"Fossil-fuel Support"
OECD Secretariat[1] background report to support the report on "Mobilizing Climate Finance"

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[1] The information provided in this background note is based primarily on recent and ongoing OECD analysis and data collection work. However, the views expressed in this note are those of the authors and do not necessarily represent the views of the OECD or its member countries. The OECD Secretariat team working on fossil fuel subsidies includes: Dale Andrew, Michael Ash, Heymi Bahar, Jonathan Coppel, Anthony Cox, Jean Chateau, James Greene, Michelle Harding, Chiara Martini, Stephen Matthews, Helen Mountford, Jehan Sauvage, Ronald Steenblik and Jagoda Sumicka. Jens Lundsgaard and Jean-Marc Burniaux contributed to some of the work on which this background paper is based while they were at the OECD.

In September 2009, G20 Leaders at the Pittsburgh Summit agreed to rationalise and phase out, over the medium term, inefficient fossil-fuel subsidies, noting that such subsidies "encourage wasteful consumption, reduce our energy security, impede investment in clean energy sources and undermine efforts to deal with the threat of climate change". The G20 also asked the IEA, OPEC, the OECD and the World Bank to produce a report analysing the scope of such subsidies and provide advice on their phase-out. A first joint report was delivered to the G20 Leaders' Summit in June 2010 in Toronto. The four International Organisations will provide an updated joint report for the G20 Leaders' Summit in November 2011 in Cannes.

Governments in both developed and developing countries have in place a number of different policy features which explicitly or implicitly support fossil-fuel production or consumption. Many of these effectively create incentives favouring the emission of carbon dioxide, one of the main greenhouse gases. Rationalizing or removing inefficient support features would not only reduce greenhouse gas emissions, but it would also raise government revenues and thereby free-up scarce resources. These resources could be used by governments to tackle other priorities instead. Supporting the aim of raising USD 100 billion per year in international climate finance by 2020 that countries committed to in the Cancún Agreements is one such potential use of the funds, along with other spending priorities and opportunities to improve tax structures by reducing taxes that may be harmful to growth and development. [2] The 2010 *Report of the Secretary-General's High-Level Advisory Group on Climate Change Financing* identified a potential for carbon-related revenues of USD 3-8 billion in revenues from the removal of those inefficient and wasteful subsidies to fossil fuels that G20 countries had identified for reform, and approximately USD 10 billion in redirection of fossil royalties in G-20 developed countries.

The OECD has compiled a new inventory of the various mechanisms that effectively support fossil-fuel production or consumption in 24 OECD countries using benchmarks and valuations from the respective governments. These measures have an aggregate value in the range of about USD 45-75 billion per year during the 2005-2010 period (OECD, 2011a).[3] For the Annex II countries under the UNFCCC (i.e. those countries that have committed to provide financial resources to enable developing countries to undertake emissions reduction activities under the Convention and to help them adapt to adverse effects of climate change), the aggregate was in the range of roughly USD 40-60 billion per year during this period.

1. Fossil-fuel support and the revenues that could be raised from support reform or removal

Governments support energy production in a number of ways, including by: intervening in markets in a way that affects costs or prices, transferring funds to recipients directly, assuming part of their risk, selectively reducing the taxes they would otherwise have to pay, and by undercharging for the use of

[2] Earmarking or hypothecating of the funds from a particular tax or from elimination of a particular tax preference to a particular spending program is not usually recommended. Sound fiscal management principles normally suggest that government spending priorities and revenue sources should be managed independently, since the ongoing revenues produced by a particular tax or tax reform are unlikely to match on an ongoing basis the expenditure needs associated with a particular spending policy. Avoiding lock-in allows changing priorities on the revenue and spending sides to be managed independently.

[3] The aggregates are arithmetic totals which do not take into account potential interactions that could affect the financial impact if multiple measures in a country were to be eliminated concurrently. See the discussion below and as elaborated in OECD (2011a) for more information.

government-supplied goods or assets. Support to energy consumption is also provided through several common channels: price controls intended to regulate the cost of energy to consumers, direct financial transfers, schemes designed to provide consumers with rebates on purchases of energy products, and tax relief.

Figure 1 provides an organising framework for examining different types of support to fossil-fuels, similar to the framework used by the OECD for organising data on support to agriculture. It divides incidence into consumption and production, and production into several sub-categories depending on whether the measure relates to output returns (*i.e.*, the unit revenues received from sales); enterprise income (the overall income of producers); the costs of intermediate inputs, such as fuel or electricity; and the costs of production factors — labour, land (which includes access to sub-surface natural resources), capital and new knowledge. The other dimension of the figure, transfer mechanism, refers to how the transfer is created.

Efforts to reform fossil fuel subsidies have been hampered by a widespread lack of data and information on fossil fuel-support. Collecting these data is an essential first step towards understanding the impacts of specific support mechanisms on government budgets, the economy, the environment, sectoral competitiveness, and low-income households.

Many of the mechanisms that support fossil-fuel production or use in developed counties are difficult to identify and estimate. The OECD has made a first attempt to compile an inventory of the direct budgetary transfers and tax expenditures reported by governments whose effect is to support fossil-fuel production and consumption in 24 OECD countries, of which 11 are G20 countries.[4] The data were sourced from official government documents and web sites, complemented by information provided directly by government agencies themselves. Where governments do not provide such information, the allocation of support across particular fuels was estimated by the OECD based on relative production or consumption levels. The inventory includes a small sampling of support provided by states, provinces or *Länder* in federal systems. The inventory has been organized using the Producer and Consumer Support Estimate (PSE and CSE) accounting framework, which is the method that has been used to estimate government support in a number of other sectors, including agriculture, for almost three decades. Over 250 individual support mechanisms to fossil fuel production or use are identified in the inventory.

[4] Australia, Belgium, Canada, Chile, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Spain, Sweden, Turkey, the UK, and US. Inventories for the other 11 OECD countries will be developed in the near future.

Figure 1. Matrix of fossil fuel support measures, with examples

Transfer Mechanism (how a transfer is created)	Statutory or Formal Incidence (to whom and what a transfer is first given)								
	Production							Direct consumption	
	Output returns	Enterprise income	Cost of intermediate inputs	Costs of Production Factors				Unit cost of consumption	Household or enterprise income
				Labour	Land	Capital	Knowledge		
Direct transfer of funds	Output bounty or defficiency payment	Operating grant	Input-price subsidy	Wage subsidy	Capital grant linked to acquisition of land	Capital grant linked to capital	Government R&D	Unit subsidy	Government-subsidized life-line electricity rate
Tax revenue foregone	Production tax credit	Reduced rate of income tax	Reduction in excise tax on input	Reduction in social charges (payroll taxes)	Property-tax reduction or exemption	Investment tax credit	Tax credit for private R&D	VAT or excise-tax concession on fuel	Tax deduction related to energy purchases that exceed given share of income
Other government revenue foregone	Reduced resource-rent tax		Under-pricing of a good, government service or access to a natural resource		Under-pricing of access to government land; reduced royalty payment		Government transfer of intellectual property right	Under-pricing of access to a natural resource harvested by final consumer	
Transfer of risk to government	Government buffer stock	Third-party liability limit for producers	Provision of security (e.g., military protection of supply lines)	Assumption of occupational health and accident liabilities	Credit guarantee linked to acquisition of land	Credit guarantee linked to capital		Price-triggered subsidy	Means-tested cold-weather grant
Induced transfers	Import tariff or export subsidy	Monopoly concession	Monopsony concession; export restriction	Wage control	Land-use control	Credit control (sector-specific)	Deviations from standard IPR rules	Regulated price; cross subsidy	Mandated life-line electricity rate

Source: OECD.

The scope of what is considered "support" for the purposes of the OECD inventory is deliberately broad. It includes both direct budgetary transfers and tax expenditures that in some way provide a benefit or preference for fossil fuel production or consumption relative to alternatives.[5] The consequence of the broad conception of support is that while a number of these measures may be inefficient or wasteful, others may not be. The inventory does not provide any analysis of the impacts of specific support measures, and so does not pass any judgement on which measures might be usefully kept in place and which ones a country might wish to consider for possible reform or removal. Its purpose is to provide information about policies that provide some level of support, as a starting point for further analysis about the objectives of particular measures, their impacts (economically, environmentally and socially), and possible reforms and alternatives.

The scope of coverage in the inventory is limited by variations in the extent to which governments report on the existence and value of support mechanisms. Also, measures at the sub-national level in federal countries were only canvassed at this stage on a selective basis, due to time and resource constraints. This first attempt at estimating support to fossil-fuel production and consumption provided by a broad range of countries of necessity concentrates on budgetary transfers and tax expenditures relating to fossil fuels. Data on these transfers are relatively straightforward to obtain from official government documents. These measures correspond, respectively, to the first and second rows in Figure 1, and also touch on elements in the third row. While the current OECD inventory aims to be as comprehensive as possible, it represents only a first effort to collect these data and some support measures will have been missed. Numerous other forms of support — notably those provided through risk transfers, concessional credit, injections of funds (as equity) into state-owned enterprises, and market price support — were not quantified, however. The data requirements for estimating the transfers associated with such measures are greater, and the calculations required to estimate the support elements more complex, than for budgetary transfers and tax expenditures. Nonetheless, a full inventory of support would ideally include these transfers. Also not covered by this exercise are measures relating to energy-consuming capital, such as support to the manufacturing of motor vehicles designed to run on petroleum fuels, or to electricity producers.

Caution is required in interpreting the support amounts and in aggregating them. This is particularly true as the majority of support mechanisms identified in the inventory are tax expenditures, and are measured with reference to a benchmark tax treatment that is generally specific to a given country (see Box 1). A tax expenditure is a relative measure of the amount by which tax revenues are lower as a result of some preference than they would be under the benchmark rules of the particular national tax system. It is not an absolute measure of the level of taxation on a transaction. Since tax systems and benchmarks vary so much, tax expenditure values are not generally comparable across countries. Also, tax expenditures are generally estimated one at a time, assuming that everything else in the tax system remains unchanged. Due to interactions, the revenue gain from eliminating multiple measures is not necessarily the same as the sum of the values of the individual measures.

[5] Thus, for example, with respect to tax expenditures, support includes support given in relative terms. Even though two comparable products may both be taxed in a particular country, a lower level of taxation on one than the other may be considered support, since the tax structure changes market prices in a non-neutral way more favourable to the lower-taxed product.

Box 1. Measurement and interpretation of tax expenditures

Unlike direct expenditures, where outlays can usually be readily measured, tax expenditures are estimates of revenue that is foregone due to a particular feature of the tax system that reduces or postpones tax relative to some benchmark tax system. There are a number of important caveats concerning both the interpretation and comparability of tax expenditure estimates.

A key challenge in determining or assessing tax expenditures is to identify the standard or benchmark tax regime against which the nature and extent of any concession is judged. A number of different approaches to deciding on the benchmark regime are possible, and these vary among countries. The data on tax expenditures that is provided in the OECD inventory reflects estimates generated by country governments themselves, and as such reflect the benchmark against which the governments chose to make these comparisons. In the absence of a common benchmark for tax expenditures across countries, the tax expenditure estimates are not readily comparable across countries.

Even when the baseline is clear, countries use different ways to measure the extent of the tax expenditure including, for example, revenue forgone, revenue gained, or the expenditure equivalent.

Whatever baseline is chosen against which to measure tax expenditures, it is also important to consider the overall taxation system, and the interactions among different elements of the tax system. Due to interactions and behavioural responses, the revenue impact of eliminating multiple measures is not necessarily equal to the sum of the individual values. Great caution is therefore required in adding together estimates of multiple measures. It should also be noted that the level of transparency in reporting tax expenditures varies among countries – some provide estimates for a broad range of measures, while others provided much less information.

In light of these factors, tax expenditure estimates must be used carefully. The fact that a particular country reports higher tax expenditures relating to fossil fuels than another does not necessarily mean that the first country effectively provides a higher level of support. The higher tax expenditures may be due to factors such as:

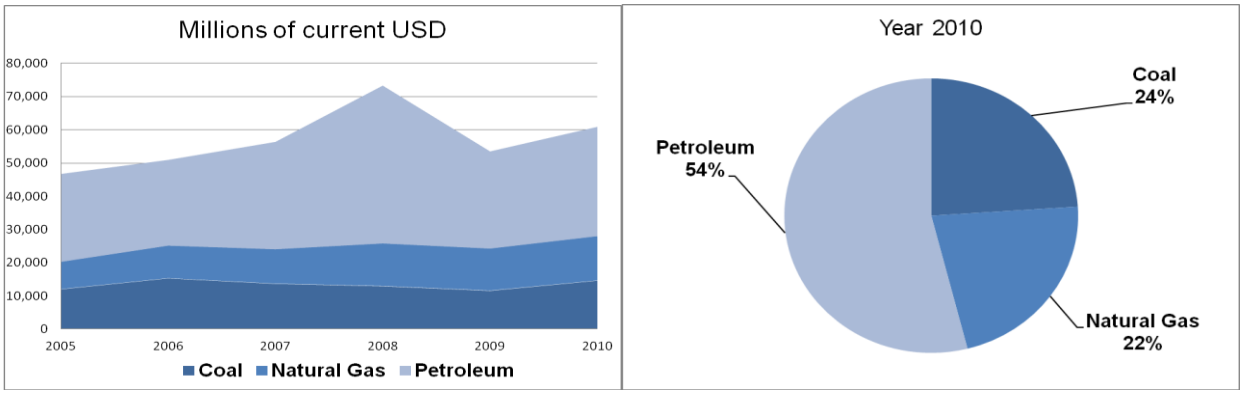
- higher benchmark tax rates against which tax expenditures are measured;
- a stricter definition of the benchmark tax system that results in more features being singled out as tax expenditures; or
- a more complete set of tax expenditure accounts.

Source: OECD (2011a)

Bearing these caveats in mind, the various mechanisms that effectively support fossil-fuel production or consumption in the 24 OECD countries inventoried are estimated, using benchmarks and valuations from the respective governments, to have an aggregate value in the range of roughly USD 45-75 billion per year over the 2005-2010 period (see Figure 2). Petroleum products (*i.e.* crude oil and its derivative products) have generally been the prime beneficiary of the measures underlying these estimates. Mexico's Petroleum Revenue Stabilisation Fund (FEIP) is largely responsible for the peak in support observable in 2008 (USD 73 billion). This increase owes much to world crude-oil prices, which averaged about USD 100 a barrel in 2008 (WTI, spot prices). This can be seen in the decomposition of the total OECD estimate, which attributes the peak to consumer measures and to petroleum products. The peak

also serves to illustrate how individual reporting of the measures by countries can influence aggregate estimates.

Figure 2. Support to fossil fuels in OECD countries by type of fuel

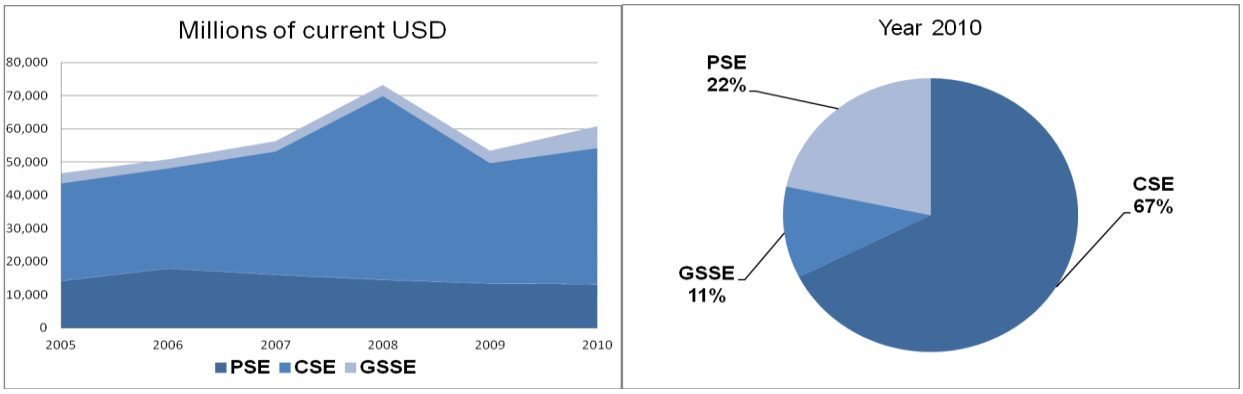


Note: This graph is based on an arithmetic sum of the individual support measures identified for a sample of 21 OECD countries, *i.e.* the 24 OECD countries included in the inventory net of those countries for which estimates have not been collected yet (Chile, Iceland and Luxembourg). It includes the value of tax relief measured under each jurisdiction's benchmark tax treatment. The estimates do not take into account interactions that may occur if multiple measures were to be removed at the same time.

Source: OECD (2011a).

In terms of recipients, Figure 3 indicates that consumers appear to have attracted a larger share of support than producers, at least formally, since these estimates do not take into account ultimate incidence nor the behavioural responses of economic agents to the measures considered. As discussed above, the set of measures that underlie the trends comprise a wide array of budgetary support and tax provisions, the effects of which are uncertain and hard to gauge. Moreover, some of these measures were introduced for reasons that bear little relation to increasing the supply or demand of fossil fuels. This is most evident when it comes to those programmes that provide support to low-income households in the form of preferential natural-gas tariffs or lower heating bills. In the United States, the federal Low-Income Home Energy Assistance Program (LIHEAP) is one example of a measure that fulfils a redistributive objective by subsidising the consumption of fossil fuels for those households having incomes below a pre-determined level. LIHEAP funding totals between USD 1 billion and USD 4 billion a year.

Figure 3. Support to fossil fuels in OECD countries by type of support



Notes:

- PSE = Producer Support Estimate; CSE = Consumer Support Estimate; GSSE = General Services Support Estimate. See OECD Secretariat (May 2010) for more information.

- This graph is based on an arithmetic sum of the individual support measures identified for a sample of 21 OECD countries, *i.e.* the 24 OECD countries included in the inventory net of those countries for which estimates have not been collected yet (Chile, Iceland and Luxembourg). It includes the value of tax relief measured under each jurisdiction's benchmark tax treatment. The estimates do not take into account interactions that may occur if multiple measures were to be removed at the same time.

Source: OECD (2011a)

The evolution of the country estimates underlying these aggregates reflects some important policy changes. Germany's decision to phase out support for its domestic hard-coal industry by the end of 2018 is reflected in a decline in the value of this support from about EUR 5 billion in 1999 (about 0.24% of GDP) to about EUR 2 billion (about 0.09% of GDP) in 2009. In the case of the United States, although total producer support represented slightly more than USD 5 billion in 2009 (about 0.04% of GDP), the federal budget for FY2012 proposes to eliminate a number of tax preferences benefitting fossil fuels, which could increase revenues by more than USD 3.6 billion in 2012 (OMB, 2011).

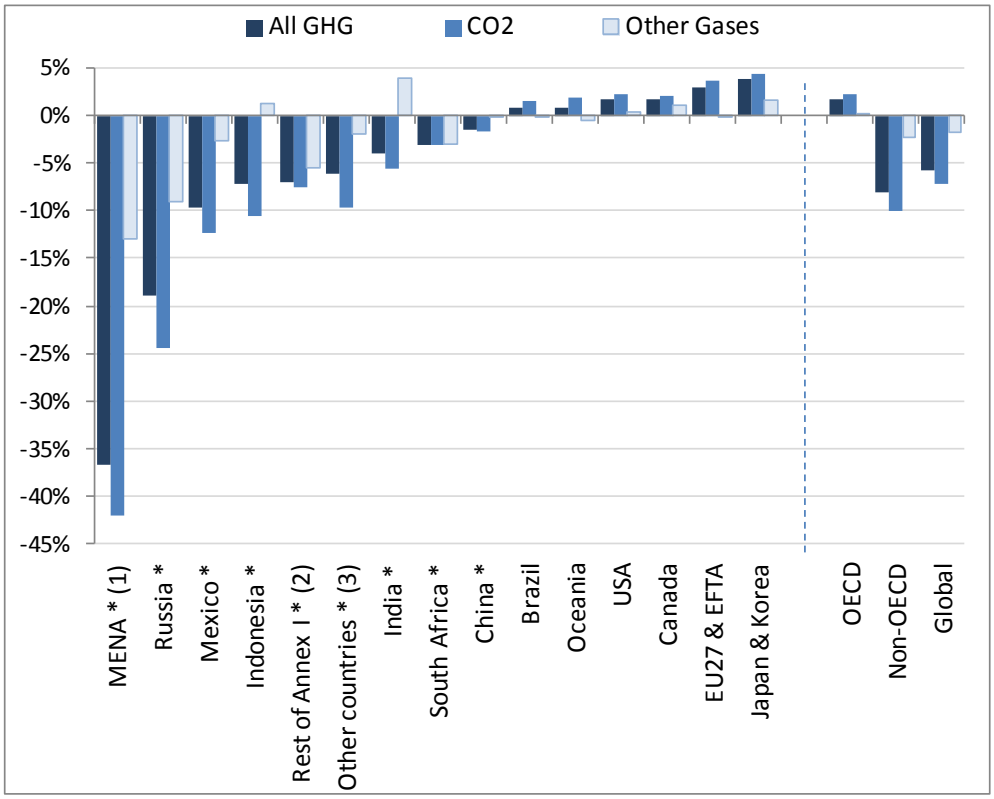
There is also considerable scope for reforming fossil-fuel subsidies in developing countries, and using some of the resources saved to more directly target poverty alleviation and other development priorities. Subsidies to fuel and electricity consumption are common in a number of developing and emerging economies. Using the Price Gap Approach, the IEA estimates that direct subsidies to consumers in these countries amounted to USD 557 billion in 2008 and USD 312 billion in 2009 (IEA, 2010). A number of these countries may also support fossil-fuel production.

2. The effects of fossil fuel support reform

Fossil-fuel subsidies are costly to taxpayers, and can damage the environment through increased emissions of greenhouse gases and other air pollutants. They amount to a *de facto* reward for carbon emissions. Removing these subsidies would lower the global costs of achieving a given goal to reduce greenhouse-gas emissions, and would constitute an important contribution towards addressing climate change (OECD, 2009).

Using the ENV-Linkages global general equilibrium model at the OECD[6] and IEA data on fossil-fuel consumption subsidies in emerging and developing countries in 2009, OECD analysis projects that phasing-out fossil-fuel consumption subsidies in emerging and developing countries by 2020 could lead to about a 6% reduction in global greenhouse gas emissions in 2050 compared with a business-as-usual scenario (Figure 4). The resulting reduction in emissions would be quite substantial in some countries or regions, for example amounting to a reduction of more than 20% of emissions in 2050 in Russia, and in Middle-East and North African countries (MENA) countries compared with the business-as-usual projection. This stylised policy simulation assumes that there is no action taken to reduce greenhouse gas emissions in OECD countries, and thus there is some leakage of emissions to OECD countries as a result of the reforms. If OECD countries do take action to reduce their emissions, in-line with their national plans and te commitments they made at the Cancún UNFCCC conference, the total emission reductions worldwide would be even greater.

Figure 4. Greenhouse gas emission reductions in 2050 from removing fossil fuel subsidies in emerging and developing countries (% change from the baseline)



Notes:
* Regions in which the fossil fuel subsidies have been removed.

(1) Middle East & Northern Africa.

(2) Other European Annex I countries : Turkey, Ukraine, Belarus, Croatia, etc.

(3) Other Asian, African and Latin American economies.

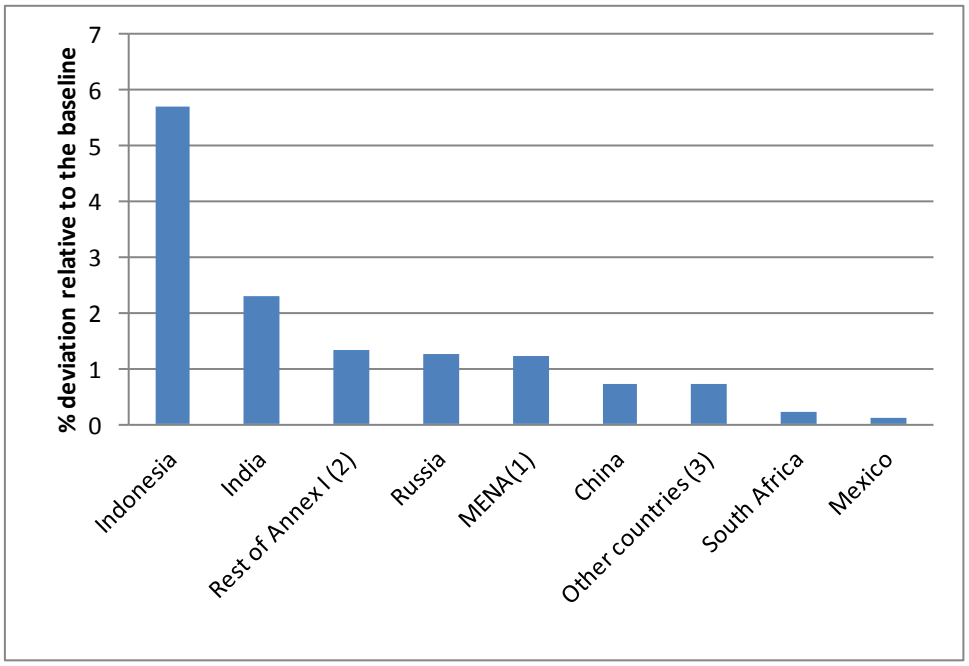
Source: OECD ENV-Linkages model; based on 2009 subsidies data from IEA.

[6] See Burniaux and Chateau (2010) for a detailed explanation of the ENV-Linkages Model.

Recent efforts to reform and phase out fossil-fuel subsidies, including the efforts undertaken by a number of G20 countries, have had an impact. This new modelling-based analysis by the OECD suggests that, compared with the projections from just a few years ago, GHG emissions from 2020 to 2050 will be about 3-4% less as a result of the reductions that have been seen in fossil fuel subsidies in recent years.

In most cases, countries implementing subsidy reform would realise a net welfare gain. Removing the subsidies would increase the efficiency of economies, reduce the financial burden on government budgets, and alleviate the potentially distortive effects of subsidies on competition. Thus, the OECD analysis suggests that most countries or regions would record real income gains and GDP benefits from unilaterally removing their subsidies to fossil-fuel consumption, as a result of a more efficient allocation of resources across sectors (Figure 5).[7]

Figure 5. Impact of unilateral removal of fossil fuel subsidies on the real income of selected countries and regions in 2050 (% change from the baseline)



N*otes*:
(1) Middle East & Northern Africa.
(2) Other European Annex I countries : Turkey, Ukraine, Belarus, Croatia, etc.
(3) Other Asian, African and Latin American economies.

Source: OECD ENV-Linkages model; based on 2009 subsidies data from IEA.

For some oil-exporting countries, these economic benefits would be offset by trade impacts if other countries also removed their subsidies and thus reduced their demand for fossil-fuel imports. The

[7] In the OECD modelling simulations analysed here, the budgetary savings obtained from subsidy removal are entirely refunded to households in a lump-sum manner. Alternatively, this transfer could be used to reduce other distorting taxes, which would increase the real income gain from subsidy removal, or to reduce poverty in a more targeted and efficient way than through a uniform subsidy to fossil-fuel consumption.

resulting income losses for energy-exporting countries would be, however, compensated by a longer production profile over time as a result of slower depletion.

Box 2. Uncertainties and robustness to alternative assumptions

The analysis presented here relies on a number of assumptions that potentially affect the results.

Reference years, country coverage and methodological assumptions

Price gaps, including the ones used for the subsidy estimates in this exercise, are usually calculated by using the corresponding world market price as a reference price. To the extent that world market prices are relatively volatile and that countries tend to isolate their domestic market from world market price fluctuations, for instance, by setting domestic prices administratively, price gaps are likely to change over time and the estimated impact of subsidy reform will depend on the year for which the price gaps are estimated. OECD analysis suggests that total reductions of GHG emissions at the world level obtained by removing price gaps are quite similar regardless of the year used as a reference for estimating the price gaps, although the pattern of reductions across countries or regions differs (Burniaux and Chateau, 2011). The choice of an appropriate reference price for estimating the electricity price gaps is not so easy compared with fossil fuels, as electricity is generally not traded internationally.

Values of fossil-fuel supply elasticities

One of the largest sources of uncertainty is related to the assumed values of the price-elasticity of fossil fuel supply. The scenario presented here is based on the assumption that the supply of coal is much more elastic (with an elasticity equal to 10) than for crude oil and natural gas (with elasticities respectively equal to 1 and 0.8). Lower supply elasticities would yield lower emission reductions, because a larger proportion of the emission reduction achieved in non-OECD countries is offset by emission increases in OECD countries. In the extreme case of completely inelastic fossil fuel supplies, the environmental benefit of the subsidy removal becomes negligible. In the ENV-Linkages model, the fossil-fuel extracting sectors (coal mining, crude oil and natural gas) are modelled assuming a quasi-Leontief input structure and a specific factor corresponding to the use of the corresponding resource, the supply of which is more or less elastic. Therefore, higher supply elasticities imply that more fossil fuel is left in the ground as a result of a subsidy removal, hence implying GDP losses in fossil-fuel exporting countries that partly offset the welfare gains from the subsidy reform.

Often subsidies to fossil fuel consumption are provided through across-the-board reduced prices for electricity or fuels, which may primarily benefit middle- and higher-income households (e.g. those that can afford cars). Reducing these across-the-board subsidies would generate large budgetary savings, with OECD analysis suggesting that the suppression of fossil-fuel subsidies could lead in 2020 to extra government revenues equal to up to 5% of GDP in some regions.

The funds from these budgetary savings could be used to reduce other distorting taxes, which would increase the economic gains from subsidy removal; to contribute to fiscal consolidation; or to reduce

poverty in a more targeted and efficient way than through an across-the-board subsidy to fossil-fuel consumption.

In addition to their economic and environmental costs, fossil-fuel subsidies are often very inefficient at achieving their intended social objectives. Several studies reviewed by the Independent Evaluation Group of the World Bank found that subsidies to fossil-fuel use tend to benefit high-income households more than the poor, due to the former's higher consumption levels (IEG, 2008). According to that report, the bottom 40% of the population in terms of income distribution received only 15-20% of the fuel subsidies in developing countries.

3. Lessons learned in managing the process of fossil-fuel subsidy reform

Experience shows that it is not easy to reform or phase-out environmentally-harmful and costly subsidies, given the vested interests of those that benefit from them and limited available data on these subsidies.

A number of countries have made significant progress in phasing-out fossil-fuel subsidies in recent years. Annex I provides summaries of recent reforms in subsidies to fossil-fuel producers and consumers in a number of OECD and non-OECD countries. Some of the key elements of successful subsidy reform emerging from these case studies are highlighted below.

The case studies on fossil-fuel subsidies provided to producers (either to industry or to electricity generation), show that these subsidies tend to become embedded in the operations of the companies. Gaining political support to reform such subsidies therefore requires careful design of the reform process to ensure that firms are able to adapt to the new economic circumstances. To make progress in reform efforts, in addition to providing transparent and timely information about the expected impacts of the reform, governments may also wish to provide temporary and targeted assistance for affected firms to, for example, restructure their operations, exit the industry, or adopt alternative technologies. Assistance to affected workers may be part of such packages and could include initiatives for worker retraining or relocation, or the provision of incentives to diversify the regional economic base.

Recent reforms to coal subsidies in a number of European countries provide examples of how governments have addressed these distributional concerns in the past few decades. Reforms of coal subsidies in Germany and Poland were accompanied by social assistance related to the closure of mines and, in the case of Poland, generous severance packages for affected workers. Reforms to the UK coal-mining industry were initially imposed with little adjustment assistance, leading to problems such as high unemployment and poor health in the affected regions. However, in 2000, the UK government began providing some financial support to assist the remaining parts of the coal industry to adjust their operations to be able to enter into commercially realistic investment projects that maintain access to coal reserves, provide employment opportunities in disadvantaged areas, and create an enabling environment for the development of alternative economic opportunities in coal-mining areas. This support has now ended.

In general, it is necessary that any assistance for economic restructuring or industry adjustment in response to subsidy reform be well-targeted, transparent and time-bound. A package approach is required to ensure that the distributional impacts on all affected parties (both companies and individual workers and communities) are addressed. This is an important component of the process of gaining support for subsidy reform. At the same time, as has been highlighted in OECD's work on green growth, it is important to bear in mind that while it will be necessary to ensure a smooth transition for workers

in sectors negatively affected by support phase-out, the efficiency and economic gains from the reforms will also lead to opportunities for new jobs growth in other sectors in a growing, innovative economy (OECD, 2011b).

The case studies on reform of subsidies to fossil fuel consumption also indicate some general lessons with regards successful reform efforts. Increasing the availability and transparency of energy support data is essential. Improved data on the scope and nature of fossil-fuel support can be useful in dispelling myths and misinformation and can encourage informed discussion and debate among both those with an interest in maintaining the policy features that provide support and those interested in their reform. In addition, support data collection and transparency can promote peer review and encourage compliance with any future subsidy reform processes.

Providing financial support for economic restructuring or poverty alleviation can help smooth the path for reform of consumer subsidies. However, such support should be well-targeted, temporary, and transparent. It should not be automatically provided, but an assessment should be made of the extent to which the economy and society can absorb the impacts of the reform, especially if the reforms are phased in over a long period. Reforms to fossil-fuel subsidies should also be considered in a package context, particularly if there are broader structural reforms underway or contemplated, and if there are opportunities to provide assistance for regional economic diversification. The experiences of Indonesia and Malaysia highlight the potential for the provision of social safety nets to be less expensive for the public purse than pursuing support to fossil fuel consumption.

An important condition for successful subsidy reform is the credibility of the government's commitment to compensate vulnerable groups for energy price increases, and, more generally, to use the freed public funds in a beneficial way. Governments need to ensure public trust in the reform agenda through broad communication, and appropriate timing of subsidy removal and implementation of compensatory social policies. Groups that are severely affected by subsidy reforms — including but not restricted to the poor — may need to be compensated. The compensation should be substantial enough to mitigate the adverse impacts that may occur, especially in the initial post reform period. A fine-tuned communication strategy is needed to explain the reform rationale and the associated compensatory measures that will be taken, before they are introduced, so as to establish trust in the reform program and to convince potential losers from reforms that the costs to them will not be as onerous as feared.

It is important to consider alternative policy tools to protect the poor, including cash and non-cash transfers, and lifeline rates. These more targeted support programmes often perform better than universal subsidies, and reduce incentives for fossil-fuel consumption. Setting up the systems to implement a new cash transfer program can indeed be challenging, as proved by the Indonesian case, and may require significant resources and a clear time frame. Compared with universal subsidies, targeted cash transfers tend to have lower leakage (inclusion errors) but sometimes higher exclusion errors if the programs are not well designed and implemented. The choice of program design features and institutional arrangements should be consistent with the administrative context and capacity in particular countries. Targeting of subsidies could also be improved by using available targeting instruments that can be supported with the use of administrative technological innovations, the use of social tariffs for gas and electricity, or income support for low-income households to help them pay their energy costs.

Looking across the experiences of governments that have managed to successfully reduce fossil-fuel and electricity subsidies, some common strategies for success can be identified, including:

- Increasing the availability and transparency of support data. Improved data on the scope and nature of fossil-fuel support can be useful in dispelling myths and misinformation, especially with respect to the distributional and competitive effects of reform. Increased transparency can encourage informed discussion and debate among both those with an interest in maintaining policy features that provide support and those interested in their reform. In particular, an important part of the communication strategy should focus on the fact that, while reforming heavily subsidised sectors may weigh heavily on state budgets, such costs are experienced in the short to medium term until the completion of the reform, while allowing subsidies to continue would lead to greater costs over the long term and the continuation of distorted markets.

- Providing financial support for economic restructuring or poverty alleviation to smooth the path for fossil-fuel subsidies reform. However, such support should be well-targeted, temporary, and transparent. It should not be automatically provided, but an assessment should be made of the extent to which the economy and society can absorb the impacts of the reform, especially if the reforms are phased-in over a long period. Alternative policy tools to protect the poor should be considered, including cash and non-cash transfers, and lifeline rates, which generally perform better than universal subsidies.

- Where possible, integrating reforms to fossil-fuel subsidies in a package together with broader structural reforms. Timing is also key: it is easier to implement a reform when there is more confidence in the markets and from the public in new economic activities. The rationale for the maintenance of inefficient subsidies and industries becomes weak when the economic outlook is bright.

- Ensuring credibility of the government's commitment to compensate vulnerable groups for energy price increases, and, more generally, to use the freed public funds in a beneficial way. Governments need to ensure public trust in the reform agenda through broad communication, appropriate timing of subsidy removal, and implementation of compensatory social policies.

ANNEX I: CASE STUDIES ON FOSSIL FUEL SUBSIDY REFORMS

This Annex provides brief case studies on lessons learned from reforms of subsidies to fossil fuel producers in France, Germany, Poland, Spain, and UK and consumer subsidy reforms in Indonesia, Malaysia, Poland and US. These case studies were highlighted in the joint report by IEA, OPEC, OECD and World Bank to G20 Leaders in June 2010. Some of the lessons learned from more recent reform efforts in Mexico and India, as reflected in the 2011 *OECD Economic Surveys* of these countries, are also summarised below.

Case Studies on Consumer Subsidy Reforms:

Country: Mexico

The 2011 *Economic Survey* of Mexico produced by the OECD found that Mexico spent more than 1½ per cent of GDP on average per year over 2005-09 on energy subsidies for electricity, gasoline, diesel and liquefied petroleum gas (OECD, 2011c). The price-smoothing mechanism for gasoline and diesel can yield additional revenues in times of declining oil prices, but results in large implicit subsidies in times of rising oil prices. As part of Mexico's ambitious energy strategy aimed at cutting national greenhouse-gas emissions by 50% by 2050 compared with 2000, the government will aim to better target energy subsidies, while bringing prices more in line with costs. The government has started to implement a new cash-transfer scheme connected to its *Oportunidades* programme to help poor households cover their energy needs with fewer distortions than under the current system. Mexico has also started an interesting pilot programme to replace electricity subsidies for pumping irrigation water with direct cash transfers in some states, thus removing the price distortion that has led to significant over-exploitation of groundwater.

Country: India

The 2011 *Economic Survey* of India produced by the OECD found that the total cost of subsidies for food, fertilisers, irrigation, electricity and fossil fuels in India can be estimated at around 9% of GDP, although outlays vary from year to year (OECD, 2011d). Just under two-thirds of these subsidies are a direct cost to the budget of either the centre or the states. While subsidies are intended to help the poor, a very high proportion of them actually accrues to households well above the poverty line. Liquefied petroleum gas (LPG) and kerosene are both heavily subsidized, although consumption of LPG, primarily for cooking, is much greater among higher-income urban families. For kerosene, over one-third is diverted to uses other than providing lighting for poor households. Progress has recently been made in rationalising petroleum subsidies. Gasoline prices are now allowed to move more closely in line with world prices, a reform the government intends to broaden to diesel. The government recently announced its intention to replace subsidies for kerosene, LPG and fertiliser with direct cash transfers to households. Plans for pilot studies are to be announced by the end of 2011. Such a move has the potential to reap considerable budgetary savings and to improve targeting. Technological progress is making targeting easier: coupons and smart cards have been successfully used in neighbouring countries to reduce fraud.

Country: Poland

Prior to 1995, the VAT rate for energy products for household consumption was 7%, less than one third of the basic national VAT rate of 22%. The government introduced a reform that gradually increased the VAT for energy products from an initial base of 7% in 1995 to 12% in 1996, 17% in 1997 and finally up to

22% in 1998 to bring it in line with the basic rate of VAT (currently 23%). The reform was carried out primarily for economic and budgetary reasons, in order to increase revenue to the budget, as well as pressure from external actors, notably the IMF and the World Bank. While trade unions did not object to the raises in VAT, they sought compensation for energy-price increases. The Polish government assured unions that excessive price hikes would not be allowed. Compensatory measures were taken for poor families and pensioners that were hit hardest by the higher energy prices. These measures included direct allowances as well as cheap credit to finance the modernisation of local heating sources. The amounts budgeted for direct compensation payments were generally modest and were applied to only to 1% of all households. A favourable circumstance for the reform was that inflation in Poland was falling continuously from 586% in 1990 to 7% in 1999, while real disposable household income grew strongly. As a result, the share of expenditure on energy in household consumption did not increase significantly over the 1990s despite the real energy price increases. The share amounted to 6.7% in 1991, 9.5% in 1993, and was estimated at 7.2% in 2005. The reform demonstrated that market fluctuations and the relaxation of price controls have been more important determinants of consumer prices for energy than an increasing VAT rate. Reduced VAT rate for energy products still exist in other EC Member States. This case study shows that increasing VAT rates for energy products to basic VAT rates can be achieved relatively expediently with a limited need for compensatory payments, even in a country where, at the time, household income was much lower than in most EU Member States. However, this should be tempered with the economic background of falling inflation rates and growing household incomes.

Country: Indonesia

Prior to 2005, the Government of Indonesia provided direct subsidies to keep the price of petroleum products low. It is estimated that the fuel subsidy provided by the Indonesian government was 3.4% of GDP in 2005 and 2% in 2006 (Baig et al., 2007). In early 2005 the Energy and Mineral Resources Minister announced that the government will gradually liberalise the domestic fuel market from 2005 to 2010, with the aim of completely eliminating fuel subsidies by 2010 (IEA, 2008). Since 2005, the Government of Indonesia has no longer subsidised oil products, with the exceptions of kerosene for household use, automotive diesel oil (AD) and gasoline for transportation (IEA, 2008). In October 2005, the government raised subsidised prices by an average of 125%, however, as energy pricing is a Presidential decision, it was decided that further price increases in the subsidised fuels should be put on hold until after the Presidential election in 2009. The international crude oil increase of 2007-08 made this price increase untenable and the government increased subsidised fuel prices in May 2008 by an average of 28.7% (IEA, 2008; IEA, 2009c). Initially, the subsidy on kerosene was not substantially reduced, and its price remained at two-thirds of the world price. However, the kerosene subsidy has been reduced significantly subsequent to the implementation of the transfer programme in May 2008 (Baig et al., 2007). The subsequent price rises led to a short-term fall in demand for kerosene, however this did not last long and demand returned to normal levels (IEA, 2008).

Alongside these price increases, the Government undertook a cash transfer programme to 16 million poor families, providing them with 300,000 rupiah (about EUR 23) every three months. The full annual cost of the programme is estimated at nearly 0.7% of GDP (Baig et al., 2007). In May 2008 Indonesia's Finance Minister estimated that the combined subsidies for fuel and electricity would total around USD 20.5 billion in 2008, making up about 4.5% of GDP and 20% of total government spending, outstripping spending on housing, law and order, health and education combined (IEA, 2008; IEA, 2009b).

While the original purpose of the subsidies was to support low income households, only a small amount of the subsidies to oil products currently reaches the poor (defined as the population living under USD 2

a day) in Indonesia, who represent 20% of the population. The near poor (those living on between USD 2 and USD 3 per day) represent another 10 to 12% of the population, but together the poor and near poor consume only about 10 million barrels of kerosene out of about 65 million barrels consumed each year. About 20 million barrels were used in the non-household sector in 1998, and the remaining 35 million were consumed by middle and high-income households. In 1999, only about USD 260 million, or roughly 15% of the total kerosene subsidy of about USD 1.75 billion reached the poorest 30% of the population. In aggregate terms then, removing subsidies would affect high-income households more than the poor. Experience in other countries has shown that the poor suffer more in relative terms since a greater proportion of their budget is spent on fuel and therefore some sort of safety net is essential when subsidies are removed. However, the cost of this safety net will be significantly less than the current cost of oil subsidies (United Nations Foundation, 2003).

The Ministry of Energy and Mineral Resources (MEMR) is pursuing alternative means to reducing the subsidy by focusing on reducing the volumes of subsidised fuels sales and encouraging the establishment of a competitive market and fuel price competition in the market. The government instituted a programme to reduce the use of kerosene by replacing it with liquefied petroleum gas (LPG), which is non-subsidised. This programme relied on the free distribution of LPG bottles and stoves (approximately 4.03 million stoves were distributed for free in 2007) as an incentive for households to switch from kerosene to LPG, with the goal to sell 12.5 million bottles of LPG to reduce kerosene demand by 30% (IEA, 2008). In addition, Indonesia's passenger vehicle fleet is modernising and the modern passenger vehicles are run on a minimum 92-25 octane fuel and not recommended to run on the subsidised 88 octane gasoline that the older vehicles run on. As these older vehicles age and fall out of use, the demand for subsidised gasoline will decline. The annual growth in passenger car sales since 2002 has averaged 20 to 25% (IEA, 2008).

Country: Indonesia

In early April 2008, the Ministry of Energy and Mineral Resources (MEMR) announced that the government would cease paying subsidies from May 2008 to larger industrial electricity consumers. This subsidy took the form of an energy tariff that creates artificially low prices of electricity. It is estimated that the average revenue received by the state-owned electricity company, PT Perusahan Listrik Negara (PT PLN) is equivalent to about US$0.06 per kilowatt hour, while the average cost of production is US$0.12 per kilowatt hour. The difference between PT PLN costs and revenue is made up by the government. In 2005 this was Rp10-15 trillion (US$1.6 billion). The 2008 National Budget estimate for electricity subsidy was Rp29.8 trillion (US$3.2 billion) to account for a sharply increasing global oil price, but was revised upwards to Rp60.3 trillion (US$6.4 billion) in early 2008 as petroleum prices continued to climb. A further subsidy is provided for the express purpose of increasing grid connections to the poor (IEA, 2009b; IEA, 2008).

This is an area where the government is able to make subsidy reductions without causing direct economic hardship for Indonesia's poor. MEMR estimated that this subsidy cut could save the government up to US$270 million annually (IEA, 2008). Due to rapid economic growth, the government was faced with the prospect of an increasing drain on its resources to meet this subsidy. Between 1990 and 1997, electricity consumption grew at an annual average rate of 13% while, following the Asian Financial Crisis of 1997/98, the growth in electricity demand slowed briefly but recovered quickly to average 7% a year between 1997 to 2005. Indonesia depends heavily on oil for electricity generation, and in 2004 moved from a net exporter of oil to a net importer. The Indonesian government therefore understood the need to make adjustments to the electricity tariffs, however large one-off adjustments made in the past were strongly opposed at the community level and triggered violent public

demonstrations. Major power price adjustments were not considered to be politically acceptable (IEA, 2008). However, in May 2008, the Co-ordinating Ministry of Economic Affairs of Indonesia advised that the top 40% of high income families benefit from 70% of the subsidies while the bottom 40% of low income families benefit from only 15% of the subsidies. In essence, the subsidies are benefitting the rich more than the poor (IEA, 2008). The relatively widespread acceptance of subsidy reductions in October 2005 and May 2008 highlighted the growing awareness of Indonesian communities of the need for some level of reform (IEA, 2008).

In August 1998, the government outlined key proposed reforms in the electricity industry. The intended reforms included industry restructuring, introducing competition and introducing a tariff regime based on full cost recovery. These reforms were introduced under a new Electricity Law in 2002, however, this was annulled by the Constitutional Court in December 2004. The provisions for a competitive electricity market and unbundling of PT PLN were ruled as unconstitutional by the court (IEA, 2008). The removal of electricity subsidies to larger industrial electricity consumers has been implemented successfully (IEA, 2008). The price of electricity for other industry and households have not seen an increase since 2003 and remains at US$0.07 per kWh. A 20-30% increase in price was planned for January 2010, however the increase has been postponed as the government continued to study the impact on the budget deficit (Suharmoko, 2010).

Country: Malaysia

Malaysia subsidised electricity and petroleum products by placing a cap on the price of the products. The difference between world market prices and the caps have been subsidised by the government. Rising oil prices in 2007 and 2008 substantially increased subsidies as the gap between world market prices and the price caps on electricity and petroleum products widened, putting pressure on the Budget and prompting the Malaysian government to review their subsidy policies. Subsidies were reported to have cost the Malaysian government USD 14 billion in 2008, which amounts to about 4% of GDP (IEA, 2009c). The reform package included subsidy reductions, cash rebates, windfall taxation on certain sectors and an expansion of the social safety net (IEA, 2009c). In August 2008 the price of gas for power generation was raised by 124% in Peninsular Malaysia, and the average electricity tariff for all sectors of the economy was increased by 24% (from US$0.075/kWh to US$0.093/kWh) in line with the increase in gas price (IEA, 2009c). Malaysia increased petrol prices by 41% and diesel by 63% in June 2008 (IEA, 2009c; Hamid, 2008). To offset the increased prices, the Malaysian government offered cash rebates in the form of lower annual road taxes (The Star, 2008). The price rises were successfully implemented despite widespread protests about fuel price increases (IEA, 2009c; Hamid, 2008).

Case Studies on Producer Subsidy Reforms:

Country: Germany

Germany has a system of Ecotaxes, which are the taxing of environmental 'bads' as opposed to taxing conventional goods or labour. Ecological tax reform (ETR) was designed as a revenue-neutral reform that simultaneously increased energy taxes and lowered payroll taxes (IEEP et al., 2007). When the ecotax (fuel excise duties and electricity tax) was implemented in 1999 it contained partial exemptions for certain high-energy consuming industries, allowing qualifying businesses to pay only 20% of the standard rate and also providing a tax cap, limiting the overall amount of ecotaxes they would have to pay (IEEP et al., 2007). In 2003, the government introduced a reform that reduces the ecotax exemptions (*i.e.* raising the amount of ecotax the affected businesses pay) with the result that affected businesses will pay more of the ecotax (IEEP et al., 2007). The reduced ecotax rates for businesses increased from 20% to 60% of the full rate and the tax-cap provision modified upwards. The drivers for this reform were both environmental and political. Environmental groups including Germany's Green Party and environmental NGOs were major promoters of reform for environmental reasons. The European Commission was a main promoter of reform on competition grounds, as ecotax exemptions potentially distort competition. The Commission allowed reduced industry ecotax rates to be continued until 2012, but approved the tax cap only under the condition that the German industry meets its voluntary commitment targets. These targets were committed to by industry in order to obtain ecotax exemptions and involve the mandatory reduction of 20 million tonnes of CO_2 emissions (IEEP et al., 2007).

However the reform has recently faced a setback, with new exemptions having been created with the 2006 Energy Taxation Law, including total exemptions of certain energy-intensive processes from energy taxation. Furthermore, in September 2006 Germany's Social Democratic Party (who, with the Green Party implemented the reform in the first place) drafted legislation with the purpose of maintaining the tax cap beyond 2006 and reducing the industry's energy tax burden to 1998 levels. Concerns about competitiveness in the world markets continue to be a popular argument against applying ecotaxes on industry and increased energy prices contribute to the perception that there is already a heavy burden on industry (IEEP et al., 2007). Ecotax reform is politically difficult to defend to the public and stakeholders. Worldwide differences in energy taxation provided the rationale for granting ecotax exemptions to domestic industries and contribute to the difficulties in reforming ecotax (IEEP et al., 2007).

Country: Germany – Federal government and federal state of North Rhine-Westphalia

Direct subsidies from the German Federal Government and the *Land* of North Rhine-Westphalia have been paid to cover the difference between production cost and the world market price of coal, and to provide social adjustment support related to the closure of mines. The reform introduced in 1998 aims for a gradual reduction of the subsidies until their complete removal by 2018. This has translated into a reduction in subsidies from about EUR 4.9 billion in 1999 to EUR 2.2 billion in 2009 (OECD 2011a). A review of the reform is planned to take place in 2012.

The original subsidies were provided by a surcharge on the price of electricity, *i.e.* the so-called '*Kohle-Pfennig*' (coal penny). This was considered unconstitutional by the German Constitutional Court in 1994 and required the subsidy to be shifted to the Budget. This shift of the source of subsidies from the German energy consumer to the Budget led to domestic budgetary and environmental considerations becoming the main drivers of subsidy reform. European competition legislation and a new government

in the *Land* of North-Rhine Westphalia were other drivers of the reform (IEEP et al., 2007, IEA, 2007). There was also a widespread public awareness that coal subsidies run counter to economic sense. However, there exists the debate on energy security of supply and domestic production alternatives, and subsidies are viewed as a vehicle to maintain domestic energy supply (IEEP et al., 2007).

The subsidies have been reduced and this has led to a reduction in the number of operating mines (from 19 to 8), with three additional closures envisaged before 2012. Coal production has declined from 53.1 million tonnes in 1995 to 24.7 million tonnes in 2005 (IEEP et al., 2007; Europe Economics et al., 2006). However, the coal mining industry continued to be the biggest receiver of direct financial subsidy from the German government (Berg et al., 2008). The share of hard coal in primary energy consumption has decreased slightly (14.1% to 12.9% between 1997 and 2005), however not as quickly as the share of hard coal in primary energy production (34% to 19.9% between 1997 and 2005), implying that domestic coal has simply been replaced with imported coal (IEEP et al., 2007). The number of employees in the hard coal mining industry fell from 92,600 to 38,500 from 1995 to 2005 while labour productivity increased slightly from 574 tonnes to 641 tonnes per head per year (Europe Economics et al., 2006). The average unemployment in the North-Rhine Westphalia (11%) is only slightly higher than the national average (10.5%), however certain mining regions of North Rhine Westphalia such as the Ruhr region are higher (14%). Within the Ruhr region in particular, Gelsenkirchen and Duisburg have relatively high unemployment rates (23% and 16% respectively) (Europe Economics et al., 2006). The reduction of subsidies is not the only factor that led to the decline in coal production. The decline is part of a long-term development caused by other factors which in general has led to the deterioration of economic conditions for German coal mining in relation to international competitors, even with the heavy subsidisation enjoyed by the coal mining sector prior to the beginning of the reform in 1997 (IEEP et al., 2007).

Country: Poland

Prior to 1990 the coal mining sector in Poland was state owned and was operated to provide high employment and cheap energy, not profit. Local policies kept coal prices below international levels, with economic and environmental consequences. This was achieved through low end-user prices, market barriers, and direct subsidies to the state-owned enterprises. The reform of the coal mining industry in Poland led to the restructuring of the mining sector from centralised planning to separate independent enterprises. In 1990 centralised planning was abolished and 70 individual coal mines were established as independent enterprises with the right to market their output independently, both domestically and abroad. This restructuring failed due to stiff competition and falling prices, which threatened the financial viability of the enterprises (IEEP et al., 2007). The current system groups the remaining 31 mines into seven joint-stock holding companies which are owned by the State but remain independent enterprises. A state-owned liquidation company was established to take over mines that are to be closed from all of the seven companies (IEEP et al., 2007).

Political and economic change in 1989 from communism to a market economy allowed changes to the mining sector and the reform of government subsidies to the sector. A key objective of the government was to liberalise coal prices so that they could be determined by market forces. Today, the mines remain as independent enterprises. Employment in the sector has fallen as has production. Over eight years, (1998 to 2005) there were about 119,900 job losses to underground miners, with further reductions of 55,600 more underground miner job losses expected within the time period of 2006 to 2015. 7 400 surface employees are also expected to lose their jobs. The impact of mine closures on unemployment rates seems to be diverse between regions in Poland, with the Upper Silesia region, seen as the most important mining area in Poland, seeing unemployment constantly decreasing between 2000 and 2006

and Katowice seeing an increase from 1.6% to 2.3% from the beginning to the end of 2005 (Europe Economics et al., 2006).

The hard-coal mining sector, however, still receives heavy subsidies from the government, which are mostly associated with the inherited social and environmental liabilities. Restructuring of the industry continues and public funding will also be dedicated to further restructuring of employment and reducing production capacities (IEEP et al., 2007). The world coal market price has increased, improving the economic situation of some coal mines. This has raised questions about the rationale for maintenance of state support for profitable companies, and there is intense discussion on the efficiency of the sector. However potential plans to withdraw financial support for selected mines face strong resistance from the industry (IEEP et al., 2007).

Country: United Kingdom

From 1957 on, British electricity generators were required to purchase a given quantity of British coal at set prices, but were allowed to pass the costs onto consumers. The UK government renegotiated the agreement with British Coal to introduce a gradual decline in the guaranteed price and quantity purchased of British coal over three years. Although reforms had been attempted throughout the 1960s and 1970s, a lack of commitment and political turnover rendered these efforts unsuccessful. By the 1990s the British coal industry had become very inefficient by world standards. The privatisation of state-owned companies by the Thatcher government in 1979 allowed progress to reformation. The Thatcher government found reforming coal subsidies and the failure of the Miner's Strikes to be an effective way of reducing the power of the British trade unions, which had strong political power at the time (IEEP et al., 2007).

Subsidies were removed, and the UK has maintained a 'more or less' competitive coal industry, albeit not without extensive mine closures (IEEP et al., 2007). However in 1999, the UK government imposed a moratorium on the construction of new gas-fired power stations in order to protect the coal industry. This moratorium was replaced in 2000 with the UK Coal Operating Aid Scheme that provided the coal industry with short-term financial support worth GBP 162 million to be disbursed in four tranches over three years, thereby allowing those elements of the coal industry with a viable future to eventually operate without any aid (OECD 2011a). In 2002, the government agreed to an investment aid package for the remaining coal mines in a bid to allow the British coal industry to compete in the reformed electricity market and to create or safeguard jobs within socially and economically disadvantaged areas (Europe Economics et al., 2006). In 2005, the rate of total unemployment was higher than the national average in seven of the ten local authority areas in which coal pits had been shut down between 1995 and 2005, however the gaps were narrow; in none of these cases were the total or male unemployment rate more than 1% above the national average (Europe Economics et al., 2006).

Coupling the reform with measures to stimulate economic development and therefore create new job opportunities in areas where industrial activities are to be scaled down or closed can increase support to the reform and foster economic growth (IEEP et al., 2007). Government aid to those entering unemployment from the coal mining sector was focused on creating an enabling environment for the development of alternative economic activities in mining areas, rather than a severance package. This helped increase support to the reform and maintain economic growth in otherwise disadvantaged areas. Economically, although the local mining areas had been initially affected badly by the mine closures, by 2004, 60% of jobs lost from the coal industry in the early 1980s had been replaced by new non-coal jobs for men within the same area. Further, the pace of non-coal male jobs appears to be accelerating, with

the number of non-coal jobs held by men increasing in the three years between 2001 and 2004 by almost as much as in either of the previous two decades**.**

Country: Spain

In the 1980s the Spanish coal industry was heavily dependent on the energy supply industry and the contracts it had made with governments. This enabled its expansion when the rest of the European coal industry was in decline (Europe Economics et al., 2006). Between 1994 and 2005 the EU authorised €12.9 billion of aid to Spain in order to provide operating aid to maintain access to coal reserves, and support for reducing the country's coal-mining activity. The energy market was liberalised in 1998 with the introduction of a long-term restructuring plan. Minimum quotas for Spanish coal continued, however, and power companies were allowed to contract directly with mining companies for the amount and price under their own quota, leading to competition between individual companies. Power companies continue to have an obligation to purchase fixed quantities of domestic coal until 2012 as part of a subsidy agreement (IEA, 2009a).

Employment in the coal mining sector has fallen nationally from 26,000 in 1995 to 8,200 in 2005, with certain areas being affected more than others. Notably, the region of Asturias saw over 10,000 job losses in the coal industry, and the region of Castilla y Leon, where nearly 6,000 jobs were lost. The proportion of unemployed who have been out of work for over twelve months is much higher in these areas than the national average. Elsewhere the rate of male unemployment and the proportion of unemployed who have been out of work for over twelve months is generally close to the national average, with unemployment in Aragon even being well below the national average (Europe Economics et al., 2006).

The Spanish hard-coal sector is still dependent on subsidies to be able to compete with imported coal. In 2004, the average cost per tonne of Spanish coal varied from EUR 82 to EUR 519 depending on the quality and source of coal, while in 2005 imported coal cost just EUR 70 per tonne, including transport costs (Europe Economics et al., 2006). Operating aid to coal mines now remains stable at around EUR 700 million per year, but this amount remains considerable for an industry with less than 7 000 miners (OECD 2011a).

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