

## 12. Reform of environmentally harmful subsidies: distributional issues

**Annegrete Bruvoll and Haakon Vennemo**

---

### 12.1 INTRODUCTION

According to the International Monetary Fund (IMF, 2013) global subsidies on energy amounted to US\$480 billion in 2011. The International Energy Agency (IEA, 2012) estimates subsidies on fossil fuels, a part of energy, to be US\$523 billion in 2011. These are subsidies on energy and fossil fuels consumed by households and enterprises. Further subsidies, such as government in-kind support, are available for enterprises. According to IEA et al. (2010a), producer subsidies add at least another US\$100 billion.

In many developing countries, subsidies on fossil fuels exceed 5 per cent of GDP. Top of this particular league is Uzbekistan, where in 2011 fossil fuel subsidies amounted to 28 per cent of GDP, followed by Turkmenistan (23 per cent), Iraq (19 per cent), and Iran (17 per cent).<sup>1</sup> Subsidies to energy are discussed in Chapter 6 of this book.

Several countries have in recent years attempted to reduce subsidies to energy, but attempts are often met with resistance. In fact, the International Monetary Fund (2013) recently evaluated 28 reform attempts carried out over a period of 20 years in 22 developing countries. In at least five instances reforms were met with widespread public protests.

The resistance to subsidy reform is striking since removal of environmentally harmful subsidies tends to increase GDP and economic welfare. There will be winners and there will be losers, but the gains to winners will be higher than the loss to losers. Ellis (2010) reviews six major multi-country, multi-fuel studies undertaken since the early 1990s. All six studies found that a subsidy reform would increase GDP in the countries studied by 0.1–0.7 per cent per year to 2050. In addition, pollution would be lower, as would greenhouse gas emissions. The strain on public budgets would be lower too. In Uzbekistan, the top subsidizer, fossil fuel subsidies are equal to 60 per cent of public revenue, according to the International Monetary Fund (2013).

A leading explanation for the resistance across the world is that the losers from reform will in fact not receive compensation. Using a social science term there is little or no ‘transition management’ including compensation and other policies to help people adjust. This insight leads to the theme of this chapter: how can policy-makers design compensation to accompany a reform of environmentally harmful subsidies and improve its support? Since it is not obvious that the wealthy deserve compensation, this design question includes an assessment of who should get compensation, in which form, and by how much.

In the sections that follow we first discuss historical attempts at lowering environmentally harmful subsidies on coal production in Europe and fossil fuel subsidies on consumption mainly outside Europe. Based on the historical attempts at lowering subsidies we outline three steps of a successful compensation scheme to support reform of environmentally harmful subsidies.

## 12.2 CASE STUDIES

### 12.2.1 Subsidies to Coal Production<sup>2</sup>

Coal production has been supported in many countries and over decades. Subsidies were defended as a vehicle to maintain jobs and domestic energy supply. In the EU, coal is still heavily subsidized in Germany’s Ruhrgebiet region, Northwest Spain, and Romania’s Jiu Valley (World Nuclear Association, 2013).

Over time the economic burdens created by the subsidies push through reform, and several countries have gradually reduced or removed coal subsidies. The major drivers of reforms have been budgetary considerations and a reduced perceived need to secure energy independence via coal mining. Climate policy and environmental pressure groups have become increasingly important drivers in recent decades.

State aid for coal production was nominally prohibited in Europe since the 1952 European Coal and Steel Community (ECSC), but multiple exceptions were allowed. After 2002, direct state support to coal production was prohibited in the EU (IEEP et al., 2007). In 2007, eight of the EU Member States produced coal: Poland, Germany, Hungary, the UK, Spain, Czech Republic, Slovakia and Greece. France closed its last mine in 2004. In 2010, some €3.2 billion in coal subsidies were handed out in six EU countries: Germany, Hungary, Poland, Romania, Slovakia and Spain (World Nuclear Association, 2013). In 2010, the European Commission decided that member governments must stop granting subsidies to loss-making coal mines by the end of 2014.

Examples from individual countries demonstrate the resilience of subsidies. The reform in France took 40 years to complete. Poland started reforming its coal subsidies in 1990. Restructuring provided for a strong emphasis on environmental protection, restructuring programmes, liquidation of consistently unprofitable mines and privatization of those that turned a profit. Poland still has a very high extraction rate of coal relying on a complex system of export and restructuring subsidies. In Germany, subsidies were reduced by 50 per cent from 1998 to 2008, and the aim is a complete phase-out by 2018. However, the average mining job was subsidized by €75 000 in 2007. The continuing subsidies in Germany are upheld by strong and organized stakeholders with connections to electoral power. In Spain the perceived importance of the energy supply industry, and contracts the industry had made with governments, enabled its expansion when the rest of the European coal industry was in decline. In 2004, the average cost per tonne of Spanish coal was up to nine times higher than the cost of imported coal. The energy market was liberalized in 1998, with the introduction of a long-term restructuring plan including increased competition. In 2012, thousands of Spanish coal miners marched to protest a cut in government subsidies by 63 per cent that they say will eliminate their industry. Overall, the subsidy reforms have led to significant fall in coal extraction and employment within the coal sector.

### **Compensatory measures**

The costs associated with the reforms are the main causes for continued coal subsidies around the world: social consequences, employment costs, fuel costs to consumers and security of supply. In France, extensive measures were used to promote alternative economic activity in the affected regions. Former miners were guaranteed employment until the age of 45, when those with at least 25 years of service became eligible for a leave, during which they would receive 80 per cent of their final working salary until retirement (IEA et al., 2010b). In Poland, relatively generous severance packages were provided to miners leaving work, based on individual arrangements (IEEP et al., 2007). In the UK, compensatory subsidies were given to stimulate competitiveness of the industry with a viable future and aid the remaining industry to compete in the reformed electricity market. Support was given to create or safeguard jobs within some socially and economically disadvantaged areas. The aid given to those entering unemployment was focused on creating alternative economic activities or supporting skill development to facilitate a transition to another progression. This partly helped reduce some of the opposition to the reform and aimed to support long-term economic viability in otherwise disadvantaged areas.

The gradual removal of subsidies has also helped to minimize dislocation of environmentally damaging activities (*ibid.*).

### **Evaluation**

Despite the potential economic and environmental benefits, coal subsidy reforms in Europe have faced severe resistance and the subsidies proved hard to get rid off. The restructuring of the UK coal sector, while driven by political concerns and economic objectives, could be seen as offering positive environmental benefits in terms of lower CO<sub>2</sub> emissions and other pollution to air and water. It also enabled the country to maintain a reasonably competitive coal industry, albeit a much smaller one. However, it was at the cost of extensive mine closures, significant social opposition, with some shift in environmental problems where domestic coal was replaced by imported coal. Coal-mining jobs in the coalfields of England and Wales accounted for about a quarter of all male jobs located in these areas. A lesson from coal reforms is that compensation in terms of stimulation of new job opportunities can increase support to the reform and foster economic growth in the longer run. Strong political will was a fundamentally key factor. Still, it shows how the economic, environmental and indeed party political benefits can be paid by increased social costs for a few. In the UK coal mining experience, the compensation of the losing parties was clearly not sufficient to avoid a rise in unemployment and social problems.

### **12.2.2 Subsidies to Fossil Energy Consumption in Some Low-income Countries**

Currently, subsidies to consumption of energy are mostly found in low-income countries. We gave some aggregate figures in the introduction – see also Chapter 6. As another indication, it was found in a recent assessment of 101 countries in Africa, Asia, the Middle East and Latin America that an increase in international fuel prices did not increase domestic fuel prices to the same extent. Between 40 and 90 per cent of the increase was passed on in a median country (Arze del Granado et al., 2012). Evidently, someone picks up part of the bill.

The stated aim of subsidizing consumption of energy is often to support low-income households. However, as a matter of fact, only a small share of the expenditure on energy subsidies reaches its aim. In a study of 20 countries it was found that for each dollar spent on energy subsidies, only 7 cents reached the bottom fifth of households, the 20 per cent of households with the lowest income. Forty-three per cent went to the top fifth (*ibid.*). Similar distributional impacts are reported from individual

countries. In Indonesia, for example, only 2 cents of every dollar spent on gasoline subsidies reach the bottom fifth of households (Dartanto, 2013). The top fifth take away 60 per cent of the subsidy. There are differences between fuels, but even in the case of kerosene, which is used more intensively by the poor, the bottom fifth in Indonesia obtain only 9 cents of every dollar spent.

In many poor countries consumer subsidies to energy amount to significant shares of GDP and even higher shares of public revenue. Uzbekistan, Turkmenistan, Iraq and Iran have already been mentioned. These are exporters of oil and gas that may believe they can afford domestic subsidies. But consider Bangladesh. This poor country spends 43 per cent of its public revenue on energy subsidies. Or consider Egypt, which despite its location in the Middle East is not a big petroleum nation. Egypt spends 48 per cent of its public revenue on energy subsidies. Yemen spends 24 per cent. Cameroon spends 20 per cent, and so on. The numbers are all from the International Monetary Fund (2013).

For each dollar spent on energy subsidies there is one less to spend on social programmes, poverty reduction, and the like. By making a priority of energy subsidies, countries forego opportunities to help their poor. Some countries have realized this, or at least realized that energy subsidies do cost a lot of money, and initiated reforms. However, according to the International Monetary Fund (2013) the reforms have had mixed success. Among the 28 reforms studied by the Fund, 12 were successful. Eleven more were deemed a partial success, and five were unsuccessful. A partially successful reform is one that was later reversed or was not completely implemented.

### **Reform stories**

The details some of these reforms are revealing. We mention six reform stories. The first reform story is about Iran (Arze del Granado et al., 2012). When international gasoline prices peaked above US\$2 per litre in 2008, they stood at US\$0.10 in Iran. In late 2010 Iran announced plans to increase domestic prices to 95 per cent of international prices. This was an announcement that could be met with resistance since poor and rich alike would have to pay significantly more for energy. Subsidies were to be cut US\$60 billion. But prior to the announcement the government had deposited US\$30 billion in special bank accounts created for nearly 80 per cent of the Iranian population, 61 million accounts in total. The ATM network was extended to every corner of the country to enable the population to confirm with their bank accounts that the promised compensation did materialize. In addition, US\$15 billion was set aside for enterprises to finance investments in energy savings. Prior to the reform the

government ran a campaign to inform the public why reform was necessary. For instance, the public was informed about the waste of energy from low prices, the low benefit to the poor compared to expenditures, and the costs of smuggling. As noted above, data from 2011 show that subsidies in Iran are still large and the reform was put on hold in 2012 amid fears of inflation, according to the International Energy Agency (2013). The International Monetary Fund (2013) calls the reform in Iran a partial success.

A second country that has tried reform is Ghana. In 2004 Ghana spent roughly 2.2 per cent of its GDP subsidizing fuel and 1 per cent on support to its national refinery company (e.g., Bruvold et al., 2011). These are much lower figures than Iran, but Ghana is an oil importer and a low-income country. A government commission found that Ghana's rich received the greatest benefits from subsidies and quantified how and to what extent the poor would be affected by future deregulation (Bacon and Kojima, 2006). The research of the commission was an important foundation for communicating the necessity of reform and for designing policies to reduce impacts of higher fuel prices on the poor. A formula was put in place to link domestic prices of oil to international prices. The formula was intended to reduce political interference in fuel prices.

The reform also included a communications campaign, and policies to assist the poor. The government (1) eliminated fees for state-run primary and secondary schools, (2) increased the number of public transport buses, (3) put a price ceiling on public transport fares, (4) channelled extra funds into a healthcare scheme for poor areas, (5) raised the daily minimum wage by 22 per cent and (6) started programmes to help spread electrification to rural areas and purchase essential equipment for workers. It also (7) continued its previous policy of cross-subsidizing kerosene and LPG. Expenses were partly paid for by an explicit earmarked social mitigation tax incorporated into the pricing formula.

In early 2008 the pricing formula was set aside and a new government reduced fuel taxes in 2009. This, however, led to a dramatic increase in fuel consumption and smuggling out of the country. In 2011 the government increased petroleum prices by 30 per cent, to full cost recovery. This generated widespread protests. The International Energy Agency (2013) reported a similar attempt in early 2013. The International Monetary Fund (2013) calls Ghana a partial success.

A third example of reform is presented by Indonesia. In 2005, the government started to gradually liberalize the fuel market with the aim of completely eliminating fuel subsidies. That year prices more than doubled, with kerosene prices rising 185 per cent, for example (Arze del Granado et al., 2012). A public information campaign that included newspapers,

TV talk shows, village notice boards, and the distribution of pamphlets and brochures preceded the price increases. In addition, the government initiated temporary unconditional cash transfers to one-third of the Indonesian population, 19 million households. Each household received about US\$120 (*ibid.*). The government budget savings from the reduced cost of fuel subsidies were estimated to be about US\$10.1 billion in 2005–06 (Bruvoll et al., 2011). Expenses on the cash transfers were about US\$2.3 billion. The government also financed programmes in education, rural development and health. While the IEA et al. (2010a) consider the compensation programme to be largely successful, Dartanto (2013, p. 2) writes that ‘the drastic reduction of fuel subsidies in 2005 resulted in misery for the poor’. A new phase of the Indonesian reform programme was initiated in 2008, with the cash compensation programme briefly reinstated. According to the International Energy Agency further reforms are taking place in 2012–13. However, as we have seen there are still large subsidies in place in the country. The International Monetary Fund characterizes the reforms of 2005 and 2008 as partial successes.

A fourth reform example is Malaysia. Malaysia has had a cap on the price of electricity and petroleum products in place for some years. The difference between world market prices and the caps has been subsidized 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 its subsidy policies. Subsidies were reported to have cost the Malaysian government US\$14 billion in 2008, or about 4 per cent of GDP (IEA et al., 2010b).

In 2008, the Malaysian government introduced a broad package of reforms to its energy subsidies. In 2008 the price of natural gas for power generation was raised by 124 per cent, and the average electricity tariff for all sectors of the economy was increased by 24 per cent, gasoline prices by 41 per cent and diesel prices by 63 per cent (Hamid, 2008). To offset the increased prices, the Malaysian government offered compensation in the form of (1) lower annual road taxes, (2) cash rebates, (3) windfall taxation on certain sectors and (4) an expansion of the social safety net. Despite these measures there were widespread protests against the subsidy reform (IEA et al., 2010b). In 2011 energy subsidies in Malaysia amounted to about 2 per cent of GDP according to the International Monetary Fund (2013).

A fifth example is the Mexican cash transfer programme (the Oportunidades programme) used to compensate very low-income households for reduced energy subsidies. Subsidized energy prices in Mexico have represented a serious economic strain on the government budget,



equivalent to more than 0.5 per cent of GDP over the period 2005–09. The programme targets human capital, that is, education, health and nutrition of children. The distribution mechanism is cash transfer and health clinic visits. Another programme in Mexico stimulates employment in rural and small communities. When labour demand is low and opportunities are few, work is provided in projects typically related to infrastructure and environmental preservation (G-20, 2010; IEA et al., 2010a).

Finally, consider an example that has so far not turned out a success, the case of subsidies to liquefied petroleum gas (LPG, in practice propane and/or butane) in Senegal. In the 1970s, Senegal had a goal of reducing deforestation by substituting part of charcoal consumption with LPG. LPG was subsidized first through cooking equipment and from 1988 the government started to subsidize LPG fuel itself. The LPG subsidy programme reduced household pollution and it reduced pressure on forests. But the policy also led to an unsustainable fiscal burden, disproportionate benefits for the relatively rich, and fuel smuggling (Laan et al., 2010).

A phased reduction of the subsidy in annual increments of 20 per cent was started in 1998. The plan was put on hold in 2002 due to increasing global LPG prices, exchange rate variations and inflation, resulting in continuing high subsidies. In 2006, the cost of LPG subsidies amounted to 1.4 per cent of GDP. In 2008, the IMF found that the 40 poorest per cent of the population gained only 19 per cent of the total improvement in welfare from the LPG subsidy, while the richest 40 per cent gained 61 per cent (ibid.).

The Senegal experience does not bear the mark of a successful policy. The government has attempted to reform the subsidy for over a decade and has made little headway. However, removal of the subsidy risks an increase in the use of charcoal and firewood by some households. Senegal could learn from the packages of measures used by, for example, Ghana, that is, research to identify those most likely to be negatively impacted by de-subsidization, information campaigns about the benefits of reform, cash transfers to the poor, and greater independence and transparency of fuel prices (ibid.). Disincentives for the use of charcoal and wood, rather than fuel subsidies, would be a more direct way to address the goal of reducing deforestation.

### **Evaluation**

The advice to Senegal summarizes some of the points that emerge from the reform stories. Information campaigns have been part of the reforms of Iran, Ghana and Indonesia. It is also an issue highlighted by the International Monetary Fund (2013, p. 28) in its evaluation of 28 reforms. The Fund wrote that ‘a far reaching communications campaign can help generate broad political and public support and should be undertaken



throughout the reform process', and cited further examples to this effect from Namibia, the Philippines and Uganda.

Cash transfers to the poor was another recommendation we gave for Senegal, and more broadly, compensation in the form of cash or cash-like spending such as lower school fees are included in the reforms of Iran, Ghana, Indonesia and Malaysia. Again this is an issue that the International Monetary Fund highlighted, writing that 'well-targeted measures to mitigate the impact of energy price increases on the poor are critical for building public support for subsidy reforms' and 'targeted cash transfers or near-cash transfers (vouchers) are the preferred approach to compensation . . . when cash transfers are not feasible, other programmes can be expanded while administrative capacity is developed' (IMF, 2013, p. 30).

A third piece of advice to Senegal was to conduct research on who are the most likely to be negatively affected by a lifting of subsidies. This knowledge is important to work out well-targeted compensation measures, and also to support the information campaign. The Ghana experience sets an example to follow. More generally the research on impacts is part of the preparation and planning that a thoughtful government will do. The preparation of the Iranian government in terms of setting up accounts, extending the ATM network and so on, is another example. The International Monetary Fund (2013) highlighted research and other preparatory work, as well as a timetable for reform, as elements of a comprehensive reform plan. A successful reform needs a comprehensive reform plan.

A final piece of our advice to Senegal was greater independence and transparency of fuel prices. The International Monetary Fund (2013) highlighted the automatic pricing formula of the kind that was tried in Ghana. Although the formula was set aside in Ghana, the Fund argued that by itself such a formula makes reform more likely to succeed. 'Depoliticize energy pricing' was the message from the Fund (IMF, 2013, Executive Summary).

A further recommendation of the Fund, based on the 28 reform episodes, is to phase and sequence price increases in order to give people time to adjust, and to accommodate inflationary pressures as in the case of Iran. The Fund also called for an improvement in the efficiency of the state-owned enterprises that commonly supply energy in low-income countries.

A suggested list of key elements of a successful reform is then:

- a comprehensive reform plan;
- a communications strategy;
- appropriately phased and sequenced price increases;

- improving the efficiency of state-owned enterprises in the energy sector;
- targeted compensation measures;
- depoliticizing of energy prices.

Taken together such a list suggests a programme for transition management before, under and after a reform of energy prices. Compensation is at the heart of such a programme. The next section describes how to carry out the compensation aspect.

### 12.3 A THREE-STEP PROCEDURE FOR USING COMPENSATION TO GOOD EFFECT

The examples we have just given are fairly representative of reforms to environmentally harmful subsidies in the sense that they cover the producer–consumer dimension; the Europe–non-Europe dimension and the dimension of exemptions from optimal taxation versus outright subsidies. More examples are found in reports and books devoted to the issue (e.g., Bruvold et al., 2011; International Energy Agency et al., 2011; International Monetary Fund, 2013).

Economic theory teaches that a reform of an environmentally harmful subsidy is a reform that increases GDP and welfare. Empirical studies confirm this (Ellis, 2010). This means that everybody in theory can be compensated for the loss of subsidies, and in addition there will be a net gain to share. If the increase is distributed well, everybody could gain. On the other hand the purpose of the reform is to increase the price of the environmentally harmful goods, which means that people will have to pay more to obtain the same quantities of these goods. By this, they lose.

One of the keys to a successful reform is to make sure that the potential gain is turned into an actual gain for the majority of those involved, and low-income groups in particular. We have seen above that low-income groups benefit surprisingly little from energy subsidies. Still the perceived benefit may be larger, and whatever the size of the benefit, compensation for their loss should be offered to low-income groups. More concretely our review offers the following three lessons, which we call steps, in a successful compensation policy of environmentally harmful subsidies:

- Step 1: Identify who gains from subsidies. These are the ones who stand to lose when subsidies are lifted, at least in the short term.
- Step 2: Identify who should be compensated when lifting subsidies. It is neither possible nor desirable to compensate everyone, but

those who qualify on certain criteria (it may not just be low income) should be given compensation.

- Step 3: Identify how to compensate and what level of compensation is appropriate over what timescale. Compensation may potentially be offered in different ways with consequences that differ.

### 12.3.1 Step 1: Identify Who Gains

Step 1 in designing a successful compensation policy is estimating who gains from the subsidies and thus, who stands to lose from a reform and hence likely oppose attempts at reform. How to do this? Consider a suggestion to reduce subsidies on energy consumption. A reasonable starting point for estimating who gains from current subsidies is the household expenditure survey. A recent household expenditure survey is available in most countries. It surveys household expenditures on a number of goods including heating, food, transport and so on, and also socioeconomic characteristics of the household such as income, education, size of household and so forth. When working out the gains from subsidies on energy we are particularly interested in how much each group spends on energy. For instance, let us assume that a particular household category spends US\$100 and that the subsidized price is US\$1. If the true price without subsidy is US\$2 a quick estimate would suggest that the household gains US\$100 from the subsidy.

The analysis could also be worked out in relative terms. If the household in question spends 10 per cent of its expenditure on energy at subsidized prices of US\$1 and the true price is US\$2 we may assume that the household gain equals 10 per cent of its expenditure.

The two approaches will in fact give different answers because they assume different degrees of price responsiveness in the household. The first approach, which concludes that the household gains US\$100, assumes that the change in purchase when the price changes is zero. The second approach, which concludes that the household gains 10 per cent of expenditure, assumes that the percentage change in quantity consumed is equal (with a minus sign) to the percentage change in price. Both assumptions are valid but the first one (zero response) seems to be more commonly used (Arze del Granado et al., 2012). In a detailed analysis, suitable price elasticities that fit local conditions should be worked out and so-called income effects should be excluded in order to work out 'consumer surplus'. Interested readers should consult textbooks in microeconomics or Google the term.

An analysis based on consumer expenditure on energy helps to estimate the direct effect of energy subsidies and their removal. The indirect effects are also important. The indirect effects concern the fact that enterprises

that use energy intensively, tend to charge less for their goods and services when energy is cheap, and conversely, if the price of energy increases because subsidies are removed, they will have to charge more. The indirect effects affect households differently depending on their overall expenditure and pattern of expenditure.

To work out the indirect effect it is necessary to estimate how much prices increase. It is reasonable to start by considering the energy costs of enterprises. Unless it can respond by using less energy, an enterprise that spends 20 per cent of its costs on energy will experience that a doubling of the price of energy means a 20 per cent increase in overall costs. Hence, a 20 per cent increase in price, and similar for other enterprises and industries depending on how intensively they use energy (and how easy it is to switch from energy to other inputs).

In addition, enterprises sometimes buy from other enterprises in order to produce goods. Hence there is for most enterprises a second-round impact on costs – which leads to a third, and a fourth and so on. To keep track of these rounds and work out the accumulated impacts on costs, economists make use of the ‘input–output table’. The input–output table records economic transactions between sectors in the economy, for example, from the energy sector to manufacturing, and from manufacturing to the energy sector and so on, in a consistent loop. In low-income countries input–output tables are sometimes not up to date, which creates an element of uncertainty in the analysis (Arze del Granado et al., 2012). Another uncertainty is created by methodological choices. The approach we have just described for instance assumes that the rate of return to owners is unaffected by the energy price changes. Wages and the exchange rate are also assumed to be unaffected.

Indirect impacts – those showing up as a consequence of cost changes of firms – tend to be quite important compared to direct impacts. For instance, in the Arze del Granado et al.’s (2012) survey the direct impact of energy subsidy removal on the poorest fifth of households was only 40 per cent of the total impact. In the case of producer subsidies including preferential treatment, free access to land, infrastructure and so on, the indirect impact is 100 per cent. This is the case since producer subsidies target costs of firms, that is, the indirect impact. The assessment of who gains from the subsidy will in this case rely solely on the estimate of the indirect impact, guided by the input–output table.

### **12.3.2 Step 2: Identify Who Should be Compensated**

Step 2 in designing a successful compensation policy is to determine who should be compensated. So far in this chapter we have focused the discus-

sion on compensation based on income – low-income groups should be compensated. But compensation based on income is not the only possibility. Compensation, for example, to laid-off workers is quite often seen as fair, independently of the relative income of workers. Sometimes, compensation has a regional dimension. In addition, compensation to vocal stakeholders may be necessary to help buy support for the reform in the political process.

### **Compensation based on income and wealth**

Low income is arguably the most common and most important criterion for compensation (e.g., International Monetary Fund, 2013). In particular this is the case when considering consumption subsidies on energy, mostly in developing countries. The primary reason why low income is important is that compensation is seen in the context of income distribution. A person with low income is entitled to compensation because he or she has low income to begin with. A person with high income is not, as a rule, considered for compensation, even if his or her loss from the subsidy reform in isolation may be higher than the loss of a poor person.

The primary reason for focusing on low income is confirmed and reinforced by the fact that the benefit to low-income groups quite often is used as a political motivation for continued subsidies. Politicians may fear removing subsidies because they to some extent benefit people with a very low budget. It may not matter very much that other groups also benefit, and in fact benefit more. The low-income people concerned often feel the same way and as reported in the introduction to this chapter proposals to remove subsidies in poor countries have sometimes met significant protest from the person in the street.

From an analytical point of view there is no consensus of what constitutes a low-income group. Sometimes the poorest fifth or tenth of households are in focus (Arze del Granado et al., 2012). Sometimes a measure of poverty is used, for example, ‘less than 60 per cent of median income’ (Dartanto, 2013). Household size and possibly other factors such as region and climate could be adjusted for. The final choice of who constitutes a low-income person depends on national circumstances.

### **Compensation based on isolated losses**

Sometimes compensation based on the degree of loss generated by the reform itself is seen as fair. Consider a reform that inflicts heavy losses on a group that in a general sense is neither particularly wealthy nor poor. It is, in short, a fairly average group. If a reform leads to heavy losses for this group, and few or no losses for other groups, some compensation could be seen as fair. A prominent example is compensation to people laid

off when, for example, subsidies to coal mining are ended. The issue of compensation to laid off miners has been heavily debated in Europe, with some arguing that compensation offered is not nearly enough, with others arguing that those laid off should seek support from the channels available in a welfare state to anybody that is laid off. Those arguing for compensation have not framed their argument in terms of the overall low income of the miners, but rather in terms of the heavy loss inflicted from the reform in isolation. The need for social stability and concerns for add-on effects on other businesses in cities and regions have also been important. A lesson from the UK coal subsidy reform is that measures to stimulate economic development, and therefore creating new job opportunities in areas where industrial activities are to be scaled down or closed, can increase support to the reform. Another example is that the provisions offered to former miners helped to make the closure of coal mines possible in France.

There is no analytical consensus on when and in what circumstances the loss from the reform in isolation could be used as a valid argument for compensation. However, it is in our view important not to overuse this argument. Any reform will imply that some people will have to change behaviour, whether in the labour market or in their purchases. Indeed, such changes are part of the point.

### **Concerns about policy processes**

Compensation may be relevant for political purposes, for example, if and when some group has disproportional influence. Politically motivated compensation is hardly an end in itself, but is rather a side-constraint on the reform of environmentally harmful subsidies. Such a side-constraint arises from the understandable fact that nobody likes to suffer from a reform, especially one that increases GDP and overall welfare. In this case compensation is a way of spreading the gains, hopefully without compromising too much of the gain itself. Put differently, compensation can be justified to mitigate transitional costs and to secure political support for improved market efficiency in the longer term.

### **12.3.3 Step 3: Identify How to Compensate**

Step 3 in designing a successful compensation policy is deciding how compensation should be carried out, which is sometimes called a compensation scheme, or compensation mechanism. There is ample scope for compensating in a more direct way than through environmentally harmful subsidies. We stated above that in average across 16 energy subsidy reforms the poorest fifth of the population obtained 7 cents out of each dollar spent. Put another way it takes US\$14 on the public budget to transfer US\$1 to

the poorest fifth. As alternative, Arze del Granado et al. (2012) offer the following example of a cash transfer: assume that 15 cents of each dollar is spent on administration, and that 80 per cent of the rest reaches the bottom fifth (20 per cent is assumed wasted on people posing as belonging to this group, and people who transitorily belong to the group). With this scheme it will take around US\$1.5 to transfer US\$1 to the poorest fifth. The example is hypothetical, but not unrepresentative of real cash transfer programmes.

There is waste in the cash transfer scheme, even visible waste in the form of administration, but clearly it is much less than the waste inherent in the energy subsidy. The key difference between the schemes is that the cash transfer scheme does not transfer huge amounts to the wealthy.

Compensation in cash is fairly easy to administer in developed economies that have compulsory social security registration and full income tax coverage. In developing countries it may be more difficult to administer. In Iran and Indonesia authorities decided to overcome the difficulties and according to the International Monetary Fund (2013) targeted cash transfers were used in nine out of 28 reform episodes. In other countries and situations, targeted compensation that resembles cash has been used instead (18 of 28 episodes according to the Fund). Summarizing from the case studies of developing countries above and further examples listed by the International Monetary Fund (2013), these include:

- social spending on health, education, rural development and the social safety net (Mexico, Brazil, Ghana, Gabon, Niger, Nigeria, Mozambique, Indonesia, Malaysia, Philippines);
- low electricity tariffs on minimum consumption (Armenia, Brazil, Kenya, Uganda, Philippines);
- support for electrification (Ghana, Kenya);
- support for public transport (Ghana, Malaysia, Philippines).

These examples indicate that developing countries can transform environmentally harmful subsidies to comprehensive social protection packages efficiently targeting the low-income groups. Other examples are the severance packages and direct aid provided to Polish, UK and French miners leaving work in the restructuring of the coal sector mentioned above.

High-income countries offer other types of examples of direct income support. (1) 'Diversified income taxation' is a textbook example of a direct measure to prioritize low-income groups. For example, the Norwegian income taxation is progressive with a marginal tax of 0 per cent for low-income groups and increasing to maximum 50 per cent. Differentiation of the pay-roll tax and energy taxes is used to avoid negative incentives to



regional development from tax changes. The Dutch tax increase on natural gas was followed with reduced personal income taxes. Consequently, net wage levels rose, and the large majority of households saw an overall increase of net disposable income. (2) 'Unemployment benefits' – the labour market has significant elements of wage coordination securing minimum incomes. Severance packages can potentially be used to alleviate transitional cost for workers when adjusting to new jobs.

### **Compensation to regions**

Countries often have political targets for local and regional economies. In this situation lump-sum support can be distributed to the local municipalities for their own distribution according to their preferences. The General Purpose Grant Scheme for Norwegian municipalities serves as an example (Ministry of Local Government and Regional Development, 2013). This system is meant to even out the differences between different localities. Municipalities with low incomes, high population growth and high level of decentralization are particularly emphasized. Based on own incomes and governmental support, local politicians can stimulate regional development by prioritizing local infrastructure to attract new industries over municipal budgets.

The government can also stimulate regional development over the governmental budgets by investing directly in infrastructure, culture, decentralization of governmental institutions, supporting health care and social support programmes.

## **12.4 CONCLUSIONS**

A well-formulated environmentally harmful subsidy reform increases GDP. Potentially everybody could gain from the reform, although it is not always desirable to compensate all parties. The subsidies are formulated to support low-income groups, and compensation to these groups is usually necessary to facilitate the implementation of reform through the political process. In order to preserve the overall gains from reform the compensation itself should be as targeted and non-distorting as possible.

With these principles in mind we have outlined three steps of a successful compensation scheme that can be embedded in a transition management process. Step 1 is to analyse who gains from the pre-reform subsidies. In the case of fuel subsidies, for instance, there are low-income groups that benefit from cheap fuel. However, the largest gains are reserved for those who consume large quantities of fuel, namely the well-off. In the case of coal subsidies to production there were segments of the working

population who had little alternative employment in the vicinity of their neighbourhoods. These groups would lose from a subsidy removal both in the labour market and in the housing market if the value of owned property fell.

Step 2 in a successful compensation scheme is to determine who should be compensated. Low-income groups, and their supporters in politics, usually require firm confirmation that they will indeed receive sufficient compensation. By focusing compensation on low-income groups the reform of environmentally harmful subsidies may contribute to improved income distribution. By contrast, the rich and well-off are seldom a priority for compensation for reasons of distribution. Political realities often dictate support to organized interests who are not candidates for compensation on pure equity grounds to help obtain buy-in to the reform. Any such support should be explicitly directed at the purpose of getting the reform through, and time limited to avoid new inefficient subsidies. A third group of recipients of compensation are laid-off workers. Inhabitants of affected regions may also require compensation, if a region stands to lose and it is deemed necessary to compensate the whole region. A general point of step 2 is that compensation should be carried out for an explicit reason – either distributional reasons, unfair losses or sometimes the political realities of having well-organized interests.

Step 3 in a successful compensation scheme is to determine how compensation should be carried out. Economic efficiency suggests that compensation should be cash-based, similarly to programmes in Indonesia and Iran. Compensation in cash was also used in coal-producing Western countries, along with support to re-education and so on. Countries that have well-developed taxation system (and high taxes) may use the progressivity of the income tax schedule for redistribution.

## NOTES

1. International Energy Association interactive database on fossil fuel subsidies, [www.iea.org/subsidy/index.html](http://www.iea.org/subsidy/index.html); accessed 20 January 2014.
2. Main sources: IEEP et al. (2007); IEA et al. (2010b); Laan et al. (2010).

## REFERENCES

- Arze del Granado, J., D. Coady and R. Gillingham (2012), 'The unequal benefits of fuel subsidies: a review of evidence for developing countries', *World Development*, **40**(11), 2234–48.

- Bacon, R. and M. Kojima (2006), *Coping with Higher Oil Prices*, Report No. 323/06, ESMAP, World Bank.
- Bruvoll, A., J.M. Skjelvik and H. Vennemo (2011), *Reforming Environmentally Harmful Subsidies*, Nordic Council of Ministers TemaNord 551 report, accessed 21 January 2014 at <http://www.norden.org/en/publications/publikationer/2011-551>.
- Dartanto, T. (2013), 'Reducing subsidies and the implication on fiscal balance and poverty in Indonesia: a simulation analysis', *Energy Policy*, **58**, 117–34.
- Ellis, J. (2010), *Untold Billions: Fossil-fuel Subsidies, their Impacts and the Path to Reform: The Effects of Fossil-fuel Subsidy Reform: A Review of Modelling and Empirical Studies*, Geneva: The Global Subsidies Initiative, International Institute for Sustainable Development.
- G20 (2010), *ANNEX: G20 Initiative on Rationalizing and Phasing Out Inefficient Fossil Fuel Subsidies: Implementation Strategies & Timetables*, accessed 21 January 2014 at [http://www.eenews.net/assets/2010/06/28/document\\_cw\\_03.pdf](http://www.eenews.net/assets/2010/06/28/document_cw_03.pdf).
- Hamid, J. (2008), 'Malaysia PM faces bigger protest, dissent over fuel', 12 June, Reuters.
- IEA (International Energy Agency) (2012), *World Energy Outlook 2012*, Paris: International Energy Agency.
- IEA (International Energy Agency) (2013), 'Recent developments in energy subsidies', World Energy Outlook Resources web page.
- IEA, OECD and World Bank (2010a), *The Scope of Fossil Fuel Subsidies in 2009 and a Roadmap for Phasing Out Fossil-fuel Subsidies*, joint report prepared for the G-20 Summit, Seoul, November 2010.
- IEA, OPEC, OECD and World Bank (2010b), *Analysis of the Scope of Energy Subsidies and Suggestion for the G-20 Initiative*, joint report prepared for submission to the G-20 Summit meeting Toronto, June 2010.
- IEA, OPEC, OECD and World Bank (2011), Joint Report by IEA, OPEC, OECD and World Bank on Fossil-Fuel and Other Energy Subsidies: An Update of the G20 Pittsburgh and Toronto Commitments, accessed 21 January 2014 at <http://www.oecd.org/env/49090716.pdf>.
- IEEP, Ecologic, FEEM and IVM (2007), *Reforming Environmentally Harmful Subsidies*, final report to the European Commission's DG Environment, March 2007.
- IMF (2013), *Energy Subsidy Reform: Lessons and Implications*, 28 January, Washington, DC: International Monetary Fund.
- Laan, T., C. Beaton and B. Presta (2010), *Untold Billions: Fossil-Fuel Subsidies, their Impacts and the Path to Reform: Strategies for Reforming Fossil-Fuel Subsidies: Practical Lessons from Ghana, France and Senegal*, The Global Subsidies Initiative, International Institute for Sustainable Development.
- Ministry of Local Government and Regional Development (2013), 'The General Purpose Grant scheme', accessed 21 January 2014 at <http://www.regjeringen.no/en/dep/kmd/subjects/municipal-economy/the-general-purpose-grant-scheme.html?id=540083>.
- World Nuclear Association (2013), 'Energy subsidies and external costs', accessed 21 January 2014 at <http://world-nuclear.org/info/Economic-Aspects/Energy-Subsidies-and-External-Costs/#.Ua96V0CpXSg>.