generated be used in approach 4(b), to invest in addressing

barriers to investment in longer-term mitigation options in those sectors covered by the ETS. Obviously, greater mitigation impact from the introduction or tightening of an ETS will be offset by increased revenues, providing that there is a market for the credits generated (at least this is the case for option 4(b) above. Option 2 would be different, as industry within the ETS would be taking on more mitigation actions and consequent impact but the benefits of the crediting would accrue to industry outside of the ETS).

The value of credits could be important for specific emerging abatement technologies, perhaps as demonstration projects. There could be a leveraging effect, as the use of such projects would overcome barriers to their deployment.

Using revenues to support a price stabilization mechanism could be a viable option, as the value (cost) of that support would be small compared with the total value of allowances, and hence could be comparable with the price of credits.

In all cases, one difficulty is that revenues from crediting accrue only after successful introduction of policy, thus at least partial pre-financing needs to be provided. Another problem is that experience shows that in fact many ETS do not in effect have a substantial difference between the baseline and the cap. This is mainly due to information asymmetry and/or lobbying efforts and results in an over-allocation of credits. Such was the case in Kazakhstan's rollout of their cap-and-trade program in 2013; over-allocation of free allowances led to an oversupplied market and a resulting carbon price that left no incentive to spur abatement. This oversupply occurred even after witnessing the repercussions of similar over-allocation missteps in the EU ETS in 2005 and the Regional Greenhouse Gas Initiative (RGGI) in the Eastern United States in 2009, demonstrating that overcoming vested interests to achieve a proper ETS design continues to be a challenge.

A softer approach is to consider whether crediting revenues could be used to strengthen an existing ETS, thus laying the foundation for future tightening of the cap. In this way it is ultimately associated with increased mitigation impact, but in a less direct way than requiring a reduction in the cap. For example:

- Trading systems that would be candidates for crediting are currently very new or emerging, and will have their problems. This is the case, for example, with poor liquidity in Chinese ETS pilots. If the policy is to play an important role in delivering future savings then these problems must be overcome. Or put another way, assistance to overcome problems, funded by crediting revenues, can help the policy be used to achieve increased mitigation impact in future.
- In the early stages of ETS deployment, the scope will be limited to those sectors/enterprises/installations that are best placed to participate in a new market mechanism and achieve savings at lowest (abatement and administrative) cost. The policy can play a greater role with increased mitigation impact if the scope were to be expanded and the infrastructure associated with the trading system be improved in order to lower the administrative costs.

There is a great potential for such market strengthening to lead to more robust market measures that would achieve increased mitigation impact. Also—and importantly—support to strengthening new and emerging systems may be more politically achievable than a negotiation directly around increased mitigation impact. However, it is also important to note that rather than the crediting being linked to direct emissions reductions (from a tighter cap), the crediting would necessarily be linked to other actions such as those listed below. This may mean that issues around additionality become prominent, as it may be harder to definitively prove that the action would not have been taken without the crediting revenues. We identify the following examples of how crediting revenues could be used for policy strengthening and therefore potentially increased mitigation impact in the future:

- Address market failings. In cases where the market suffers from poor liquidity, crediting revenues could be used to support actions such as awareness raising, capacity building, increased system information disclosure or the facilitation of new market products.
- Address compliance performance. In cases where participants do not meet their compliance obligations (reporting and allowance surrender), crediting revenues could be used to support the development of laws, penalty regimes and oversight measures.

- Reduce administrative costs. Crediting revenues could be used to support the development of lower-cost electronic reporting systems, registries and standardization of those systems to help reduce costs to operators and lower barriers to the expansion of a scheme's scope to new sectors and facilities.
- Expand the scope of the system. Crediting revenues could be used to support the identification of new installations to be covered by the ETS. This could be via new sectors, lowering qualification thresholds for existing sectors or increasing the scope of emissions covered by existing installations. This could lead to increased mitigation impact (additional abatement sought from those new sectors/installations/gases) or just increase the pool of potential abatement and therefore allow the existing targets to be met at lower cost.
- Improve capacity of ETS participants. Crediting revenues could be used to support participants in their engagement in the trading system to help ensure that carbon pricing is being factored into investment decisions and that participants operate in a mature way regarding market participation (unlike experience with early-stage EU ETS industrial participants, many of whom hoarded allowances).
- Encourage a market for ETS services. Whether third-party verification is required then in ETS early stages it is possible there would be a shortage of verifiers or less choice for operators. Credit revenues could be used to support capacity building in the market for verifier services.

4.2.4 Menu of Options for Discussion With Governments

Clearly, whether crediting is likely to be a viable option for encouraging the introduction or tightening of an ETS will depend on what the barriers to these happening are. Indeed, an analysis of the specific barriers for the country in question would be a first step to investigating the potential for crediting to help with the introduction or tightening of an ETS. For example, where the barrier is resistance to auctioning, using crediting revenues to compensate the government for giving free allowances might not work, as the value of the credits would need to be significantly higher than the allowance price to placate ETS participants.

On the other hand, if the main barrier is the inability of the ETS to stimulate longer-term mitigation investments, then the revenues from crediting could be used to support such investments and act as demonstration projects. An important further consideration, however, is whether softer use of credit revenues could help strengthen an existing ETS policy and thereby position it to be the vehicle for achieving increased mitigation impact in future. The direct purchase of allowances has similarities and may be the most promising avenue.

The options given in Table 4.2 are considered to be the most promising for discussion with countries. The measures are not considered to be fuel- or sector-specific.

Table 4.2. Menu of ETS options to discuss with countries

Subsidy recipient/beneficiary	Option for discussion
Support introduction of ETS or increased mitigation impact of ETS	
Address barriers to acceptance of increased mitigation impact / ETS	
ETS operators	Support price ceiling measures
ETS operators/ verifiers	Finance MRV for operators
Address abatement cost barriers	
ETS operators	Fund emission reduction policies and projects to help support abatement in ETS sectors
ETS operators/ technology providers	Subsidize low-carbon technology development or reduce costs and bring forward additional abatement options.
Support strengthening of ETS	
ETS operators	Address market failings, such as measures to improve liquidity
Competent Authorities	Address compliance performance, such as legal, institutional and regulatory assistance
ETS operators	Reduce administrative costs, such as improved compliance management/data systems
Policy-makers	Expand the scope of the system, such as examine suitability of sectors, abatement modelling, engagement
ETS operators	Improve capacity of ETS participants, to encourage carbon pricing in investments and more effective engagement in the market
ETS operators/verifiers	Encourage market for ETS services, such as expanding verifier supplier market
Direct purchase of allowances	
Entities covered by ETS	Direct purchase of allowances

4.3 CARBON TAX

4.3.1 Introduction

Again there are two principal ways in which crediting could be used to encourage mitigation impact regarding an energy or carbon tax: it could be used to support a country in adopting a tax where there is previously none in place, or, less practically, it could be used to support an increase of a tax that is already in place. In both cases, revenues from the sale of credits would need to address the barriers to the tax being introduced or to the tax level being raised. Crediting could in both cases be given to (partially or initially) compensate companies suffering a loss due to the tax introduction or increase in order to reduce political headwinds against such a measure. In order to maintain a pricing signal, one should arguably offer compensation for only a part of the energy price increase and/or do so for only a part of the economy.

An interesting variant is to include a hurdle or standard within the design of the tax mechanism. Entities meeting the standard would be exempted from paying some or all of the tax. This mechanism would be judged successful on the basis of whether entities reduced their GHG emissions in order to move under or toward the standard; it would therefore require careful and sector-specific assessment of where to set standards, an inexact process. Some mechanisms of this type have been implemented—for example South Africa's recent carbon tax and several mechanisms within the energy efficiency field—and many more have been proposed across the world. One positive aspect they provide is that they increase the attention financial and other managers pay to emission reductions and they allow entities to strive for "best-in-class" and to claim public credit for being so. A more detailed assessment of incentives, costs and benefits is indicated.

4.3.2 Baseline, Additionality and MRV

Crediting of a carbon tax would require baseline setting at the level of the sector subject to the tax. Unlike an ETS, which sets an explicit emissions cap, the final level of emissions is undetermined for a carbon tax: ex ante, it can be estimated or assessed via modelling (for example using a general equilibrium model, see e.g., Bovenberg and de Mooij, 1994). Ex post, credits should accrue for the difference between the sector baseline and the effectively

taxed emissions, subject to MRV. As the tax receipts incur over time and emissions reductions can be observed, corrective action can be taken, for example by ramping up mitigation impact through an increase of the tax level.

While partial or general equilibrium analyses of "first-best" carbon pricing strategies can often reveal the "Pareto optimal"[33] price of carbon, in reality political constraints will prevent setting the carbon price at this point.

While the baseline emissions need to be established as outlined in Annex A, determining the actual emissions level regulated under the carbon tax is a straightforward task: Given that the level of the carbon tax and the volume of the tax revenues are known to the host country government as they accrue, the emissions can easily be inferred ex post. Using tax receipts as a means to determine emissions covered by the tax scheme is a robust monitoring and reporting approach, which does not require further monitoring efforts.

In cases where offsets are allowed in lieu of paying the tax, they need to be accounted for in the same fashion as the tax receipts in order to provide a robust picture of emissions covered by the tax. There would be revenue implications from allowing offsets in terms of reduced income to the state.

The MRV issues around a hurdle or standard under which the tax is partially or fully exempted are significantly more complex. There is a need to set the hurdle value, which requires a detailed knowledge of entities' emissions per unit of output or activity, expressed in an indicator where data is available. An assessment also needs to be made of how many entities would potentially be able to reduce (and interested in reducing) their emissions to attain or move toward the standard, potentially a complex undertaking yielding an inexact answer. The number of entities meeting the standard could be tracked over time, noting that entities would be motivated to minimize the reporting of their emissions under the standard covered by the tax and to maximize the physical production attributable to this, i.e., some may seek to "game" the system.

4.3.3 How Crediting Could Increase Policy Mitigation Impact

The revenue from crediting could be used for targeted policies notably by:

1. Revenues could be spent on measures facilitating abatement by companies under the tax and thus alleviate the tax burden as well as increase acceptance by those companies benefiting from such facilitation (e.g., revolving fund, direct support for R&D spending or direct subsidies for low-carbon technology investments). This could partially address barriers to tax implementation—at least in those sectors where the additional costs of low-carbon technology options are at comparable scale to crediting revenues. However, in order to be effective it would require advance payment by the host country government, given that technology investments occur ex ante.
2. The revenues could be spent on directly alleviating the tax burden of selected industries (e.g., of heavy emitters) to help overcome barriers for acceptance of the tax. This could be done either ex ante (requiring advance payment by the host country government) or ex post. In case of ex ante alleviation from the tax the barrier to introduction of—or increasing—the tax would be addressed, whereas later refunds would allow the host country government to define conditions under which industry stakeholders would be eligible for refunds.
3. Finally, revenues could be used in order to attenuate effects on vulnerable populations and their potential opposition against introduction of a carbon tax which would lead to passing-through of increased prices. Such measures should aim to create visible and communicable benefits for those populations particularly vulnerable to such changes in pricing and particularly critical to the government's approval. This can be done either by lowering the net burden from other existing tax instruments or providing energy rebates to low-income households. Opposition could even be attenuated by an information campaign that seeks to increase the understanding of the long-term benefits of pricing energy correctly as well as highlighting the potential short-term benefits offered thanks to the revenue from crediting.

[33] The Pareto optimum is the point at which it is impossible to make any entity subject to the tax better off without making at least one other entity worse off. For carbon pricing, it would be realized with a set of different prices across entities and groups of entities; thus such carbon prices could differ significantly.

The following table provides an overview of a number of specific barriers and potential use of crediting revenues.

Table 4.3. Barriers to introducing or increasing an energy or carbon tax and possible design options.

Barrier	Design option
Opposition from industries with high asset specificity heavily reliant on energy or use of fossil fuels	**A "revolving fund"** could use crediting revenues to improve access to attractive borrowing conditions in order to leverage private investments into low-emissions development. A parallel can be drawn to China's Clean Development Fund (China CDM Fund, 2013) or to the United Kingdom's tax exemption for energy-intensive industries, which is conditional on investments in energy-efficient measures (Pearce, 2006).
Opposition from industries who would become less competitive e.g., on an international level	**Provide targeted subsidies or tax exemptions (ex ante)** to industries vulnerable to international competition.
	Tax refunds to large emitters. Industry stakeholders can request tax refunds ex post. The advantage would be that the emissions reductions did in fact occur before the request for refund.
Opposition from low- and middle-income households due to pass through of carbon tax costs.	**Use crediting revenues to lower other existing taxes or offer rebate or dividend payments.** In case of direct carbon taxation on households, recycling of crediting revenues would reduce net cost of policy and could permit the carbon price to rise above households' willingness to pay.
	Redistribute revenue to households that are sensitive to initial increases in costs of goods or fuels (e.g., low-income energy rebates).
	Reduce perception of costs. Use an information campaign to bring more transparency of future benefits or real costs and their distribution (Jenkins, 2014).

Supporting nascent industries and the development of clean technologies, as well as addressing investment barriers into low-carbon technology by underwriting investment in capital-intensive infrastructure should be able to enhance long-term abatement possibilities and thereby provide the potential for the most ambitious targets, as well as delivering wider socioeconomic benefits. Such measures thus seem the most promising use of crediting and might be deployed in a combination with widely visible and highly targeted measures alleviating the pressure on vulnerable industries and households. As in case of an ETS, one difficulty arises from the fact that revenues from crediting accrue only ex post, thus requiring some pre-financing of the measures described above.

4.3.4 Menu of Options for Discussion With Governments

Again the key consideration is "carbon economics"—how large could payments from credits be compared to the revenue generated by the scheme? The question then becomes, whether the effect could still be significant, which largely depends on what specific barriers a country is facing: if a particularly influential and fossil fuel-dependent share of the industry is blocking introduction of the tax the prospect of additional revenue from crediting of the policy introduction will most likely not be sufficient. If, however, a strong information campaign and a few highly targeted measures to alleviate cost pressure on vulnerable households could be sufficient, then even a moderate credit price could indeed make a difference.

Unfortunately, the recycling of revenues to make the tax more neutral ex post could—even in a high-price scenario—still have only a limited impact on overcoming initial policy introduction barriers given that consumers are generally most sensitive to initial increases in costs. Since the promise of offsetting future taxes—at least for private households—is unlikely to fully erase sensitivity to these initial cost increases (Jenkins, 2014) the design of governmental schemes that offer upfront compensation for price increases from tax introduction or increase might be decisive.

Alternatively, the government could earmark carbon revenues from crediting to increase mitigation impact at a later stage by either increasing the tax level or by subsidizing low-carbon abatement within or in other sectors.

The options given in the table below are considered to be the most promising for discussion with governments of countries considering carbon tax introduction or increase. All these options should be time-limited, e.g. to five years.

Table 4.4. Menu of options for use of crediting revenues to compensate stakeholder groups

Targeted stakeholder	Energy resources affected by the tax introduction or increase	Option for discussion
Energy consumer	Electricity price increase	• Cushion price increases by tax exemptions for particular consumers i.e., industry sectors vulnerable to competition or low-income households for a limited time. • Use crediting revenue to subsidize investments into energy-efficient motors or household appliances.
	Heating and industrial processing fuel price increase	• Support replacement of fossil fuel heating systems by renewable energy ones. • Support replacement of fuel-based industrial plants by electricity/ renewable fuel-based ones. • Reward overachievers against a standard by partial or full exemption from the tax.
	Transport fuels (gasoline and diesel) price increase	• Cushion price increase by exempting vulnerable stakeholder groups such as taxi and bus operators.
	Kerosene-* and air traffic price increase	• Use credit income for targeted payments to the poorest. • Targeted subsidy to airlines on particularly competitive routes.
	LPG*	• Use credit income for targeted payments to the poorest.
Energy producer	Exploration and production of fossil resources based fuels	• Counteract job losses by targeted job creation programs e.g., in energy-efficiency or renewable energy sectors. • Support conversion programs, e.g. from fossil fuel exploration to support of renewable energy equipment.
	Electricity producers	• Prevent job losses by sector-internal capacity building for renewable energy generation.

**Note that the replacement of kerosene by LPG is a policy that has been used in countries such as India and Indonesia.*

4.4 ENERGY SUBSIDY REFORM

4.4.1 Introduction

The barriers, design options, financing needs and GHG emission reductions from fossil fuel subsidy reform depend on the type of subsidy being reformed. These have been classified in the table below.

Table 4.5. Classification of energy subsidies

Subsidy recipient	Fuel(s)	Case study
Consumer	Transport fuels (gasoline and diesel)	Indonesia
	Kerosene*	
	LPG*	
	Electricity**	Morocco
Producer	Exploration and production of coal, oil and gas***	

**Note that the replacement of kerosene by LPG is a policy that has been used in countries such as India and Indonesia.*

***Can include subsidies to fuels used for electricity generation, other support to the electricity system (e.g., government write-off of debt) and final consumer tariffs which are inadequate to cover costs. "Electricity" may not be strictly contained with the category "fossil fuel subsidy reform" but is included within this analysis.*

****It can be difficult to define where the boundary between producer and consumers ends, for example where a coal mine is attached to a coal-fired electricity plant.*

For the reform of consumer subsidies, the main driver of GHG emission reductions is decreased demand brought on by higher prices. For the reform of producer subsidies, a weak impact on consumer prices would be expected, but lower upstream activity would also lead to a reduction in GHG emissions. The GSI's "GSI–IF" model (Merrill, 2015) estimates that 6 to 13 per cent of national CO_2 emissions could be reduced in the developing countries considered, in line with emission estimates for global studies. Fuel switching, the rebound effect (domestically

and internationally) and more general rebalancing of the economy complicate this calculation. A further very important point is made in Section 3.2.3—the level of GHG emission reductions depends on how the fiscal savings are reallocated.[34]

The essential logic behind consumer subsidy reform is that subsidies are inefficient in their performance against achieving one or more goals (notably supporting the poor and key industries), i.e., that other policies would meet these goals at lower costs. Reform would therefore lead to a benefit to the government budget, a redistribution of costs to consumers (some of who may end paying more), and—generally—an increase in overall GDP (or at least improvements against "full economic cost" when environmental costs and benefits in particular are included).

For electricity systems, the reform of subsidies will make the utility (or whatever form the distribution entity takes) better off if it receives more revenue from consumers and government support than it loses in the form of higher fossil fuel input prices.

Finally, for production subsidy reform, we would expect to see a reduction in the profitability of certain upstream projects or activities, some of which may then be discontinued or may not then go ahead. A key concern for governments is whether they would see a reduction in their income from taxation and other sources. What does not tend to be included in these considerations is the option value of wealth in the form of fossil fuel resources being left underground for potential future use. Among the pricing reform policies considered in this study—energy subsidy reform, ETS and carbon tax—the reduction in producer subsidies is the main case where we could envisage a reduction in government revenue (noting that this would not be certain in all cases). In theory for the other cases, all those who lose out could be compensated to at least the value of their losses; in practice, this does not happen as there are only a more limited number of consumers who governments choose to compensate for equity and/or political reasons. Furthermore, if change is slow and the steps taken are small, governments may decide that there is no need for any compensation at all.

4.4.2 Baseline, Additionality and MRV

Ex ante (modelling) estimates of GHG emission reductions[35] are far more prevalent than ex post empirical estimates of the impacts. The baseline discussion presented generically in Section 4.1.1 and Annex A is relevant: there is considerable uncertainty in setting a counterfactual for the business-as-usual case and in measuring savings against this.

The boundary around which savings are calculated includes a number of choices. It is important to note that a range of indirect impacts can occur if the fuel price changes, including the rebound effect and also that reduced demand for fuel in one part of the world reduces *inter alia* the world price for that energy, leading to higher consumption elsewhere (this "leakage" impact is one of the key impacts predicted by CGE models when looking at carbon prices or energy price increases in various parts of the world; whether caps in carbon are absolute and similar considerations becomes important[36]). There is limited empirical analysis on the impacts of fuel price changes on GHG emission reductions.

The major challenge in MRV is attribution: if there are changes to fuel demand and hence GHG emissions, to what extent is the subsidy reform policy responsible?

Finally, the Morocco case study raises the issue of how long credits should be given: over what period can a reform be considered additional to what would have happened under business-as-usual?

The MRV issues around producer subsidy reform are far more complex. Ideally, impacts from changes to fuel markets across the world would be included. A simpler alternative would be to associate credits with fossil fuel reserves that are not exploited because of the policies enacted, noting that establishing causality between the policy and the fuel being left in the ground may not be straightforward. This method may have significant leakage if

[34] For example the "GSI-IF" model simulates reallocating 20 per cent of savings into energy efficiency and 10 per cent into renewable energy

[35] See for example the recent "GSI-IF" model, which uses a simple ex ante approach, essentially calculating elasticities for the past 20 years and projecting demand forward by assuming that current subsidies are eliminated over a certain period.

[36] See for example the review of leakage in Wooders, Cosbey and Stephenson (2009).

investment moves to exploit other fossil fuel reserves in preference. A (significant) discounting of credits generated by this mechanism is indicated.

4.4.3 How Crediting Could Increase Policy Mitigation Impact

The two case studies on electricity (Morocco) and transport fuels (Indonesia) are summarized in Table 4.6. Crediting of estimated savings at USD 10/tCO_2 would yield approximately USD 20 million per year (Morocco) and USD 350 million per year (Indonesia). The key question is whether these amounts would be sufficient to alter the scale and/or pace of reform.

Table 4.6. Summary of energy subsidy reform case studies (Morocco and Indonesia)

Morocco (Electricity)	Indonesia (Transport fuels)
• Large subsidies, notably to petroleum products • Around 13 per cent to subsidized fossil fuels for electricity generation, to the national utility ONEE (not other generators—IPPs are frozen out of market) • ONEE also gets debt write-off among other subsidies from government (e.g., 2012 saw one recorded transfer of 1 billion Moroccan Dirham [approx.. USD 105 million]) • 1.6-3.1 per cent CO_2 savings possible from subsidy reform, around 2 MtCO_2 p.a.. At USD 10/tCO_2, the annual value would be USD 20 million annually. • Note also that administrative and other administrative costs could be significant • Energy-intensive industry electricity prices below costs: price increases to electricity-intensive industry would be likely to be resisted. • Already a lifeline tariff, would be politically difficult to change and no plans to do so. • Some potential options: i. Increase lifeline tariff and put savings, and credit money, into cash transfer or other welfare scheme ii. Increase lifeline tariff (to reduce free riders; or those to any other consumer group) and put money into energy efficiency for that group, topped up by credits (note how redirection to energy efficiency increases GHG reductions) iii. Increase lifeline tariff (or those to any other consumer group) and put money into priming renewable energy generation through supporting developers, e.g., by developing publicly licensed sites, topped up by credits (note how RE redirection increases GHG reductions)	• Fuel subsidies have been in place since independence in 1949. In 2013, they had risen to around USD 18 billion. This was approximately 2.5 per cent of GDP and 25 per cent of direct government expenditure. • Modelling of the removal of those subsidies showed that savings in 2020 could be around 6 per cent of GHG emissions (35 Mt CO_2). At USD 10/tCO_2, the annual value would be USD 350 million annually. • November 2014 saw significant gasoline and diesel price increases, coupled with a rolling back of most of the subsidies to these fuels. January 2015 saw price decreases as the world price reduced. • Earlier gasoline price increases (2005 and 2008) were accompanied by cash transfer schemes targeting around one-third of households and left in place for around six months. • 2015 plans are that USD 5.4 bn should go into SOEs on infrastructure, with the aim of counteracting increases in living costs. • Infrastructure transfer significantly higher in magnitude than the estimate if USD700 million made from the potential value of credits. But hypothecation is not formal—there is a lack of budget space (budget tends to be pre-allocated to various purposes). • A further option is that credits could be used to match funds redirected, e.g., to low-carbon transport or improved electricity infrastructure (noting that around 20 per cent of the population does not have access to electricity). • There are differences in how schemes would be designed between those where results are already evident (gasoline and diesel) and where progress to reform needs to be paved (e.g., kerosene, LPG and electricity). • The scale of subsidies (and therefore savings) depends on policy direction, international fuel price and other drivers. Reform itself could also be back-tracked (especially when prices spike). • Indonesia has very strong nationalist sentiment and tends to be resistant to foreign intervention.

There are a large number of potential stakeholders and barriers to reform (see the detail in the Indonesia case study). Which stakeholders and barriers are most important depends on the type of fuel being reformed, with generic considerations presented in Table 4.7.

Table 4.7. Key stakeholders and barriers to energy subsidy reform

Subsidy recipient	Fuel(s)	Key stakeholders/barriers
Consumer	Transport fuels (gasoline and diesel)	For the poorest in the population, indirect impact are typically higher than direct impacts (the poor consume little fuel directly, and the most important channel of cost increase tends to be food prices). General cost inflation is a major concern to governments. State-Owned Enterprises likely to lose market share/monopoly on distribution. Delivering better public transport for all—notably middle classes—very challenging.
	Kerosene*	Depends on ability to transfer benefits to the poor (existence of welfare, possibilities of hypothecation; what are they interested in); would they fall back down the energy ladder? But what about middle class beneficiaries and those linked to illegal rent-seeking and diversion?
	LPG*	
	Electricity**	Redistribution through graduated tariffs (including a "lifeline" tariff) very common in developing countries. Competitiveness concerns can be very strong for industry (e.g., in Viet Nam). Fuel suppliers to electricity generators will be better off.
Producer	Exploration and production of coal, oil and gas***	If lower government revenue, need to encourage other tax-paying activities in the economy. Will be social concerns in specific areas hit by lower activity.

**Note that the replacement of kerosene by LPG is a policy which has been used in countries such as India and Indonesia.*

***Can include subsidies to fuels used for electricity generation, other support to the electricity system (e.g., government write-off of debt) and final consumer tariffs which are inadequate to cover costs. "Electricity" may not be strictly contained with the category "fossil fuel subsidy reform" but is included within this analysis.*

****It can be difficult to define where the boundary between producer and consumers ends, for example where a coal mine is attached to a coal-fired electricity plant.*

For all but producer subsidy reform, we can think of subsidy reform as liberating financial savings to the state budget that would allow those who lose out—and who it is considered should be supported for equity and/or political reasons—to be fully compensated. Actual reform tends to be simpler. There are numerous examples (see for example the graduated and planned reduction over around 18 months of India's diesel consumer subsidy) where reform was not accompanied by any significant compensation measures (slow pace of reform can be seen as itself ensuring that shocks do not occur, and such shocks—i.e., rapid changes in price—are often governments' main concern, rather than the level of the price itself). In the Philippines, the government linked fuel prices to world prices during the 1990s, but was under intense pressure to reintroduce subsidies during the recent high oil price period. It gave a relatively small subsidy to only one group—the drivers of "jeepneys," private suppliers of mass transport that have great political and symbolic importance. The Indonesia case study showed that transport fuel price rises in 2013 and 2014 essentially occurred without any direct compensatory measures. The increased expenditure on infrastructure is an example among many across the world where there appears to be some link and logic in two policies, but there may not be anything other than circumstantial evidence. At the other end of the scale, Iran redirected its entire savings from major subsidy reform largely to the population, with no targeting by income level or any other indicator (see Hassanzadeh, 2012).

Softer measures may be a more influential way of using credit revenues to increase policy mitigation impact. Within subsidy reform, there are fewer options than for ETS or even carbon tax. A more promising option appears to be to redirect subsidy savings into investments that are of general benefit to holding down energy costs, such as energy efficiency and energy infrastructure.

4.4.4 Menu of Options for Discussion With Governments

A general consideration is that savings are already sufficient to compensate those who are adversely affected and who governments decide should be compensated for equity and/or political reasons. In general, these groups are common across developing countries: the poor; farmers and fishers; the freight industry; public transport; energy-intensive industry (notably where this is trade-exposed, i.e., where international competition is strong). Again, we therefore need to ask how crediting could have an additional impact. The following conclusions are drawn from the case studies and from the wider literature:[37]

[37] See for example Beaton et al. (2013).

- Savings are generally sufficient to compensate those who are impacted and whom the government wishes to compensate.
- There may be a hypothecation issue—e.g. in the Indonesia case study, where government budgets at all levels are essentially allocated—which crediting may give some flexibility to overcome.
- There may be a relatively low cost but politically and symbolically important option which can unlock reform (analogous to the recent subsidies to jeepney drivers in the Philippines). Here, crediting could pay for itself many times over.
- What might work is country-specific, and would require a conversation with that country by the advocate of crediting. This should build on mechanisms and discussions already in place, such as World Bank assistance to energy pricing, to welfare system development and in support of development more widely. It is within these discussions that the additionality of crediting can be assessed.
- Discuss the relationship between avoided expenditures due to FFSR and credit revenue. If the former is much higher than the latter, impact is likely to be low. Framing of crediting revenue: more highly visible and thus more able to influence policymaking compared to invisible avoided expenditures.
- Also for FFSR, the biggest barriers are during initial implementation. Crediting is basically an exposed RBF scheme in which revenues are targeted toward interest groups only after the subsidy has been removed and resulted in the desired effect. Uncertainty in credit price/levels is therefore quite important when considering the design of targeted compensation measures.

The options given in the table below are considered to be the most promising for discussion with countries.

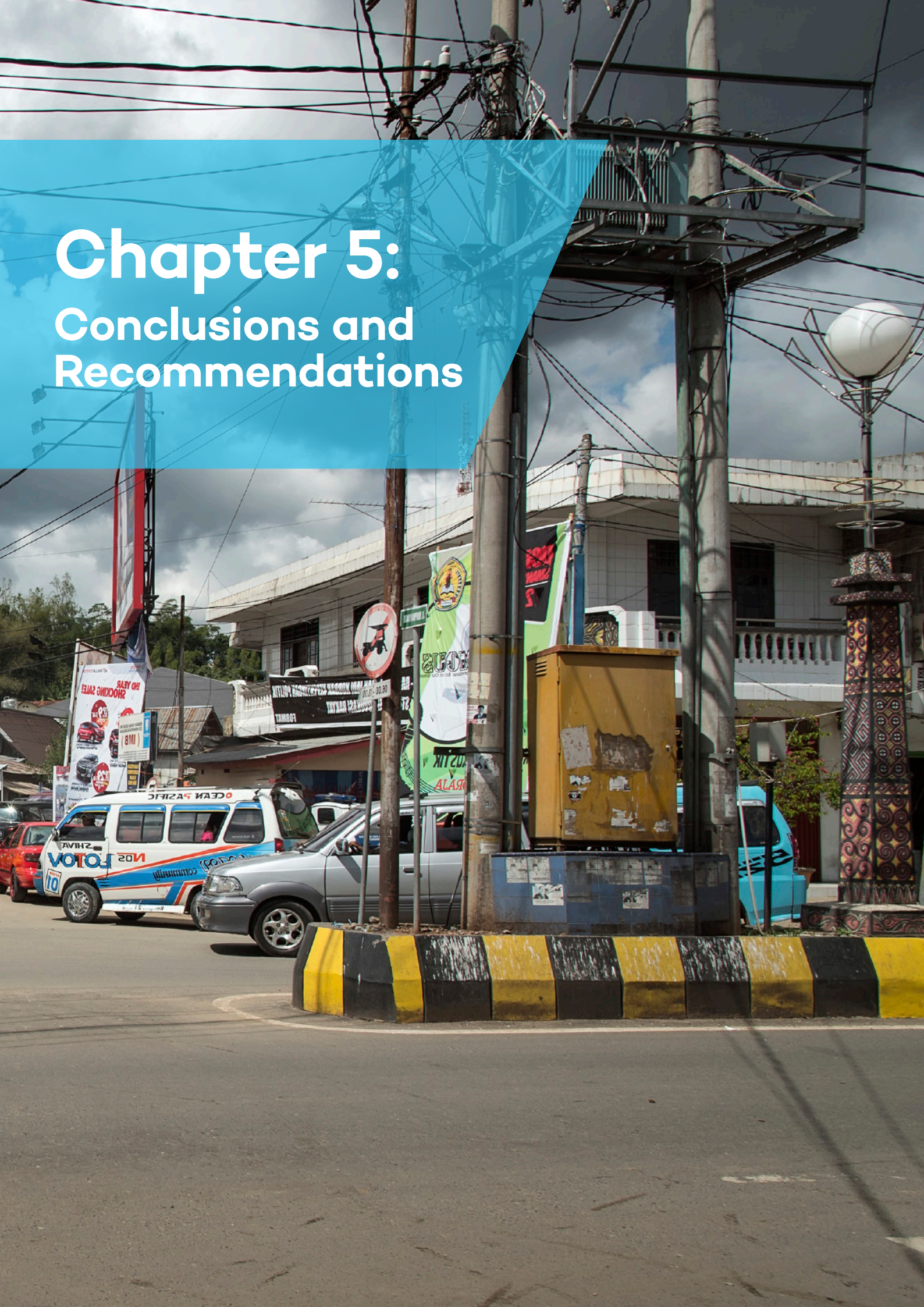
Table 4.8. Energy subsidy reform mechanisms proposed for discussion with countries

Subsidy recipient	Fuel(s)	Option for discussion
Consumer	Transport fuels (gasoline and diesel)	Higher transport prices affect even those who do not consume the fuels directly. Use credit income as matched fund for welfare payments to the poorest and to boost low-carbon transport and improved electricity infrastructure for consumers more generally, including the middle class.
	Kerosene*	Use credit income for welfare payments to the poorest.
	LPG*	Use credit income for welfare payments to the poorest.
	Electricity**	Reduce the volume under the lifeline tariff. Use credit income for either: cash transfers/welfare payments and/or increased renewable energy and/or increased energy efficiency. Electricity-intensive industry could be treated as a stranded asset, and payments made (for a limited period).
Producer	Exploration and production of coal, oil and gas***	Entirely different calculus as compared to consumer subsidies. Most promising option likely to be using credits to compensate affected communities and individuals, as per example of downscaling of Poland's coal industry in the 1990s.

**Note that the replacement of kerosene by LPG is a policy that has been used in countries such as India and Indonesia.*

***Can include subsidies to fuels used for electricity generation, other support to the electricity system (e.g., government write-off of debt) and final consumer tariffs which are inadequate to cover costs. "Electricity" may not be strictly contained with the category "fossil fuel subsidy reform" but is included within this analysis.*

****It can be difficult to define where the boundary between producer and consumers ends, for example where a coal mine is attached to a coal-fired electricity plant.*



Chapter 5:
Conclusions and Recommendations

Chapter 5: Conclusions and Recommendations

The goal of this study is to determine whether there is a role for crediting in pricing reform[38] efforts as a way to assist government to increase their mitigation impacts. This can either be through:

a. **a policy being implemented which would not have been without crediting; or**

b. **an existing policy or one that has been decided upon is made more stringent (i.e., that its mitigation impact is increased).**

The analysis presented started with a literature review (Section 2) and worked through case studies (Section 3) and key design issues (Section 4.1) through to specific recommendations for each of the three pricing reform mechanisms (Sections 4.2-4.4). Table 5.1 summarizes the findings, against the six ways that crediting revenues could be used identified within this study and with reference to the "carbon economics" (the value of credits relative to the fiscal savings from the policy under consideration). The summary is generic in nature (further details and considerations are identified in Sections 5.2–5.4), reflecting that crediting for increasing the mitigation impact of pricing reform policies has not been undertaken in practice, in the developing world or elsewhere. As such, all mechanisms assessed would benefit both from further work to make them more specific, to understand how and with what certainty MRV could be applied and to more precisely calculate the "carbon economics." But beyond such technical work, there is also a clear need to discuss the potential mechanisms with countries where they could be applied, both to understand their reactions and preferences but also to get a better idea of specific political economy challenges which potential mechanisms would need to be aligned with.

From the Table, three mechanisms show the most promise:

- **Support emission reductions at the policy margin.** In the case of an ETS, a possible crediting approach is to purchase allowances from the market and therefore tighten the cap beyond the domestic policy reach—potentially pro rata to emission reductions achieved by the ETS in the past. This would clearly deliver additional GHG reductions. The main implementation issue would likely be around whether the use of foreign funds to create scarcity and increase prices on the market would be welcomed, perhaps especially if prices for allowances were already relatively high. On the other hand the effect is not different when different ETS are linked (for which they are real-world examples). A similar approach to a carbon tax could consist in tax-exempt installations reaching a performance benchmark and in crediting emission reductions resulting from overachievement relative to the benchmark. In the case of an energy pricing reform applying such an approach is more challenging as the policy may not directly address individual installations. Energy pricing policies could be combined with supporting measures such as energy-efficiency programs in which case emission reductions attributable to these complementary measures, i.e., net of the effect of the energy pricing reform itself, could be credited.
- **Support emission reductions within the policy instrument.** This is to provide financial support to additional GHG abatement in the sectors/entities affected by pricing reforms. This option, which could be applied to any of the three pricing reform policies considered, has a political benefit in that part of the government's increase in revenue is reallocated back to at least some of those affected by cost increases as a consequence of policy implementation. Whether the size of reallocation is large enough to drive increased mitigation impact on any significant scale is open to question.
- **Overcome barriers to effective policy implementation and operation.** This option aims to enhance the performance of a pricing reform policy: by reducing compliance costs of participants through MRV support; by intervention in the market (e.g., increasing liquidity) in the case of ETS; or by increasing the capacity of participants in general. The approach appears most applicable to ETS, although applicable to all three pricing reform policies. Nevertheless, establishing causality between such support measures and emission reductions is very challenging. Support to implementation and operation may be similar in scale and scope to technical assistance programs that donor countries traditionally fund in developing countries.

[38] Here we use the general term "pricing reform" to cover carbon pricing approaches such as emissions trading systems (ETS) and carbon taxes, and removal of negative carbon prices (i.e. reductions of fossil fuel or energy subsidies. For description and examples of these pricing reform/policies, see e.g. IMF (2013) and World Bank (2015).

Table 5.1. Summary of potential mechanisms, their applicability and potential to increase policy mitigation impact

Use of Crediting Revenue	Examples of Specific Mechanism(s)	Which policies could it be applied to?	Could be supported by policy crediting?	Would crediting make a material difference?
Accrue to national government, held in National Treasury	Not applicable	All three	Yes	Very unlikely: crediting revenues would be very low relative to national budgets and individual budget lines.
Overcome barriers to policy acceptance	Payments/ tax exemptions to particular stakeholders; compensation for stranded assets; investment in alternative jobs for those affected, e.g., in clean energy.	All three	Potentially: if foreign credits were deemed beneficial within local politics and/or if there was a hypothecation problem.*	Unlikely: the level of extra revenue from carbon credits is very low compared to fiscal savings from base policy implementation.
Support abatement within the instrument	Financial support to implement GHG abatement in affected sectors, notably industry (subsidize low-carbon technology development would fit under option 6).	All three, but most commonly considered under carbon tax and ETS, for industrial consumers.	Yes, abatement is supported in many actual schemes. Also those regulated want to see at least part of revenues raised come back to them.	Potentially, depending on the relative value of investments to cost of compliance and impact of returning part of revenue to those affected.
Overcome barriers to effective implementation and operation	Improve market performance, e.g. liquidity and price floor in ETS; reduce compliance costs through paying for participants' MRV; capacity building of market participants and suppliers.	All three, ETS may have highest potential.	Yes, provided the argument can be made that such support would increase mitigation impact in the longer term.	Improving market performance and access can create positive conditions for future policy. Very difficult to establish causality and especially to measure impacts.
Buy emissions reductions at the policy margin	Purchase of allowances from ETS market.	All three but so far only ETS experience.	Yes, providing there is not strong resistance to foreign purchase driving up costs of allowances on the market (could focus only on purchases when the market price is low). In case of tax or energy pricing reform approaches might be possible that avoid potentially controversial distributional effects.	Yes, in case of ETS each allowance purchased creates the need for additional mitigation, in case of tax or energy pricing reform additional mitigation would occur as well.
Redirect to mitigation activities outside the scope of the instrument	Investment in energy efficiency or renewable energy, through matched funding, ESCO investment, etc.	All three	Yes, providing firstly that a link can be made between this redirection and increased mitigation impact in pricing reform policy, and that this could be measured.	Will be very hard in practice to establish a causal link to increased mitigation impact and to measure impacts.

* *Noting that revenue neutrality is often an important consideration for new pricing reform policies.*

This study also assessed what are considered the two critical design and implementation issues for policy crediting:

1. Setting baselines (and the associated additionality and MRV implications); and
2. The political economy of reform.

Baselines, Additionality and MRV (Monitoring, Reporting and Verification)

There are at present no agreed standards or international agreements that allow for the estimation of GHG emission reductions from policy[39].

- For ETS—a quantity-based policy—this presents little issue: increased mitigation impact means a tightening of caps and, since MRV is a key component of ETS, cap stringency does not add extra MRV requirement compared to a less stringent "base policy" cap. Issues around carbon leakage from within the region covered by the ETS remain.
- As fiscal instruments, it is much more challenging to quantify GHG emission reductions from *carbon tax or energy subsidy reform*. Ex ante, models are commonly used to estimate the impact of carbon taxes, and there are some examples of models having been used for energy subsidy reform. Estimating elasticities—notably price elasticity of demand—is key to models, with empirical work indicating that short-term elasticities are lower than longer-term ones (where there is more opportunity for investment in new technologies, alternatives, etc.). Ex post, there are some examples of empirical work available in the literature. The challenges in both cases are to both: (i) set a baseline for the counterfactual where the policy is not implemented/is implemented without increased mitigation impact; and (ii) to then attribute any change to the increased mitigation impact as against other drivers of change (technological progress, changes in the economy, changes to prices and other economic variables, competitiveness with respect to other countries, etc.[40]). There is also likely to be a time lag in impact following a policy's introduction. It can certainly be concluded that whatever method is used for baseline and attribution will lead to uncertainties in the estimate of GHG emission reductions to at least some, and possibly to a high, extent. Approaches would also need to consider issues around the period within which credits should be recognized (this study notes that transformational change is often the target of fiscal policy and would require crediting over a long period.[41]

The analysis presented concludes that understanding the GHG emission benefit from any given policy is uncertain, relying as it does on baseline, boundary, timing and other issues, including feedbacks in the national and international economies. Crediting of policies against their GHG emission reductions—including developing methodologies which are as simple and cost-effective as possible—remains a highly interesting and rapidly developing area. The development of INDCs—which may effectively be a collection of NAMAs in some developing countries—is one current and concrete application where estimates of benefits are required. The area will benefit from pilot schemes and from further study and debate. The team conducting this study has revised its views and insights continually throughout the study, and expects to continue to do so.

Political Economy

It is increasingly accepted that it is not simply the overall economic impact of energy subsidy reform (and other fiscal policy) that determines whether or not such policies are implemented. Rather, specific impacts on certain sectors of the economy, suppliers or parts of the population are key, notably when such sectors or parts hold or influence political power or are deemed "vulnerable" (or otherwise deserving of society's protection against adverse impacts).[42] Similar arguments can be applied to an ETS too, noting that its direct impacts are focused on

[39] Noting that IISD's Global Subsidies Initiative is developing, and looking to gain support for, a relatively simple approach for energy subsidy reform using its "GSI-IF" model, and that the WRI and others have proposed protocols for various policies. But established baselines and methodologies for policies remain far behind what has been established for projects through the CDM, VCS, etc.

[40] Noting also that fiscal policies alter the costs and effectiveness of other GHG mitigation policies such as those covering energy efficiency and renewable energy. Here it is important not to double count emission impacts (and in some cases to therefore share reductions between fiscal and other policies). The "E+/E-" methodology within the UNFCCC was developed to update project baselines under the CDM in the case of policy changes and would be applicable for fiscal policy changes.

[41] This study notes that fiscal policy often targets transformational change, which tends to be a long-term process and would therefore ideally require crediting over a long period. This presents challenges: methodologically, it is easier to establish causality for change over shorter time periods; in terms of policy additionality, it can be argued that fiscal policies will be brought in over the long term anyway, i.e. it is more a question of "when and how" than "if.".

[42] Noting that the middle class is often a key political group and policy implementation may require mitigation of impacts to them, even if equity considerations would not support such action.

industry and suppliers and therefore in particular stokes fears over losses in competitiveness of certain economic sectors as well as another concern common to fiscal policies: concern around short-term economic shocks which could lead to changes in longer-term economic growth paths. For all pricing reform policies considered, the literature suggests that perception of the scale of impacts is generally higher than what would be expected (ex ante analysis) or was observed (ex post), and analysis indicates that the fiscal savings from policy reform is generally far higher than the costs of mitigating impacts to key sectors, suppliers or parts of the population.

The analysis of the case studies in Chapter 3 indicated that the value of carbon credits as a share of fiscal gain from base policy implementation would almost certainly be low. Using credits as a means to mitigate policy impacts to any more than a highly targeted group is therefore not possible, noting again that the level of fiscal savings from base policy implementation would already be sufficient to mitigate impacts if the host government wished to make such a transfer and had the means to hypothecate (including indirectly). This is a central part of the debate: could the additional income from credits overcome a barrier to policy implementation? Analysis from the case studies and beyond strongly indicates that there are barriers to policy implementation beyond demonstrating overall economic gain. Unsurprisingly—given that all policies considered cover pricing reform—it also identifies similar key stakeholder groups, noting that which of these are most important in any specific application will depend on the policy and country in question.[43]

Next Steps and Recommendations

The case studies chosen, while providing examples of pricing reforms in developing countries, did not include any external crediting in their considerations or final design. In effect, all the analysis presented is at least to some extent hypothetical. This is exacerbated by the target of the potential mechanism being developing countries, while the main body of experience on pricing policies is in developed countries.

Conceptually, crediting at the policy margin looks the most promising, in particular in a pilot phase. Crediting on the full pricing of reform policies seems to be more challenging and dependent on the circumstances. In-depth feasibility and identification of suitable policy crediting approaches is needed in specific contexts, through real-world testing/piloting and engagement with interested countries and other relevant stakeholders.

A more general case for policy crediting might emerge through the implementation of the Paris Agreement: Countries with defined and committed targets/mitigation pledges might approach crediting of policies less from an offset logic but more from a principle of connecting domestic policies through an exchange of credits to increase efficiency. This interest in building connections is already visible in attempts to link ETSs but might expand to other implicit or explicit carbon pricing approaches as well. Crediting might then become a considered option in cases where policies and mitigation impacts are too different for more direct linking approaches.

[43] The study uses the concept of "menu of options for discussions with countries" to take account of the specificities of implementability: it is not considered possible to identify options, or a menu of options, which would be applicable generically across all cases.

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Annex A: Baselines

The appropriateness of crediting is generally based on criteria related to environmental integrity, or ensuring that emissions reductions are real. Certain elements—such as appropriate baselines, additionality determination, and MRV and accounting frameworks—are to be developed with the aim of safeguarding the environmental integrity of credits. As the interest of this study focuses on the role crediting revenues can play in supporting domestic pricing policies, the monitoring of the flow of revenues is another important design consideration.

A1 BASELINE DETERMINATION

A baseline typically provides the standard against which the performance of mitigation actions, including policies, can be measured: the difference between the baseline and actual emissions after policy implementation would theoretically be eligible for crediting. Despite the importance of baseline setting in guiding the design of mitigation policies, there is currently no international standard or guidance on determining baselines. In general, there is a trade-off between rigorous baseline setting and administrative capacities (Danish Energy Agency et al, 2013). Historically, the recognition of such capacity constraints has led to conservative baseline setting in most developing countries in efforts to ensure that credited emissions are real. While this helps preserve the environmental integrity of emissions reductions, such conservative baselines lead to the generation of very few, or no, credits as shown in Figure A1 and thus no financial incentive for mitigation.

Several of the figures in this Annex refer to baselines developed using CGE modelling. CGE modelling is one technique to project baselines going forward but there are a range of alternatives using a variety of tools and techniques. Each alternative has its pros and cons, therefore references in the Figures to CGE modelling should be viewed as illustrative only

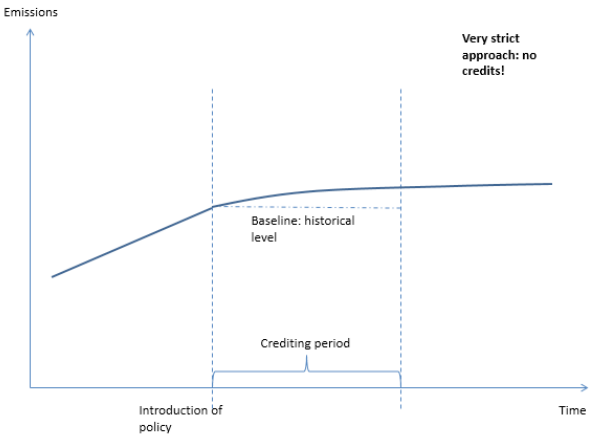

Figure A1. Conservative baseline determination

Source: Author diagram.

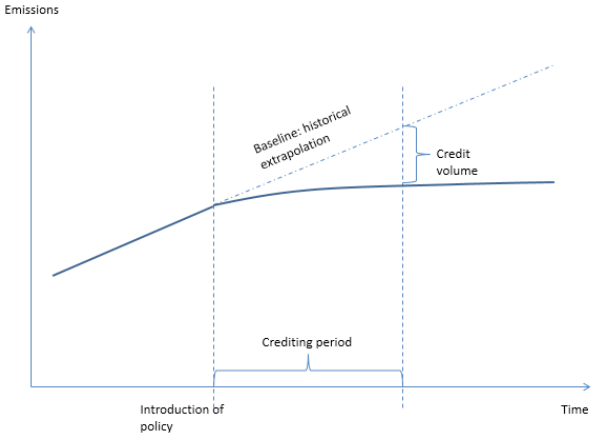

Figure A2. Baseline determination by extrapolating historical emissions

Source: Author diagram.

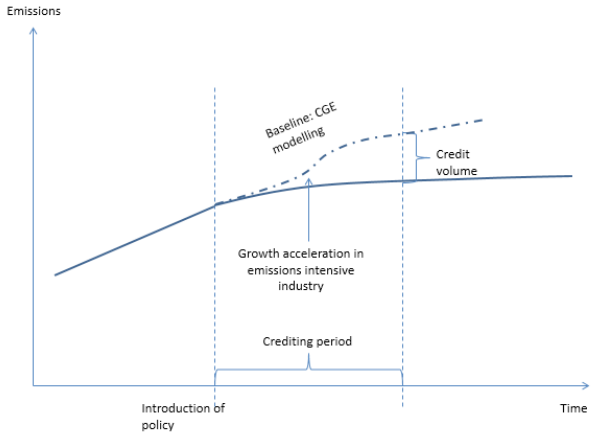

Figure A3. Baseline determination using CGE

Source: Author diagram.

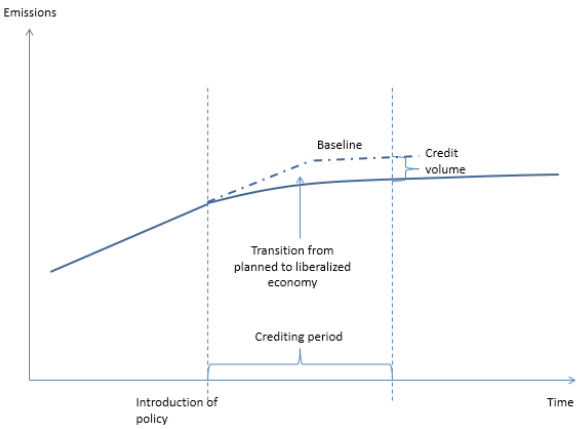

Figure A4. Readjustment of baseline after significant economic transformation

Source: Author diagram.

In an imperfect analogy to the additionality determination of CDM projects, the baseline should include uptake of no-regret policies in case of a complete absence of barriers to their implementation—on the premise that such policies would be implemented in the absence of crediting support. Given that removing fuel subsidies is generally considered a "win-win" option (Baron & Ellis, 2006), it may be particularly relevant to assess barriers to implementation for this policy type. Traditional methods of proving additionality (such as investment analyses) are often infeasible for policies given that benefits, such as savings in health protection and pollution prevention, accrue to the society as a whole while costs accrue to stakeholders. Thus, an alternative way to assess additionality is through a common practice analysis (Okubo, Hayashi, & Michaelowa, 2011), watching whether the policy is introduced in other countries of comparable level of development. This however becomes difficult if a significant share of countries are receiving credits for policy implementation, and thus introduces the policy earlier than it would have done in the absence of such support.

Generally, baseline determination is politically tricky and can be exploited by lobbying groups. Every domestic stakeholder included in the scope of the pricing policy has an interest in overestimating his baseline emissions in order to increase revenues. Common practice analysis offers the added benefit that it addresses arguments regarding international competitiveness. The main advantage of including common practice considerations is that countries acting as "first movers" for implementing energy pricing policies will essentially be rewarded with crediting, which compensates for potential damages to their cost-competitiveness for globally traded sectors. As over time more countries begin to implement similar policies and level the playing field, the same policies would eventually no longer be eligible for crediting.

A1.2 GENERAL ISSUES FOR MITIGATION

As discussed previously, it is the difference between a baseline and the emissions levels after policy implementation that would be eligible for crediting. However, a particular challenge in policy crediting is the inability to establish a causal link between the policy and observed emissions reductions due to time lags, feedbacks, or external effects such as price fluctuations or other changes in the economy. To avoid attribution, some have suggested discounting of policy credits in order to ensure good environmental integrity (Baron & Ellis, 2006; Okubo, Hayashi, & Michaelowa, 2011) yet this in itself would be a highly politicized issue and would reduce the amount of revenue available for support of policy introduction. In order to assess the potential of crediting to drive reform we consider only undiscounted crediting in this report.

All policies that influence mitigation projects under market mechanisms (like CDM or JCM) need to have double counting provisions; i.e., the credits accruing through the project-based mechanism need to be deducted from the policy credits.

A critical parameter for crediting of policies is the crediting period given the sometimes long time lags between policy implementation and final GHG emissions reduction outcomes (see Figure A5). This is especially true for policies that aim to reduce emissions through energy pricing reform, as price elasticities of demand are much higher in the long run (Enevoldsen, Ryelund & Andersen, 2007).

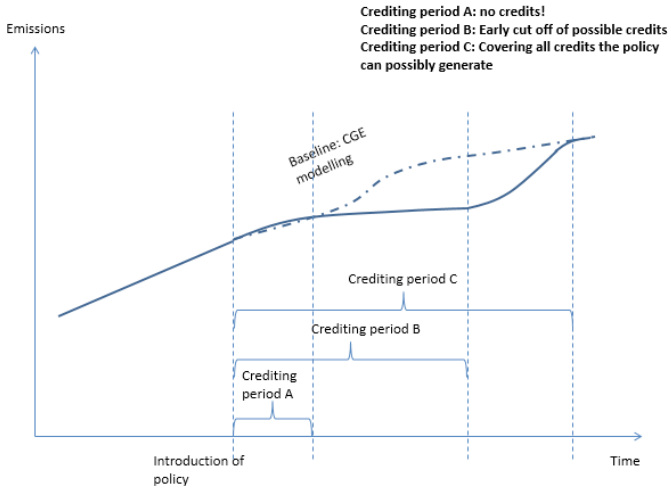

Figure A5. Illustration of time lags between policy implementation and emissions reductions

Source: Author diagram.

There is a trade-off between the growing uncertainty of the baseline as the crediting period is lengthened and the enhanced incentivization due to crediting revenues accruing over the long-term. An additional issue with shorter crediting periods is that they are less conducive to "transformational change," as they focus more on short-term results and restrict host countries' flexibility in achieving emissions reductions or energy savings over the long term—an objective that is usually pursued when carbon pricing policies are introduced.

Another issue related to the crediting period is the issue of increased mitigation impact or preserving additionality over the long term. Additionality may be justified in the initial stages of policy implementation; in this case, the revenues from crediting would overcome barriers to policy introduction. However, in the long term, due to technological progress or economic factors (such as increased fuel prices etc.) the policy may cease to become additional, and maintaining the baseline at its current level would lead to overfunding or lagging mitigation impact (Okubo, Hayashi, & Michaelowa, 2011). In this case, crediting periods could be shortened and baselines re-evaluated periodically; thus, crediting revenues could be used to increase the mitigation impact of policies.

Another challenge, well recognized in the literature on pricing of carbon emissions, is leakage of emissions upon implementation of carbon pricing (see e.g., Barker et al., 2001). While several countermeasures are known (Fischer and Fox, 2009) a discussion of these aspects is not within the scope of this study.

A2 BASELINES FOR CREDITING POLICIES

The generic approach to calculating credit levels for all policy instruments is to deduct the emissions level after policy introduction from the baseline that specifies emissions in the absence of the policy instrument, for a predetermined crediting period.

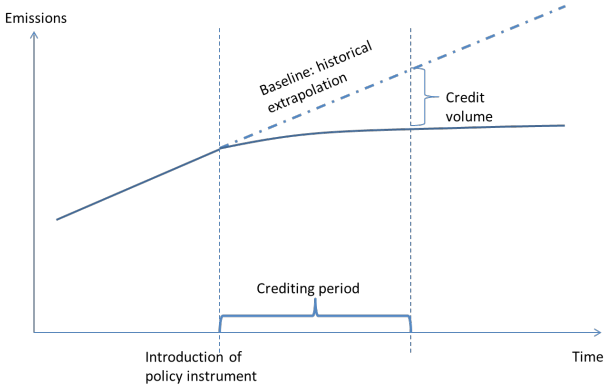

Figure A6. General principle of policy crediting for the introduction of a policy instrument

Source: Author diagram.

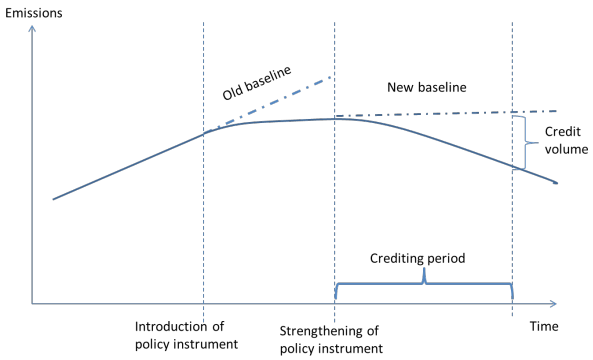

Figure A7. General principle of policy crediting for the strengthening of a policy instrument

Source: Author diagram.

In the case of crediting of increasing stringency of existing policy instruments, the baseline denotes the emissions level in case the policy instrument would continue unchanged, with the credits determined by the difference to the emissions level after the strengthening of the policy.

Environmental integrity will be driven by the characteristics of the baseline, which shall not be overestimated, and the emissions level after introduction/strengthening of the policy instrument, where monitoring needs to ensure that no emission sources are omitted. The critical issue in policy crediting is the baseline methodology. The determination of the emissions level post-policy implementation differs between the policy instruments and will be discussed in specific subsections.

The degree to which the policy instruments support up-scaled mitigation depends on the conservativeness of baseline estimation as well as whether 100 per cent of the difference between baseline and post-policy emissions level will be credited. In the context of the discussion on sectoral crediting/trading, the EU had proposed that crediting would only start from a threshold that would be more stringent than the baseline. Governance and accountability do not depend on the underlying policy instrument.

A2.1 CREDITING OF EMISSIONS TRADING SYSTEMS (ETSs)

Crediting of the introduction of an emissions trading system is the simplest approach of any policy instrument given that an ETS is by definition a quantity-based instrument.

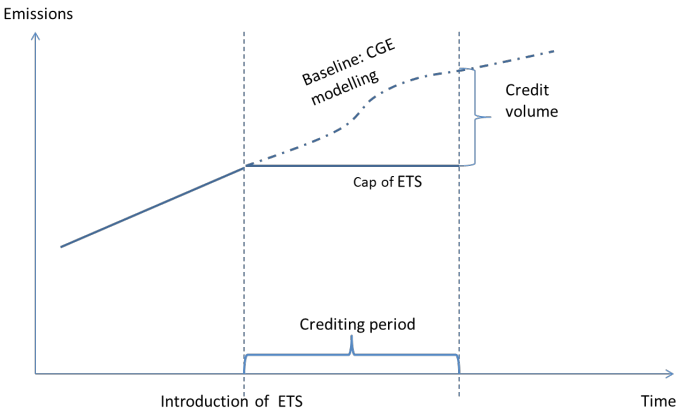

Figure A8. General principle of policy crediting for an ETS

Source: Author diagram.

An ETS fulfills the principle of additionality if the cap is set below business-as-usual levels. A strong MRV system is a precondition for a functioning ETS. The emissions level after the introduction or strengthening of an ETS is determined by the overall cap which is equal to the allocation of allowances. Estimating the effect of the ETS ex ante is thus simple, as long as compliance with the cap is ensured. One complication is the issue of carbon leakage to jurisdictions with lower stringency of carbon policy.

A2.2 CREDITING OF CARBON TAX

A carbon tax is a pure price instrument. It is always additional compared to a situation without a tax. The MRV system needs to be able to cover all emissions influenced by the tax. Principally these emissions can be derived from the tax receipts. The actual coverage of the tax then determines which emissions are covered by the baseline. Differences between the baseline and post-tax emissions coverage need to be avoided, because they would lead to inconsistencies in calculation of emission reductions. For example if the tax is levied only on transport fuels, the baseline needs also to be limited to emissions from transport fuels. If there are tax exemptions for certain actors, they need to be excluded from the analysis. The ex ante estimate of the impact of the tax requires knowledge of the price elasticity of demand for the fuels on which the carbon tax is levied. Some empirical studies on carbon taxes exist (see overview in Sumner, Bird, & Smith, 2009).

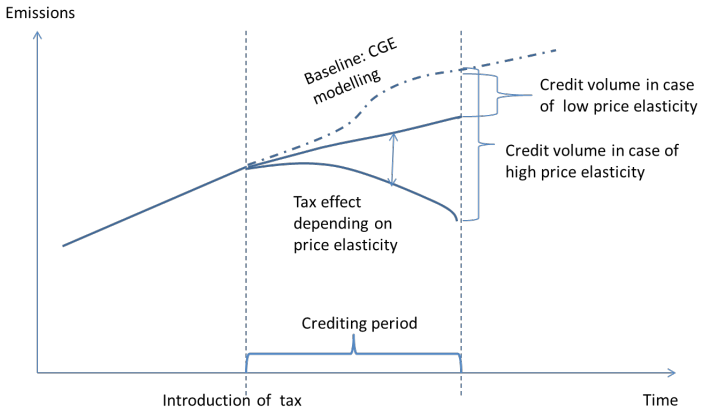

Figure A9. Ex ante uncertainty of policy crediting for a carbon tax

Source: Author diagram.

A2.3 CREDITING OF FUEL SUBSIDY REMOVAL

Subsidy removal is an instrument that addresses emissions only indirectly. The emission reduction is triggered by the increase of consumer prices for fuels/electricity to the levels determined by the cost of inputs, and by fuel substitution. The additionality of fuel subsidy removal is difficult to assess, principally because a situation without subsidies would be economically optimal. Estimating the impact of this increase requires knowledge of price elasticity of demand for fuels, especially their difference in the short and long term, again noting substitution between fuels and substitution within the economy more generally. The estimate for the impact on emissions is likely to be more difficult than for the case of a tax, given that the subsidy removal will usually not be linked to the carbon content of fuels. Moreover, removal of electricity subsidies will have differentiated effects on the various electricity supply options, as the price increase is likely to mobilize electricity generation options whose unit cost is just above the subsidized price level and that therefore now become competitive.

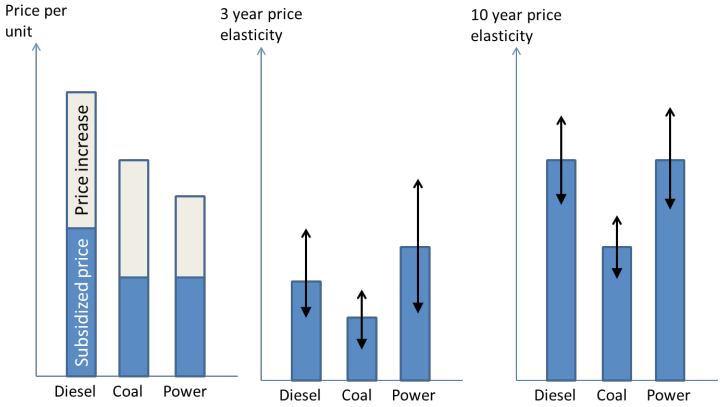

Figure A10. Cumulated uncertainties for estimating emissions impact of fuel subsidy removal

Source: Author diagram.

Studies on the empirical effect of subsidy removal are more limited than for carbon taxes, while theoretical general equilibrium-based assessments abound.

Annex B: The Political Economy of Introducing Mitigation Policies at the National Level

While price reforms appear to be an economic matter, there is substantial agreement that the crux lies in politics (e.g. Fritz et al., 2014).

In accordance with the theory of public choice, political decision making is influenced by interest groups and can lead to the formulation of a policy outcome that does not provide the largest societal benefits (Michaelowa, 1998). By a similar logic, collective action theory helps explain why mitigation policies are particularly vulnerable to the influence of interest groups: the groups who stand to benefit from mitigation are often diffuse and disorganized, while the "losers" tend to be concentrated and powerful (Jenkins, 2014). Therefore, understanding these stakeholders, their influence and underlying motivations is necessary in order to identify opportunities for crediting to support such policies.

This section analyzes the role of crediting in the political economy of introducing or increasing the mitigation impact of an ETS, a carbon tax and fossil fuel subsidy reform. For each policy, we discuss the political dynamics of implementation, draw analogues from existing similar policies and assess the advantages and disadvantages of crediting to address stakeholder concerns. Full analysis also requires an understanding of the impacts on each of these stakeholders, ideally both using analytical techniques and stakeholder perception. Beaton, et al. (2013) is one of the publications that show which impacts to assess across which stakeholders.

Crediting can directly influence energy/carbon pricing through revenues. This additional source of government income can be used to help generate support or limit opposition for pricing reform by changing the economic payoffs of the policy. Crediting can also have impacts on a more ideological level; these will also be explored in this section. Note that the impact of crediting can be positive, by changing stakeholder interests/stakes and strengthening pro-policy interest groups, but can also potentially reinforce opposition.

B1 NATIONAL STAKEHOLDERS

In general, we identify three categories of national stakeholders relevant for all policy types in this study:

- *Government* – while it is likely that the various ministries within governments will have different incentives and stances toward policy implementation, we focus this section on national politicians.
- *Domestic private industry*, including
  - Emissions-intensive heavy industries, which have a strong economic interest in preserving low carbon prices for the sake of maintaining profit margins and international competitiveness.
  - *Fuel producers* with an interest in keeping carbon prices low for the sake of maintaining high fuel consumption, profit margins and domestic competitiveness over renewable energy sources.
  - *Low-carbon technology/energy suppliers* who would directly benefit from higher carbon prices due to increased competitiveness against FF technologies.
- *The general population*, divided into three strata:
  - *The poor members of society* who depend on low energy prices to meet their basic daily needs such as cooking, heating, lighting, and transportation; and have limited ability to adapt to price changes.
  - *The emerging middle class,* a group particularly relevant for developing countries given its rapid expansion, driver of growth and political progress as well as its increasing consumption of energy-intensive goods and services.
  - *The societal elite with an emissions-intensive lifestyle*, but also the financial resources to respond to price changes.

These interest groups differ in their size, form of influence and political power. The differences need to be understood in order to prepare the subsequent analysis on opposition and support for reforming climate and energy policy e.g., by introducing crediting.[44]

[44] See Michaelowa 1998a for an analysis of this in the EU context.

The table below provides an overview of each stakeholder's position and influence on mitigation policy. The analysis is generic in nature: further details require analysis in a specific country.

Table B1. Overview of stakeholders' positions and influence on mitigation policy

Stakeholder	Interest and Stakes in Achieving Policy	Power
National politicians	**Economic payoffs:** Interested in maximizing income (e.g., from taxes, subsidy removal, auction revenues and offset revenues); might require successful mitigation policies to meet future emissions reductions obligations. **Reputational:** Preventing social unrest and instability as a result of the reform policy; reputation in the international arena as "progressive."	**Description:** Politicians can choose from a menu of measures to arrive at the same general outcome. Their choice will be driven by balancing their incentives to maintain political power and achieve efficient policy outcomes. **Form of influence:** Clientilism, campaigning and attempting to shape framing through the media.
Heavy Industry	**Economic payoffs:** Generally oppose energy pricing reform since it increases their costs, both directly (e.g., through taxes, compliance costs, abatement costs, increased factor prices) and indirectly (e.g., through devaluation of assets). This also has implications on global competitiveness of these industries. Only improved planning security could be an advantage. **Reputational:** May oppose the policy since it increases transparency of their contribution to climate change.	**Description:** Highly concentrated, well-organized and often financially and politically powerful. **Form of influence:** Lobbying politicians, influencing the public through advertisement campaigns.
Fuel producers	**Economic payoffs:** Stance on policy is dependent on whether pass through of costs is allowed. If pass through allowed: likely indifferent in the short-term; however, high fuel prices could result in decreased domestic demand in the long term. However, higher fuel (or carbon) prices could allow them to tap into international markets. If pass through not allowed: oppose policy due to decreased profit margins. **Reputational:** May oppose carbon-focused policies due to the unfavourable framing of "punishing fossil fuel use."	**Description:** Highly concentrated, well-organized and often financially and politically powerful. **Form of influence:** Lobbying politicians, influencing the public.
Low-carbon industry	**Economic payoffs:** Support the policy since it improves their competitiveness with incumbent emissions-intensive players. **Reputational:** Policy would "champion" low-carbon players.	**Description:** tend to be infant industries with limited influence. Form of influence: Lobbying politicians, influencing the public.
Poor members of society	**Economic payoffs:** Have a limited ability to respond to price increases so will be disproportionately adversely affected under the policy even if pass through of direct energy costs is not allowed as increases in indirect goods (e.g., food) is likely. **Reputational:** Could support policy if sustainable development benefits (improved air quality, freed up fiscal space for investment in development programs) are understood. Perceived impact of the policy is the key determinant of political action; this perceived impact can be highly influenced by others due to limited education levels of this group.	**Description:** Highly distributed and suffer from collective action problems of high costs of organization; however, their influence can be significant if collective action barriers are overcome); low in financial power. **Form of influence:** public protests, voting (in case of democratic regimes), political destabilization.
Emerging middle class	**Economic payoffs:** Interest in affordable consumption goods. Support or opposition of policies largely dependent on whether pass through of costs is permitted and the visible impact of the policy on factors such as employment, income, prices of consumption goods, social mobility etc. **Reputational:** Visibility of the above factors is largely dependent on framing by media. With more education environmental protection the logic of energy pricing reform policies (including longer-term benefits) may play a role.	**Description:** Collectively high in financial power (in the form of spending power), both governments and industries will be interested in appeasing the middle class to tap into this potential; tend to be concentrated in urban areas; influenced strongly by media. **Form of influence:** Voting (in case of democratic regimes), political destabilization.
Societal elite	**Economic payoffs:** Although typically leading an emissions-intensive lifestyle, potential impacts from crediting do not significantly impact their budgets; they might however be heavily involved with carbon-intensive or fossil fuel industries. **Reputational:** Their stance rather depends on the image they want to portray, which can be unpredictable and case-specific.	**Description:** Small group, can have personal connections to decision makers and industries. **Form of influence:** Influencing the public through well-known individuals, exploiting high-level government and industry connections.

B2 INSTITUTIONAL FACTORS

While stakeholders and their interests have a large influence on mitigation policies, institutional factors form the underlying drivers of their actions and incentives (Fritz et al., 2014). For example, a net exporter of fossil fuels will have less fiscal incentive for removing fossil fuel subsidies than a net importer, democratic regimes tend to be more accountable to their citizens than autocratic regimes, a small island developing state that will be significantly impacted by climate change may be more motivated to implement mitigation policies. A clear understanding of these institutional factors helps with the feasibility of implementing mitigation policies while increasing the mitigation impact of policies may even require changing some of these structures. Institutions will vary depending on each specific case and are thus more clearly reflected in the case studies below.

B3 ETS

An ETS does not generate government revenues unless allowances are auctioned. In such a case, revenues can be reinvested to improve acceptance of the instrument; for example, since 2008, the Regional Greenhouse Gas Initiative (RGGI) has partially used allowance auction revenues for direct bill-assistance programs for low-income families (Bifera, 2013). The design of efficient ETSs has historically been plagued by lobbying by interest groups. For example, in Phase 1 and 2 of the EU ETS, auctioning of allowances was strongly opposed on the grounds of competitiveness, leading instead to a grandfathering or free allocation of allowances based on National Allocation Plans and over-allocation of credits. These plans were influenced strongly by lobbying of individual firms rather than economic efficiency on the grounds that stringent caps could lead to carbon leakage. Given that ETSs do not encourage abatement beyond the cap, the risk of setting a lenient cap due to lobbying and distorted representation of industry projections places a particularly heavy weight on the environmental integrity of an ETS.

The matrix below summarizes the pros and cons of crediting to support an ETS in relation to stakeholder interests.

Table B2. Pros and cons of crediting to support an ETS, by stakeholder (+ = pro / – = con)

Stakeholder	Economic	Ideological
National politicians	+ Prospect of crediting revenues would incentivize setting an ambitious cap (credits likely to be given for the difference between the cap and the baseline). – Increased transaction costs due to an added layer of complexity (accounting, meeting international MRV standards etc.) [not applicable if the mechanism is the direct purchase of allowances].	+ Crediting would bring legitimacy to the allowances generated under the ETS. + Capacity building in MRV and accounting structures. Ideologically the international feel of crediting could be both advantageous and disadvantageous for ETS introduction.
Heavy industry	+ Increased ease of linking domestic market to an international one to lower future compliance costs. – Crediting revenues only occur ex post while investments in low-carbon technology are required ex ante.	– Crediting would emphasize the policy's carbon focus. + Capacity building in MRV could help industry adapt to future climate legislation.
Fuel producers	The economic effect is largely independent from crediting support.	– Crediting would emphasize the focus on carbon of the policy.
Low-carbon industry	+ In case of a more ambitious cap due to crediting, will benefit from additional revenues from emissions-intensive industries wishing to buy offsets.	+ Crediting revenues can be used to strengthen low-carbon industry and increase their influence.
Poor members of society	+ Crediting revenue could finance social programs/ finance low-carbon appliances that replace fossil fuel-based technologies (lighting, cooking, transportation).	+ Bilateral or multilateral crediting may be contingent on "high quality" offsets with co-benefits.
Emerging middle class	Social programs are unlikely to target this group, other economic effects from crediting support are unlikely to affect this group either.	
Societal elite		

B4 CARBON TAX

From a domestic stakeholder's perspective, a carbon tax has few disadvantages compared to an ETS. For a carbon tax, there is no prospect of windfall profits due to free allocation of credits and, for the public, the cost of a tax is more transparent. A revenue-neutral tax could serve to appease opposed interest groups by maintaining household purchasing power and the economic competitiveness of taxed industries. Tax neutrality is a cornerstone of several successfully implemented carbon taxes such as in British Columbia, Switzerland, Sweden and France. In France, this redistribution of revenue was deemed "a necessary and sufficient" condition to ensure acceptability of the tax (OECD, 2013). While such neutrality can be achieved through tax exemptions or reductions in taxes that are most penalizing for economic growth, arguably lump-sum compensations are more effective as they make the economic logic of neutrality more transparent (OECD, 2012). Even partial revenue redistribution may be sufficient to stymie interest groups, as the tax scheme in Finland, which uses revenues to decrease income taxes, with the rest accruing to the fiscal budget, demonstrates (Sumner et al. 2009).

Table B3. Pros and cons of crediting to support a Carbon Tax, by stakeholder (+ = pro / – = con)

Stakeholder	Economic	Ideological
National politicians	+ crediting revenues are an incentivize for policy introduction. – Since governments will have two sources of revenue (domestic tax and international credits), possibility that the level of the domestic tax could be set lower.	+ Crediting frames the tax as a policy with concrete (environmental) benefits rather than simply additional government revenue. – Offset revenues, on top of the tax, could exaggerate the fiscal benefits accruing to the government. This could paint the government in an unfavourable light, leading the population to think of it as excessive and the tax as "greedy."
Heavy industry	+ Crediting revenues can be used to buy off opposition to the tax via lump-sum payments or tax exemptions.	
Fuel producers		
Low-carbon industry		+ Crediting revenues can be used to strengthen low-carbon industry and increase their influence.
Poor members of society	+ crediting revenue could finance social programs/finance low-carbon appliances that replace fossil fuel-based technologies (lighting, cooking, transportation).	
Emerging middle class	+ Crediting revenues recycled or used to decrease other taxes (e.g., income tax).	
Societal elite		

B5 FOSSIL FUEL SUBSIDY REFORM

It is generally accepted that fossil fuel subsidy reform is economically advantageous for the implementing country, as it results in savings in the general budget and removes distortions in the market (IMF, 2013). A key driver in successful subsidy reform has been the pressure on fiscal budgets. However, there often is a lack of transparency about the fiscal cost of existing subsidies, due to poor governance or the fact that subsidies are often implicit (e.g., reflected as low energy prices instead of direct government transfers) and kept off government budgets, making it difficult for the public to recognize the inefficiency of subsidies (UNEP, 2003). Additionally, the benefits of reform tend to be diffuse and not transparent (or they are dispersed across members with both limited access to political decision-making processes and higher costs of organization). The benefits are also less certain than the losses that accrue to the (concentrated) losers. Information campaigns to increase the transparency about the allocation of costs and benefits of subsidy removal can mobilize those who would benefit from fuel subsidy reform in order to gain political support and momentum (Victor, 2009).

Even when the economic advantages of subsidy reform are recognized, social or political barriers must be overcome. Past efforts to adjust prices or remove consumption subsidies have been met with protests by well-organized interest groups, i.e., energy-intensive industries, who benefit from these subsidies, and, in many cases, led to a complete or partial reversal of the reform (IMF, 2013). These groups prove powerful, since it is often easier to demonstrate the concrete benefits of maintaining a subsidy than the implicit costs of keeping it. Compensation or inoculation of these interest groups is often required for successful implementation. For example, Germany's coal subsidy removal was accompanied by measures to preserve the jobs of coal miners, despite these measures being uneconomical overall (Victor, 2009).

Consumer subsidies are defended on the grounds that they help provide affordable energy access to the poorest; however, universal energy subsidies tend to be regressive since higher-income households spend more of their income on fuel. The poorest 20 per cent of households capture only 7 per cent of fossil fuel subsidies compared to 43 per cent of the richest 20 per cent of households in low- and middle-income countries (IEA, 2011). Still, the effect of removal of energy subsidies would likely be proportionally greater on the poorest members of the population, at least in the short term. As such, appropriate compensation measures—either through direct cash transfers or the scaling/implementation of social programs—are necessary from both an equity point of view as well as to prevent widespread social unrest (IEA, OPEC, OECD, & World Bank 2010).

Subsidy reforms can be more widely accepted if they are part of a larger package of reforms (e.g. improving energy security, quality of service [IMF, 2013]). This can address another barrier to subsidy removal—low levels of public trust in the government's reform agenda. Like a carbon tax, in theory subsidy reform can be "neutral" if the benefits are appropriately distributed to affected stakeholders. In practice, however, limited transparency and domestic capacity to achieve the desired distributional impact may make such targeted compensations schemes difficult.

Gradually phasing out of fossil fuel subsidies allows households to adjust to rising prices and the implementing country to build capacity using subsidy savings (i.e., developing the administrative tools to appease interest groups). Gradual phase-out also meets less political resistance (Beaton et al., 2013). However, gradual reform also results in lower short-term budgetary savings and thus less opportunity for the government to generate initial support by "showcasing" the improvements that savings can achieve.

Table B4. Pros and cons of crediting to support Energy Subsidy Reform, by stakeholder (+ = pro/– = con)

Stakeholder	Economic	Ideological
National politicians	+ Establishment of a crediting period could improve the robustness of reform by ensuring longer-term fiscal benefits. + Crediting revenues can support government budgets and decrease pressure for rapid phase-out. This would allow planning for a slower subsidy reform process and more discretion in choosing the starting time of the measure (e.g., to wait for a low international fuel price level). – MRV requirements could present a significant technical challenge.	– International interference in the energy sector could be perceived as a loss of national sovereignty.
Heavy industry	+ Establishment of a crediting framework will require transparency about energy subsidy reform timelines and thus reduce uncertainty and risk in investments.	– Accounting of subsidies under a crediting scheme forces transparency about cost and benefits of existing subsidies and undermines industry arguments for maintaining subsidies.
Fuel producers	+ Establishment of a crediting framework will require transparency about energy subsidy reform timelines; producers will know true and longer-term fuel prices.	
Low-carbon industry		+ Crediting revenues can be used to strengthen low-carbon industry and increase their influence.
Poor members of society	+ crediting revenue could finance social programs / finance low-carbon appliances that replace fossil fuel-based technologies (lighting, cooking, transportation). – Additionality requirements may require shorter crediting periods and thus shorter timelines for phasing out subsidies. This gives less flexibility for governments to pace subsidy phase-out in order to give poorest members of society time to adjust.	+ Transparency in credit revenues accruing to governments may increase government accountability to utilize these funds for targeted programs (rather than the implicit savings of energy subsidy reform that can easily be hidden).
Emerging middle class	– Inflationary effect of domestic energy prices not addressed by crediting	
Societal elite		

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