



SUMMARY FOR POLICY-MAKERS

Green Revenues for Green Energy: Environmental fiscal reform for renewable energy technology deployment in China

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1.0 Introduction

China's economy continues to grow rapidly with corresponding increases in both energy consumption and environmental pollution. Renewable energy is a key part of China's response to this challenge. The current costs of measures to facilitate the large-scale deployment of renewable energy are primarily met through an electricity surcharge—effectively a tax on electricity consumption. However, concerns have been raised that continuing to rely on the surcharge alone places a disproportionate burden on electricity consumers. In response, the need for further debate on how best to fund renewable energy and reduce environmental pollution was identified by the IISD and the CNREC, leading to the establishment of a research project to examine the international experience of similar schemes and their relevance to China. This report presents a summary for policy-makers of the findings of that research. The full report is available on the IISD website here: <http://www.iisd.org/publications/pub.aspx?pno=2848>.

Key Messages

There are many international examples of Environmental Fiscal Reform (EFR) measures linked to renewable energy. This report provides eight case studies selected to provide an illustrative range of applied instruments across a geographically and economically diverse range of countries. The case studies show a considerable diversity of policy instruments that share a common goal: the promotion of renewable energy research and development or deployment through environmental taxes, carbon trading or other environmental fiscal reform measures.

Earmarking revenues increases transparency, aids communication and reduces uncertainty for investors. Theorists contend that earmarking taxes reduces budgetary flexibility and, in general, should be avoided. However, many governments routinely ignore this principle in the case of environmental taxes, due to the strength of the perceived advantages for the communication, public acceptability and transparency of such measures. Indeed, in 2006 the OECD reported that around one third of environmental taxes included some level of earmarking (OECD, 2006).

International experience points towards a number of key findings that would apply to any country considering implementing an EFR:

- **Economic growth:** Environmental taxes and EFR measures do not necessarily have a negative impact on economic growth. If revenues are recycled effectively the impact can be positive.
- **Revenue stability:** Manual or automatic adjustment of environmental tax rates on a quarterly or annual basis can help maintain a constant flow of revenues and provide stable funding for spending commitments.
- **Allocating revenues:** Raising sufficient revenues to compensate groups that will see increased costs from the tax—both industry and households—and invest in renewable energy is key to the policy aims discussed here. Revenue recycling can bring potential opposition groups on board and mitigate distributional impacts resulting from increased prices, but it is essential that a surplus remains that may be invested in renewable energy.

EFR measures earmarked for renewable energy are one potential revenue source for renewable energy technology deployment in China that merits consideration. China has drawn up ambitious renewable energy targets that necessitate an increase in government spending over the next few years. If the source of revenues is drawn from taxes and charges on environmentally damaging activities, there is the opportunity to address environmental pollution, thus generating a “double dividend.”

An earmarked carbon tax measure in China faces some key political challenges, including concerns about whether ring-fencing revenues for a particular policy goal can be justified, the economic performance of the measure as a whole, and the need to coexist with established plans for carbon trading schemes as well as both proposed and existing environmental taxes and charges.

2.0 Using EFR Measures to Fund Renewables

Three factors have contributed to the current pressure to increase the proportion of renewable energy in the energy mix in China:

1. **High levels of GDP growth (4 per cent to 11 per cent on average between 2002 and 2011) and primary energy consumption (550 per cent between 1980 and 2011) (IEA, 2012).**
2. **China is a net importer of oil, coal and gas, creating pressing energy security concerns.**
3. **The manufacture and export of renewable energy technologies has become a strategically important industry in which China has become a global player.**

These factors have led China to include a target to increase power generation from renewable energy resources to 20 per cent by 2015 in its 12th five-year plan (FYP) (2011–2015) and have been supported by an estimated annual investment in renewable energy of US\$67 billion in 2012 (UNEP, 2013).

EFR shifts the burden of taxation and subsidies towards environmentally damaging activities and can raise substantial amounts of revenue that could be used to meet the need for future investment in renewable energy in China. In principle, EFR sets out to internalize external costs—to use fiscal measures to incorporate the cost of environmental, social and economic impacts incurred as a result of pollution or excessive resource use in the price of goods or services.

In China, there are currently a number of EFR measures in place. For example, energy taxes of between 0.3 to 30 RMB/tonne are levied on coal, crude oil, natural gas and other energy carriers. Renewable energy production and consumption are entitled to tax reductions including a 13 per cent value-added tax (VAT) rate (normal VAT rate is 17 per cent), accelerated depreciation of assets and a 15 per cent enterprise income tax rate (normal rate is 25 per cent). An excise tax reduction is available for biodiesel, and import duty exemptions are available for advanced wind power equipment. The National Bureau of Taxation reports that resource tax revenue rose from 6,286 billion RMB to 30,164 billion RMB between 1999 and 2008, but declined slightly as a proportion of total tax revenues from 0.61 per cent to 0.52 per cent over the same period.

The Chinese government has paid great attention to climate change... and will introduce a series of fiscal and taxation reforms to proactively promote emission reduction and new energy.

- Lou Jiwei (China Dialogue, 2013)

As well, the 12th FYP sets out China's commitment to develop a carbon trading market, with the National Development and Reform Commission (NDRC) determining seven cities and provinces (Beijing, Shanghai, Tianjin, Chongqing, Shenzhen, Guangdong and Hubei) in which to set up pilot projects to test emissions trading schemes (ETS). Finance Minister Lou Jiwei announced on July 10, 2013 at the 5th round of the China-U.S. Strategic and Economic Dialogue that China would extend environmental taxation to include carbon (Chinese Ministry of Finance, 2013), while recent statements by the Ministry of Finance have suggested that a carbon tax could be introduced by 2015. However, no political decisions had been made at the time of writing (BusinessGreen, 2012). A 2009 report from the Chinese Academy for Environmental Planning and the Energy Research Institute of the NDRC stated that a carbon price of 20 RMB/tonne (approximately US\$3.3/tonne) was the minimum needed to bring about emissions reductions (Wang, Yan, Jiang, Liu, Yang, & Ge, 2009). Against this background, this report sets out to investigate environmental fiscal reform and market-based instruments as possible mechanisms to both raise revenue and address some of the market distortions that may slow investment in renewables.

The non-affectation principle requires that tax revenues not be ring-fenced, although political economy benefits may override this principle.

While this report looks specifically at earmarking EFR revenues for renewable energy, the non-affectation principle requires that tax revenues are not ring-fenced, to allow flexibility in allocating spending. Indeed, the OECD warns that earmarking can create "rigidities" in the budget process, leading to economic inefficiencies and possibly the violation of the "polluter pays" principle. Nonetheless, one third of environmentally related taxes in OECD countries were earmarked in 2006 (OECD, 2006), at least in part due to the political economy benefits of earmarking. Earmarking allows governments to present a clear link between a tax rise and a corresponding increase in spending on a specific measure, helping to increase transparency and prevent the tax increase being viewed as a revenue-raising measure disconnected from any immediate benefits. Earmarking can also instil confidence in the beneficiaries of funds that there is a clear mechanism by which the funding will continue in the future. However, this can backfire if revenues raised do not correspond to spending requirements, as described in detail below.

3.0 Key Issues and Findings

A number of observations were made based on the case studies, presented here as key issues or findings. For each a brief discussion is provided, drawing on the theoretical literature and examples. The implications for China are highlighted at the end of each section.

3.1 Environmental Taxes Can Be Pro-Growth and Pro-Competitiveness

A common concern raised in response to proposals for EFR measures is that they will slow economic growth and reduce international competitiveness. All countries are concerned about this effect and have come up with some innovative ideas to limit the impact on growth in the design of EFR measures and to protect energy-intensive industry in particular from energy price increases.

- **Emissions intensity limits**, such as in Alberta's Specified Gas Emitters Regulation (SGER), place a charge based on emissions per unit of output, effectively providing a constant incentive that does not change due to economic activity.
- **Revenue recycling**, such as that used by Australia and the United Kingdom returns revenues to businesses so the overall effect is neutral, but a transfer is made to more efficient firms.

There is little evidence of environmentally related taxes having caused reductions in competitiveness of any sector, largely because governments have used a proportion of EFR revenues to protect sectors vulnerable to competitiveness impacts, or have exempted energy-intensive industry from EFR measures (OECD, 2006).

Furthermore, since the revenues collected are spent elsewhere, the net effects of EFR on the economy are not necessarily negative. Indeed, if the revenues can be diverted into a strategically important sector or can leverage private investment, or are recycled to reduce distortions in the economy, the net economic effect will probably be positive. Determining the overall economic impact of a system of taxation and spending is a complex matter, subject to much debate, and requires a detailed modelling exercise to fully understand. However, in several countries with carbon-energy taxation in Europe such modelling has been conducted (see e.g., COMETR, 2007), as well as in Japan (Lee, Pollitt, & Ueta, 2012), which indicates that slightly higher GDP growth is to be expected than in a business-as-usual scenario.

Implications for China: China's economy has grown at an unprecedented rate (11.2 per cent on average during the 11th five-year plan period (2006–2011)), and there are legitimate concerns that growth would be threatened by the imposition of additional taxes. However, policy instruments can be designed to limit the impact on strategic sectors through revenue recycling and compensatory measures. In addition, revenues may be used to deliver economic benefits through support to strategic priorities and sectors that may prove to have a net positive impact on economic growth.

3.2 Revenue Stability Can Be Ensured With Adjustments, Price Caps and Price Floors

The establishment of a link between an environmental tax and a program of spending is intended to provide predictability and transparency, as it establishes a clear link from revenues to spending in the future. However, it is by no means certain that this model will ensure stability of revenues. On the one hand, rapid technology cost reductions, such as those seen in the PV industry in recent years, can quickly change project economics and lead to an increase in deployment and support costs. On the other hand, revenues from EFR measures, particularly

those reliant on market-based pricing, may be unstable. For example, the German Energy and Climate Fund (ECF), which allocates revenues from the auction of EU ETS permits, is currently significantly underfunded, due to the fall in emissions allowance price in the EU ETS. Because funds did not correspond to spending requirements, the government and the German Bank for Reconstruction (KfW) have had to step in to meet the shortfall. Conversely, in India, coal cess revenues have not been spent by the National Clean Energy Fund (NCEF), largely due to poor governance. Both cases make clear that attempting to match a potentially unstable revenue stream with an equally unstable spending requirement is a significant challenge for policy-makers.

Nonetheless, the cases have revealed some innovative responses to this problem. Adjustment mechanisms can effectively reduce volatility and lead to stable revenue generation and spending, as seen in the case of the Danish Public Services Obligation (PSO), where tariff rates are reviewed every three months to ensure that revenues raised correspond to spending. Adjustment mechanisms, whether automatic or ad hoc, are also useful to compensate for falling revenues as the market reacts to the price signal, resulting in reduced levels of taxable polluting activities. In a similar vein, a price cap and/or a price floor can be imposed within ETS to limit market impacts on revenues. For example, a gradually increasing price floor (US\$14) and price cap (US\$19) will be in place during the transitional phase of the Australian carbon pricing mechanism from 2015–2018, while in Alberta, Canada, there is an effective price ceiling of US\$15 within the carbon trading system. A well-designed measure should include such mechanisms to reduce revenue and spending volatility to acceptable levels.

Implications for China: China should consider a revenue-raising mechanism designed to reflect the spending commitments of the renewable energy fund. As spending on renewable energy deployment requires long-term commitment, a mechanism that allows the policy to be reviewed regularly (and tax rates adjusted automatically or on an ad hoc basis and without political renegotiation) merits consideration.

3.3 Revenues Can Promote Renewables, as Well as Protecting the Vulnerable, Improving Competitiveness and Building Policy Acceptance

Revenues from environmental taxes are generally allocated to programs that reduce the net cost to those subject to the tax (revenue recycling) or to achieve a strategic goal, such as the promotion of renewable energy. If an EFR measure does not raise enough revenues to meet its spending goals, perhaps because a tax rate has been set too low, then that is clearly a case of poor policy design. In this report, environmental taxation is looked at through the lens of its potential to raise revenues, while protecting vulnerable groups from the impact of price increases. However, in the United Kingdom and Australia the overall fiscal impact of the measures examined was negative, as the cost of the various spending programs exceeded the revenues of the taxes, largely in response to the need to placate powerful opposition to EFR measures.

In Australia, the introduction of the carbon price was politically very controversial, and generous support to a number of stakeholder groups, including households and the coal and steel sectors, was deemed necessary to ensure the resulting scheme would be politically acceptable. This, in turn, led to more revenues being recycled to households or used to compensate industry than were raised by the introduction of the carbon price mechanism. In the United Kingdom the situation was slightly different. Widespread opposition to other EFR measures and concerns over industrial competitiveness meant that the tax was implemented at the same time as a corresponding cut in employment taxes, with the aim of revenue neutrality. In fact, revenues raised could not cover the cost of the tax cut, let alone the additional commitments of the climate change levy (CCL) to support renewables. Both cases exemplify how political economy concerns can lead to high levels of spending and negative fiscal impacts.

3.0 Key Issues and Findings

There are often good reasons to recycle a portion of revenues to assistance schemes, including protection of vulnerable groups, maintaining industrial competitiveness and reducing opposition from stakeholders. Revenue recycling measures were a feature of a number of schemes examined, and are, of course, a common feature of EFR, e.g., in Sweden, Denmark, Finland, the Netherlands, the United Kingdom and Germany, and should be considered during the design process of similar mechanisms. The decision to compensate, and if so, which groups and by how much, is inherently a political decision. There is a strong case for developing policies to protect vulnerable households, e.g. from energy price increases while retaining the incentive effect of an EFR measure.

Implications for China: The impacts on stakeholder groups and the case for providing compensation through assistance programs should be included in the design of an environmental fiscal measure. It is important to consider whether revenues raised will be able to meet the total spending needs of the policy, including revenue recycling and compensation, as well as renewable energy investment needs. More ambitious policies with higher tax rates are more likely to raise sufficient revenues to achieve all of these aims.

3.4 Policy Stability Increases Leveraging of Private Finance

A key part of the effectiveness of environmental taxes and renewable energy subsidies stems from market confidence that investments will have time to come to fruition before the policy measures are reformed or phased out. This is particularly important in the case of renewable energy deployment, where projects may take several years to recover their capital. Thus, policy instability thus discourages investment in the sector.

EFR instruments that have endured have tended to be those built on a cross-party consensus, such as the PSO in Denmark, where all the major parties were in favour of measures to support renewable energy as the country transitioned to a more liberalized electricity system. Similarly, the CCL in the United Kingdom was a project begun under a Conservative Government and continued under Labour. Conversely, where measures have been introduced by narrow margins in the face of strong opposition, concerns over whether measures will be removed, most notably the case in Australia, may have held back investors waiting to see if the policy would survive before committing resources to the development of projects. Equally, policies that require periodic renewal coupled with a lack of political consensus, such as the ITC and PTC in the United States, have been responsible for a series of “stop and go” cycles that have been detrimental to the renewable energy industry.

On the spending side, the creation of a renewable energy fund run at arm’s length from day-to-day decision making in government has helped to stabilize renewable energy funding in the medium term, such as Energienet.dk in Denmark.

Implications for China: China’s system of five-year plans is well suited to providing policy stability over the medium to long term. However, cross-departmental (such as fiscal, energy and environmental departments) support and consensus are still challenging and present a key barrier to implementation of successful EFR measures.

3.5 Multiple Environmental Fiscal Policies, Including Taxes and Trading Schemes, Can and Do Co-exist in Many Countries

The landscape of environmental tax policy is often complicated, as many of the case studies in the document show. In three of the cases, the United Kingdom, Denmark and Germany, EFR measures must coexist with the impact of the European Union Emissions Trading Scheme (EU-ETS). In two further case studies, Canada and the United States, the systems of federal and provincial/state government may create conflicts with local initiatives.

However, although the co-existence of national or supranational initiatives is a challenge for the development of environmental fiscal policy measures, the cases show that these problems can be dealt with effectively. In Europe,

concern over the low cost of carbon in the EU-ETS has led countries to impose new (or continue with existing) environmental taxes and charges on carbon and energy. In Alberta, the threat of federal measures was one factor in establishing the SGER, a provincial measure designed to be sensitive to local concerns around restricting economic growth. The case studies show that EFR measures rarely exist in a vacuum and that interaction with other measures is both feasible and commonplace.

Implications for China: To date, China has pursued both a system of carbon trading, through a series of seven pilot cities and provinces, in addition to plans to introduce a carbon tax (BusinessGreen, 2012). A key question is whether they will work in parallel or have only one system apply to each sector or province. Each system has advantages: where sectors involve a few large, relatively sophisticated actors, trading systems allow savings to be realized at the lowest marginal cost. On the other hand, a carbon tax provides more certainty to investors by establishing a clear price for emissions. International experience shows that there are numerous examples of EFR instruments that co-exist with similar measures across jurisdictions.

3.6 Renewable Energy Revenues Need Good Management and Governance if They Are to Achieve Targeted Objectives Efficiently

The case studies show two distinct systems for management of collection of revenues and spending. In the United Kingdom and Japan the revenues are managed by government departments in line with earmarking commitments where they are in place. By contrast, in Germany, India, Denmark and Alberta the revenues are allocated to a fund that operates with varying degrees of political independence and spending takes place according to the governance structures put in place at the establishment of the fund. The funds are either used to support one-off payments to specific projects following a competitive tender process, as in India and Alberta, or to support continuing obligations for renewable energy generation subsidies, as in Denmark. As mentioned above, it may be advantageous that such funds are distanced from annual budgetary decision-making processes, and thus tend to be more stable.

In both cases, the most important factor is the establishment of clear governance structures and clear rules about how funds are to be used—otherwise there is potential for accountability problems in the allocation of funds. In India, for example, there has been some concern around the use of funds from the Clean Energy Cess. The international experience shows that where earmarking measures are established with specific, targeted objectives and governance structures that provide accountability, there is less chance of mismanagement and funds being reallocated to pursue short-term political priorities at the expense of the original objectives. However, as priorities change, it may be necessary to revise objectives to meet changing needs and take account of short-, medium- and long-term goals.

Implications for China: A key rationale for the development of this project was the perceived need to identify sources of revenue that could be used to fund renewable energy deployment. If EFR were to be implemented in the Chinese case, revenues raised would meet a proportion of total renewable energy funding, with the remainder coming from the “renewable energy electricity price add-on.” Because an established structure already exists—the Renewable Energy Development Fund—adding revenues to this fund should be considered to minimize duplication and coordinate spending priorities. To ensure a good transition, short-, medium- and long-term actions would be needed. In the short term, while continuing to stabilize the system of renewable energy electricity price add-on, it would be advisable to start exploring a legislative and policy agenda of using natural resource taxes and a carbon tax to provide renewable energy with stable support, by setting up goals and building transitioning mechanisms. In the medium- and long-term, it would be advisable to smoothly and stably transition to rely more (or even completely) on using natural resource taxes and a carbon tax to fund renewable energy development, instead of the price add-on policy.

4.0 Further Research and Recommendations

The final section of the report proposes some directions for further research. First, the development of specific policy recommendations for the Chinese policy context against the background of an analysis of fiscal measures already in place is proposed. Second, modelling of possible policy instruments could be looked at in detail. Third and finally, the untapped potential of EFR measures to facilitate investment in renewable energy is identified as an area that would seem also to merit further in-depth research.

Annex: Case Studies

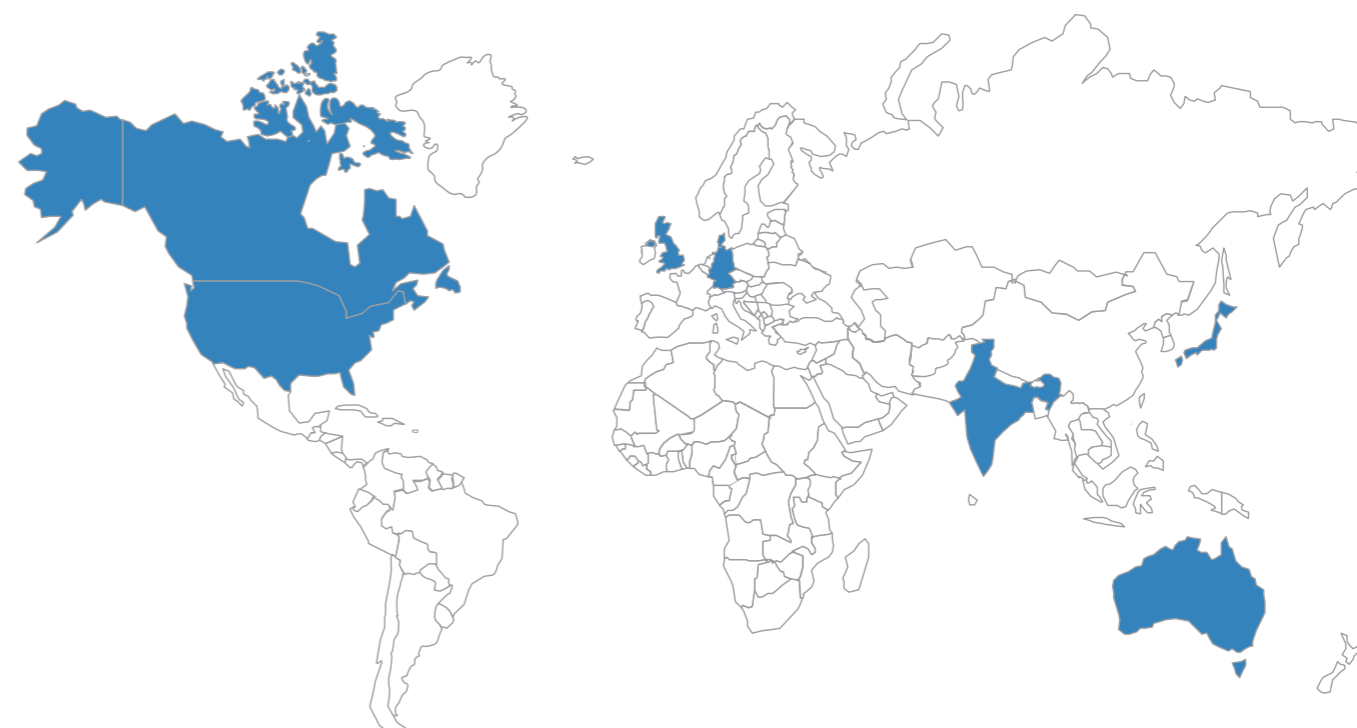
Each case study covers a specific fiscal instrument selected to provide an example of a measure that provides support to renewable energy and that is relevant to the debate in China.

The table provides a brief summary of each case study. The instruments reviewed in the case studies include examples of measures that effectively introduce charges on carbon emissions, energy consumption, inputs to the energy sector, and combined revenue raising and spending through a single tax break. The level of the charges was either established through market-based measures such as trading schemes, ad hoc decision-making processes, or set in response to revenue commitments. Finally, the revenues raised through the scheme were distributed to support renewable energy for the purposes of research and development, deployment or a combination of the two.

Full case studies are available in the full version of this report, which can be downloaded from IISD's website: www.iisd.org.

Australia	Clean Energy Future Carbon Price	A carbon price initially set in legislation and designed to transition towards a carbon trading system. The policy was introduced by a coalition government against political opposition. The overall fiscal impact is reported to be negative. Earmarking occurs primarily through the Clean Energy Finance Cooperation (CEFC). The recent election places the future of carbon pricing in Australia in doubt.
Canada, Alberta	The Specified Gas Emitters Regulation (SGER)	The SGER is an emissions intensity target on the most significant emitters. Those regulated under the scheme are obliged to meet an emissions intensity target, offset, or pay into the Climate Change and Emissions Management Fund (CCEMF). The CCEMF provides funding for energy efficiency and renewable energy projects.
Denmark	The Public Service Obligations Tariff (PSO)	Denmark operates a levy on electricity consumption. All revenues are allocated to Energinet.dk, an independent, not-for-profit body. The levy is adjusted quarterly to meet spending commitments. The structure of the mechanism gives a high degree of confidence to investors.
Germany	Energy and Climate Fund (ECF)	The ECF receives revenue from the sale of EU-ETS allowances. As an independent organization it has a degree of political autonomy. The low price of carbon in the EU-ETS has led to a shortfall in revenues and required additional funds to be obtained to meet obligations.
India	Clean Energy Cess on Coal	The Clean Energy Cess is a tax on coal. The revenues are allocated to a National Clean Energy Fund that provides funding to clean energy technology deployment and research and development. Some concerns have been raised about whether funding has been allocated in accordance with the original intentions of the fund, highlighting the need for strong governance.
Japan	Carbon Dioxide Tax of Global Warming Countermeasure	Japan has introduced taxes on carbon dioxide from petroleum, coal and gas in the face of opposition from industry. The low level of the tax means that the impacts are expected to be relatively small. The tax was reported to be under consideration for many years before finally being implemented in 2012.
United Kingdom	Climate Change Levy (CCL) and Climate Change Agreements (CCA)	The United Kingdom introduced a system of taxes on energy use in industry and the option of an exemption from part of the tax by signing up to sector-specific target benchmarks. Much of the revenue from the scheme was recycled to reduce the impact on competitiveness, although a small portion was allocated to the Carbon Trust to support the renewable energy research and development.
United States	Production Tax Credit (PTC) and Investment Tax Credit (ITC)	The PTC and ITC are tax credits that provide a direct tax break for renewable energy generation and investment in renewable energy, removing the need for the collection and disbursement of funds. Political disagreement over extension to the schemes has led to a "stop and go" renewables industry, where projects are either rushed to completion or shelved to match legislative timetables.

Map of Case Study Countries



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