

**ENVIRONMENT DIRECTORATE  
ENVIRONMENT POLICY COMMITTEE  
TASK FORCE FOR THE IMPLEMENTATION OF THE ENVIRONMENTAL ACTION  
PROGRAMME FOR CENTRAL AND EASTERN EUROPE, CAUCASUS AND CENTRAL ASIA****OVERVIEW OF KEY METHODS USED TO IDENTIFY AND QUANTIFY ENVIRONMENTALLY-  
HARMFUL SUBSIDIES WITH A FOCUS ON THE ENERGY SECTOR****Draft report****24-25 September 2012, Oslo, Norway***Agenda item: 3.i**This draft report will be presented and discussed at the upcoming EAP Task Force meeting which will be held in Oslo, Norway, in September 2012.**The report discusses different analytical tools and methods for the identification, measurement and evaluation of environmentally-harmful subsidy schemes and the quantification of environmental and welfare effects that can result from the removal of such subsidies. The focus of this work is placed on energy subsidy schemes with potential impacts on GHG emissions and public budget spending.**The report proposes a step-by-step methodology for launching work on energy subsidies in the EECCA region. Participants are invited to reflect on the project implementation methodology and provide comments on its applicability. Please send your comments on the report by 20 October 2012.****ACTION REQUIRED:** For discussion and comments.***For additional information, please contact: Ms. Nelly Petkova, Environmental Performance and Information Division, OECD Environment Directorate, tel: +33 1 45 24 17 66, fax: + 33 1 44 30 61 83, e-mail: nelly.petkova@oecd.org****JT03326269****Complete document available on OLIS in its original format***This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.*

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## ABBREVIATIONS

APEC	Asia Pacific Economic Cooperation
ASCM	(WTO) Agreement on Subsidies and Countervailing Measures
BOT	Budgetary and other transfers
BP	Border price
CCGT	Combined-cycle gas turbine (plant)
CFCs	Chlorofluorocarbons
CGE	Computable general equilibrium (model)
CO <sub>2</sub>	Carbon dioxide
CSE	Consumer support estimate
DP	Domestic price
DSGE	Dynamic stochastic general equilibrium (model)
EC	European Commission
EECCA	Eastern Europe, Caucasus and Central Asia
EHS	Environmentally-harmful subsidy
EU	European Union
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GHG	Greenhouse gas
GSI	Global Subsidies Initiative
GSSE	General Services Support Estimate
IEA	International Energy Agency
IEEP	Institute for European Environmental Policy
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund
IPR	Intellectual property rights
MPS	Market price support
OECD	Organisation for Economic Co-operation and Development
OTC	Other transfers from consumers of a commodity
PSE	Producer support estimate
PV	Produced volume of a good
TCT	Transfers from taxpayers to consumers of a commodity
TPC	Transfers to producers from consumers of a commodity
TSE	Total support estimate
USD	US Dollar
VAT	Value-added tax
WTO	World Trade Organisation
WWF	Worldwide Fund for Nature

## EXECUTIVE SUMMARY

The main objective of this report is to launch and support scoping discussions, self-learning, as well as actual country-level analytical work, on identifying and quantifying environmentally-harmful subsidies in the countries of Eastern Europe, Caucasus and Central Asia (EECCA). The report provides information and guidance on the methodological and political economy aspects of environmentally harmful subsidies (EHS) reform that can support political and technical debates. The focus is placed on the identification and measurement of energy subsidies that represent wasteful public budget spending and potentially encourage greenhouse gas (GHG) emissions and other kinds of negative environmental impacts in a direct, or indirect manner.

Energy subsidies cover a wide range of public support, including subsidies for fossil fuels (coal, natural gas, oil), electricity and heat generation, nuclear energy, renewables, biofuels. The report discusses mostly fossil fuel subsidies and support for the electricity and heat generation sectors. Given that the use of alternative and cleaner energy sources in the EECCA countries is limited, public support for such energy sources is excluded from the present discussion.

### Background

Both developing and developed countries need to phase out inefficient subsidies, particularly against the background of the current economic crisis. This can be a potential “quick win” approach to help governments achieve their economic and fiscal objectives, while also tackling environmental problems like climate change. Energy subsidies in particular need to be rationalised as their removal can have significant environmental and welfare benefits. Subsidies can be justified in theory if they promote an overall increase in social welfare. Even in this case however subsidy schemes and programmes need to be time-bound. The timing rationale behind subsidies design is important as restricting the subsidy duration helps prevent rent-seeking behaviour and market distortions. The consensus of expert opinion is that fossil fuel subsidies have a net negative effect, both in individual countries and on a global scale. Fossil-fuel subsidies lower fossil-fuel prices, leading to market distortions with consequences that go well beyond the specific policy objective that the subsidy is intended to achieve. These distortions have wide environmental, economic and social impacts, in many cases increasing energy consumption and greenhouse gas (GHG) emissions, straining government budgets, diverting funding that could otherwise be spent on social priorities, such as healthcare or education, and reducing the profitability of alternative energy sources.

Energy subsidies are large, wide and diverse. A recent study by the International Energy Agency (IEA) (World Economic Outlook 2011) shows that in 2010 fossil-fuel consumption subsidies in non-OECD countries amounted to USD 409 billion, with subsidies to oil products representing almost half of the total. For the same year, information for some EECCA countries shows that fossil fuel subsidies for consumers (oil, coal, gas, electricity) may have totalled about USD 1 billion in Azerbaijan (equivalent to about 1.5% of GDP), USD 4 billion (3% of GDP) in Kazakhstan and USD 8 billion in Ukraine (6% of GDP). According to the IEA, only 8% of the USD 409 billion was distributed to the poorest 20% of the population, demonstrating that these subsidies are inefficient means for assisting the poor. In addition, the IEA estimated that if all fossil-fuel subsidies were completely phased out by 2020, global primary energy demand would be cut by nearly 5% and CO<sub>2</sub> emissions by 5.8%, compared to the business-as-usual scenario.

Subsidy reform is typically beneficial to the economy as a whole but political barriers hold up reform plans. Due to their highly politicised nature, and the uneven distribution of costs and benefits, energy subsidies are often difficult to remove. Nevertheless, reforming environmentally damaging subsidies can help to relieve pressures on public budgets and to reduce GHG and other pollutants that can adversely affect public health. Whether or not to pursue these objectives depends on countries' priorities.

While there is an on-going debate in the OECD and some developing countries, including, among others, within the G-20 and the World Trade Organisation (WTO) context, there is, generally, little discussion of the need to reform specific energy subsidy schemes in the EECCA region. Despite some assessment of the magnitude of fossil-fuel consumption subsidies (done by the IEA) and except for Russia (where a first inventory of subsidies to upstream oil and gas activities has been prepared), comprehensive studies on the identification, quantification and impact measurement of environmentally-harmful subsidies in the EECCA countries are lacking. Preparation of analytically-sound analyses of subsidies that are potentially environmentally harmful is a necessary first step for launching a meaningful policy debate on their reform.

### **What is a subsidy?**

Although the term “subsidy” is widely used in economics and national and international law, defining what is and what is not a subsidy is not a trivial issue. The concept of a subsidy has evolved significantly over the years. The simplest and narrowest definition describes a subsidy as a direct budgetary payment by a government to a producer or consumer. However, subsidies exist in a variety of different and complex forms – from direct budgetary transfers, to various tax exemptions (known as tax expenditure) to price control mechanisms (including also through border measures such as tariffs and quotas). The subsidy definition has been further expanded to include also environmental externalities, such as pollution or habitat damage, as well as government uncollected and under-collected revenue (or foregone revenue) which can result, for example, from un-taxed resource rents or royalty relief associated with the exploitation of publicly-owned or managed resources. While subsidies are often perceived as direct cash payments to companies, in reality, they are often used for controlling and sharing the risks and rewards of economic activities. An operational definition of subsidies needs to reflect this feature as well: subsidies are government-provided goods or services, including risk-bearing, that would otherwise have to be purchased in the market. For these reasons, the OECD speaks more often about support measures rather than subsidies as such.

Several international organisations have contributed towards defining the subsidy boundaries, including, among others, the OECD, the WTO, the European Union (EU), the IEA, the World Bank, the International Monetary Fund (IMF), and the Global Subsidy Initiative (GSI). Despite certain differences in definitions developed by these organisations, they largely reflect the essential elements of a subsidy, as understood today by economists, and constitute a useful guidance for national governments. Of all the subsidy definitions that exist, the WTO definition is the only one which has become legally binding for the WTO member countries. The WTO definition is often the starting point in analysing subsidies.

Determining the environmental harmfulness of subsidies is a major challenge. Currently, there is no common definition of an environmentally-harmful subsidy (EHS). The OECD definition, developed in 2005, has been generally used by analysts in evaluating such subsidies. The OECD and other institutions have developed various tools to help operationalise the identification and assessment of environmentally-harmful subsidy schemes.

National legislation sometimes provides a subsidy definition, which may or may not be aligned with internationally-established definitions. In discussing specific subsidy schemes, such national-level definitions are of key importance as they embed the discussion in the national context. At the same time, revealing differences in national and international definitions, and assessing the magnitude of subsidies based on boundaries defined internationally, may point to important gaps in the national-level evidence base for subsidy schemes management and reform.

### **Approaches to subsidy identification, measurement and evaluation**

If governments intend to rationalise their energy subsidy schemes and implement difficult subsidy reforms, they first need to have a very good understanding of what these schemes are, how much they cost the public purse and what their economic, social and environmental impacts are. Various methods and tools to identify and measure subsidies and their impacts have been designed and applied by different governmental and non-governmental institutions. These methods serve different purposes and they vary in the level of detail and the depth of analysis.

The main approach to subsidy analysis involves three consecutive steps. These steps include: 1) identification of a subsidy scheme; 2) measurement; and 3) evaluation. The main tools and methods for doing such analysis, as discussed in this report, are roughly divided into three main groups:

1. Methods focused primarily on the **identification of energy** and, specifically **fossil fuel, subsidy schemes**. These include two main approaches to classifying and preparing subsidy inventories, namely a matrix of energy subsidy schemes, developed by the OECD, and a similar subsidy classification framework, developed by the Global Subsidy Initiative, hosted at the International Institute for Sustainable Development in Geneva.
2. Methods focused primarily on the **measurement** of the subsidy magnitude. This group discusses three subsidy estimation methods, namely: the Price-gap approach, the Producer Support Estimate (PSE) and the Consumer Support Estimate (CSE).
3. Methods to **identifying environmentally-harmful subsidy (EHS) schemes, assessing the impacts of such schemes and evaluating their effectiveness**. The impact of subsidies (and their removal) is analysed in terms of pollution emissions and poverty reduction, and economic and fiscal consequences. This group introduces several analytical frameworks (“decision trees”), such as the OECD Quick scan model, Checklist and Integrated assessment model as well as models for estimating the impact of subsidy and their removal on the economy and environment (such as the OECD Environment-Linkages and other general equilibrium or regression models).

It is important to mention that social cost-benefit methods, which are essential in any policy evaluation, and not just subsidies, are not discussed in this paper, as they alone can be a subject of a separate research effort.

Each of these methods and tools has its advantages and limitations. The advantages and disadvantages of each approach largely depend on the purpose for which they have been developed. For the purposes of working on environmentally harmful subsidies, decision trees can be very useful. They can provide a useful conceptual framework to shape national discussions on subsidy effects.

### **Political economy of reform**

Reforming energy subsidies is a difficult policy choice. Energy subsidy reforms are highly politicised and to be successful they need a high-level political support and the concerted efforts of the government. Reforming existing energy subsidies calls for a strong political will and long-term vision to take tough decisions that benefit society as a whole. Investing time and resources in analysing the size of environmentally-harmful and economically wasteful subsidy schemes and the potential effects of their removal may help politicians in making these decisions more explicit and understandable for all parts of the population. Transparency and stakeholder dialogue are the first steps to prepare subsidy reform.

While the potential benefits of reforming EHS have been widely recognised in the OECD countries, progress has often been impeded by opposition from affected groups such as farmers (when removing agricultural subsidies), consumers, and energy-intensive sectors and firms. Thus, effective reform strategies need to identify ways in which the adverse effects of subsidy reform, particularly on the poor and vulnerable groups, could be mitigated without undermining the environmental effectiveness of the reforms. The report lists a number of factors that should be taken into consideration while preparing such strategies.

### **Organising the work on energy subsidies in the EECCA countries**

Addressing the issue of energy subsidies involves resolving questions related to definitions, measurement and evaluation techniques. Despite existing challenges with subsidy measurement and assessment, it is clear that subsidy tracking in the EECCA countries can proceed using available analytical tools. The proposed procedure for conducting work on EHS in the energy sector in the EECCA countries consists of the following major steps:

- Launching a country stakeholder dialogue to agree on the scope and focus of the work, including an agreement on subsidy definition that will be used in the analysis, identifying sources of information;
- Developing and using a questionnaire to support data collection;
- Identifying and initial screening of subsidy schemes in support to coal, oil, natural gas, electric energy and heat – using the OECD matrix and GSI methodology;
- Measuring subsidy magnitude applying existing tools, as appropriate (e.g. the price-gap approach, Producer support estimate, Consumer support estimate);
- Selecting and agreeing on the sector(s) and specific energy subsidy schemes which will undergo an in-depth analysis;
- Evaluating the effectiveness of the selected subsidy schemes;
- Developing/adapting an economic model to assess scenarios for CO<sub>2</sub> reductions resulting from the reform of the support schemes;
- Applying the model and evaluating the impacts of the phase-out of the identified subsidy schemes;
- Defining barriers to subsidy reform – identifying drivers for reform in close cooperation with government officials, experts and stakeholder groups representatives;
- Preparing an analytical report and policy recommendations on a possible reform path and launching discussions in the government.

The identification and measurement of subsidies in the EECCA region will often be limited by the lack of expertise and data. Addressing the latter problems will require support from international partners. It is also worth noting that while the above steps are generally applicable across countries where this work will be done, the methodology has to be tailored to the specifics of each country (e.g., different countries will have different types of subsidy schemes, countries may be net energy exporters or net energy importers, etc.).

Implementing internationally-supported pilot projects in the EECCA countries that wish to advance EHS reforms may bring benefits for the entire region. Such an analysis could help increase the transparency of existing subsidy schemes as well as raise awareness among policy-makers of the potential costs and benefits of subsidy reforms. Such evidence-based analysis could also help to generate political support for the adoption of energy subsidy reform plans and their further implementation.

## INTRODUCTION

### I. Objectives and structure of the report

1. The main objective of this report is to provide guidance on the methodological and political economy aspects of environmentally harmful subsidies (EHS) reform thus supporting political and technical debates, as well as actual activities on identifying and quantifying environmentally-harmful energy subsidies in the countries of Eastern Europe, Caucasus and Central Asia (EECCA). The focus is placed on the energy subsidies with potential contribution to greenhouse gas (GHG) emissions and other environmental impacts and wasteful public budget spending.

2. The report consists of three main parts:

- Part I summarises different definitions and specific issues related to the concept of subsidies and discusses the implication of sometimes diverging understanding of these concepts for planning and conducting EHS reforms. This part is instrumental for defining the scope and priorities of such reforms;
- Part II includes a brief description of existing efforts to identify and measure energy subsidies and assess the impacts of their removal. The main tools and approaches covered in the report include: the OECD quick scan, checklist and integrated assessment framework, the Producer Subsidy Estimate (PSE) and the Consumer Subsidy Estimate (CSE) and as well as the price-gap approach used in calculating consumer subsidies. It also looks at some macro-economic models used in quantifying the results of subsidy phase-out in terms of economic, social and environmental consequences;
- Part III discusses issues related to the political economy of subsidy reform and describes the possible procedure for launching the work on environmentally-harmful energy subsidies in the EECCA countries.

### II. Target audience

3. This technical report is first and foremost targeted at governmental and non-governmental analysts in the EECCA countries that need a better understanding of different tools and methods for identifying, measuring and evaluating various subsidy schemes. These could be people working in governments or as researchers and consultants who are asked to provide solid analytical support to policy makers who consider reforming different subsidy measures. The report may be of interest also to policy makers who may want to understand better the political intricacies of launching and organising the reform process, in addition to getting acquainted with various methods and tools that are used by analysts in preparing the analytical background to subsidy reforms.

4. While the tools, as reviewed in this report, are mostly analysed from the point of view of potential users in the EECCA countries, they are not limited to this region. In fact, the application of these tools is broader and they can be used by analysts and government officials in both OECD and non-OECD countries.

### III. Demand for supporting subsidy reforms

5. Energy subsidies have long been used by governments to advance particular political, economic, social and environmental goals or to address different market failures. In this context, the most common argument of politicians for introducing and maintaining energy subsidies is the support of important domestic policy objectives, such as rural and industrial development and the creation of new jobs, improved energy access, achieving energy security and independence, or alleviating poverty. Despite stated objectives, these subsidies are often driven by non-energy objectives. Different studies show that energy subsidies tend to gravitate to the largest, most economically powerful recipients (and not to the poorest), thus increasing the profits for well-connected private investor or industries.

6. The economic cost of energy subsidies can represent a significant burden on a country's finances, can weaken its growth potential and encourage wasteful energy consumption. Governments support the production or consumption of energy in many ways: from providing grants or low-interest loans to tax exemptions and price controls that lower the cost of energy production, or raise the price received by energy producers or lower the price paid by energy consumers. Subsidies to energy, by encouraging the use of fossil fuels and discouraging the production of low-carbon fuels, can lead to increased emissions of carbon dioxide and other greenhouse gases. Empirical studies suggest that the emission reductions from removing subsidies that encourage wasteful energy consumption could be substantial and could bring major environmental, economic and social benefits.

7. In 2009, the G-20 leaders committed to rationalise and phase-out, over the medium term, inefficient fossil fuel subsidies that encourage wasteful consumption. The call to phase out fossil-fuel subsidies was directed at all nations that subsidise fossil fuels, not only at the G-20 countries themselves, taking into account the specific circumstances of each economy. Through its Green Growth Strategy, the OECD has made the phase out of such subsidies a major policy objective for the developed countries. Similarly, the issue of wasteful energy subsidies has come up in the discussions held at the Asia-Pacific Economic Cooperation (APEC) meetings. In the European Union (EU) context, the "Roadmap for a resource efficient Europe" calls on member states to phase out environmentally-harmful subsidies by 2020, with due regard to the social impact of such reforms, in particular on the poor. In addition, subsidies are a particularly hot issue in the framework of the World Trade Organisation (WTO) trade negotiations and are a particular concern for those EECCA countries that have chosen to join the WTO. All these international processes are helping to raise the profile of the environmentally-harmful subsidies in general and energy subsidies in particular on the international agenda.

8. Reducing subsidies can have a particularly beneficial fiscal impact which is of significant importance at the time of financial and economic crisis. In some cases, phasing-out a subsidy may have direct positive budgetary consequences, that is increased budgetary revenues (from saved subsidies) can be directed elsewhere and spent where they are more needed, such as on various social, health or education programmes. In this context, governments need to undertake systematic efforts to monitor energy subsidies and analyse the economic impacts of their potential reduction. While measuring the impacts of a subsidy on the economy and environment remains a highly challenging task, a good understanding of how a given subsidy scheme works helps to determine the likely effects of subsidy removal.

9. The long or medium term consequences of subsidy removal are usually different from the short term impacts. Their prediction is difficult since multiple factors drive decisions of entities that face the effects of subsidy removal. Many of these factors are not purely financial or economic. For example, government policy to phase-out coal subsidies would influence business choices of coal users (e.g. owners of power plants and heat plants). The degree of response depends, however, on the availability of alternative fuels, the cost-effectiveness assessment, the stage in the economic life of facilities.

#### **IV. Methodology and authors**

10. The report is based on a desk review of information available from international organisations that play a leading role in supporting subsidy reforms, most importantly on a review of information available at OECD following extensive work in this area that focuses on member countries. The authors are in debt to the intellectual inputs of a number of analysts whose contributions have been reflected throughout the report. In addition, the development of the report benefited from expert input and review. Special thanks go to Ivetta Gerasimchuk (GSI) who provided an in-depth review of the draft. In particular, the draft report was discussed at an expert meeting held in March 2012 at the OECD Headquarters. The meeting involved representatives of both OECD and EECCA countries. During this discussion, a number of challenges with subsidy definition, measurement and evaluation were identified. Angela Bularga's (OECD) help with shaping the paper and Brendan Gillespie's (OECD) comments are very much appreciated. Irina Massovets's (OECD) assistance throughout the whole project was extremely helpful.

11. The report was co-authored by Rafal Stanek (SST-Consult, Poland) and Nelly Petkova (OECD, Environment Directorate) with substantive contribution by Andrzej Gula (Institute of Environmental Economics, Poland).

12. The report was developed under the umbrella of the OECD/EAP Task Force. The mission of the EAP Task Force is to guide the improvement of environmental policies in the transition economies of Eastern Europe, Caucasus and Central Asia by promoting the integration of environmental considerations into the processes of economic, social and political reform. The members of the Task Force comprise OECD and EECCA government officials. International organisations and financial institutions, business and civil society representatives actively participate in the work of the EAP Task Force.

13. The OECD/EAP Task Force work on subsidy reform is financially supported by the governments of Germany, Norway, and Sweden.

14. The support and contribution of all these people and institutions is gratefully acknowledged.

15. The views expressed in this report are those of the authors and do not necessarily reflect those of the OECD or its member countries.

## PART I. DEFINITIONS OF BASIC CONCEPTS

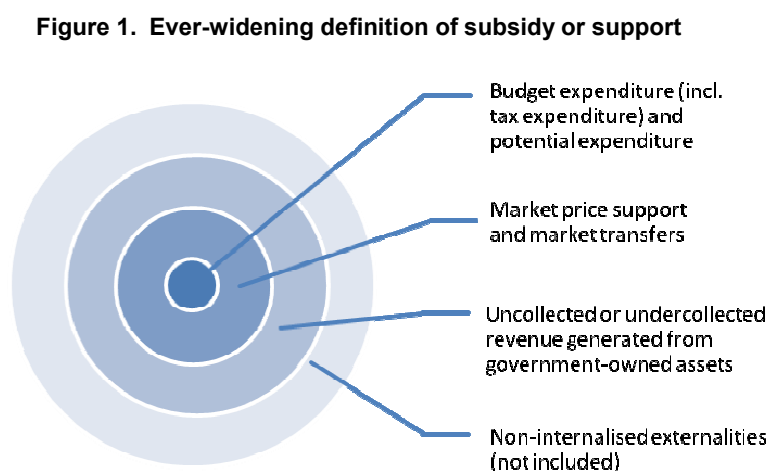
16. Although the term “subsidy” is widely used in economics and national and international law, it is still a very elusive concept. This chapter briefly presents the major subsidy definitions used by selected organisations. It also discusses issues related to the classification and types of subsidies with a particular focus on support for the energy sector.

### 1. Subsidy definition

17. Given the significance of subsidies as an instrument of public policy, there is a need to understand the subsidy boundaries. A clear subsidy definition has implications for the country’s subsidy classification system. Such a definition helps not only the statistical data collection process, but most importantly, it can be used in conducting monitoring of subsidy implementation as well as relevant reporting and policy analysis that underpin policy decision-making particularly with regard to developing subsidy reform plans.

18. Domestically, how a country chooses to define a subsidy is rather a political decision that reflects domestic political, economic and legal frameworks and traditions. Internationally, a number of organisations have developed their own subsidy definitions. Despite certain differences in these definitions, they largely reflect the essential elements of a subsidy, as understood today by economists. The major international organisations that have contributed to the solution of this subsidy puzzle, include, among others, the OECD, the World Trade Organisation (WTO), the European Union (EU), the International Energy Agency (IEA), the World Bank, the International Monetary Fund (IMF), the Global Subsidy Initiative of the International Institute for Sustainable Development (IISD-GSI). Of all the subsidy definitions that exist, the WTO definition is the only one which has become legally binding for the WTO member countries.

19. Over the years, the concept of a subsidy has significantly evolved. Figure 1 below presents the ever-widening definition of a subsidy. The traditional understanding of a subsidy has been expanded to include different support measures.



Source: OECD (2010c).

20. Many economists today agree that it would be better to speak of “support” (or “transfers”) rather than a “subsidy”, as ‘support’ appears to be a less judgemental term which also covers a wider range of transfers of public resources (including those for goods and services for which markets are missing). However, in general, people still use a number of different terms to express the notion of a subsidy. These include, among others, (public) support, (public) assistance, state aid, grants. These terms are often used interchangeably.

21. The simplest and narrowest definition describes a subsidy as a direct budgetary payment by a government to a producer or consumer. Such direct payments may take the form of a grant, loan or loan guarantee (a type of potential liability for the budget), for example. In the 20<sup>th</sup> century, analysts added tax expenditure to the subsidy group. Tax expenditure are special exemptions from standard required tax payments and may take the form of tax deductions, tax rate reductions, tax credits or tax deferral granted to selected groups or specific activities<sup>1</sup>. They are considered a more significant source of public support than direct budgetary expenditure. Thus, governments can provide support directly (through budgetary transfers and tax expenditure) or indirectly, through market interventions, that is policies that have effects on prices of certain goods and services<sup>2</sup>.

22. Subsidies can be provided to both producers and consumers. When support to producers is provided through a price mechanism, this kind of subsidy is referred to as Market Price Support (MPS)<sup>3</sup>, when such support is provided to consumers, it is called market transfer. From the point of view of the government, this kind of subsidy may be preferable as it does not show on government budgets and, as such, is much less transparent. This price support measure can be delivered in many different ways. It can be done by raising domestic prices artificially (by setting a minimum price for a good above market rates) that will guarantee corporate rates for producers. This is usually supported by introducing foreign trade barriers such as tariffs or import quotas which make imported goods more expensive relative to similar domestic goods, thus protecting national producers and shielding them from competition. With such subsidies, domestic producers usually gain a significant market share but consumers, who bear the real cost of such subsidies, are in a losing position. The overall effect of MPS measures on economy, including on the environment, can be altogether negative. For this reason, economists consider such subsidies to be one of the most market-distorting forms of support provided through government interventions. This subsidy type however is quite typical for the agricultural sector and less frequent in the energy field, with the notable exception of biofuels.

23. Market transfers, usually delivered in the form of regulated prices for consumers set at below-market rates, are typically provided as a means to guarantee access to minimal volumes of consumption of a certain good or service, particularly for the poorest segments of the population. Subsidising consumer prices, however, usually has implications for the budget, as the gap is normally made up by the government in one form or another. Overall, this form of subsidies is more widely spread in the energy terrain, including in the EECCA countries.

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<sup>1</sup> Most terms that appear in the report are explained in more detail in the Glossary at the end of the report.

<sup>2</sup> For example, tax and subsidy programmes and trade barriers are policies that affect cost structures of producers and subsequent prices.

<sup>3</sup> MPS refers to the monetary value of gross transfers from consumers and taxpayers to energy producers arising from policy measures creating a gap between domestic producer prices and reference prices of a specific energy commodity, measured at the mine-mouth or well-head.

24. Uncollected and under-collected revenue generated from state-owned assets (often referred to as foregone revenue) is now considered a form of a subsidy. This foregone revenue can result for example from un-taxed resource rents or royalty relief associated with the exploitation of publicly-owned or managed resources. With state-owned infrastructure and publicly-provided services (e.g. water, electricity, heat), the government may lose revenue due to non-payment by the users of these services.

25. Whether the value of non-internalised externalities should be included in the accounting is a bone of contention between those responsible for generating subsidy estimates and environmental economists. For example, the non-internalisation of external costs strongly contributes to making coal competitive with regard to other low-carbon technologies. While environmental externalities, such as pollution or habitat damage, certainly constitute subsidies to industry, many subsidy studies do not analyse them. The uncertainty regarding their value is larger than that for most direct subsidies. As a result, analysts often leave them out in order to focus attention on the many ways that direct government subsidies help polluting industries.

26. One of the most common misconceptions about subsidies is that they are simply cash. In reality, a great deal of market activity involves controlling and sharing the risks and rewards of economic activities. While bearing less risk or getting a larger share of the rewards can greatly improve the economic returns to a private company, the subsidies themselves may take the form of shifting how risks or rewards are allocated, rather than providing payments to industries directly. An operational definition of subsidies needs to reflect this feature as well: subsidies are government-provided goods or services, including risk-bearing, that would otherwise have to be purchased in the market<sup>4</sup>.

27. In contrast to direct payments, some of these “other” support benefits may come to public attention only rarely, and the issues may not be readily understood when they do. Many of these mechanisms tend to be hidden in legislation. When they come to public attention, they are usually cloaked in some socially benign language and as such may encounter ready public acceptance.

28. The broad definition of subsidies needs to take account of all these types of public support. Below we discuss the extent to which these support measures are reflected in the definitions that different international organisations have developed.

### **1.1. *WTO definition of a subsidy***

29. The WTO Agreement on Subsidies and Countervailing Measures (ASCM) (1994) includes the following definition of a subsidy:

#### Article 1, Definition of a Subsidy

For the purpose of this Agreement, a subsidy shall be deemed to exist if:

(a) (1) there is a financial contribution by a government or any public body within the territory of a Member (referred to in this Agreement as “government”), i.e., where:

(i) a government practice involves a direct transfer of funds (e.g., grants, loans, and equity infusion), potential direct transfers of funds or liabilities (e.g., loan guarantees);

(ii) government revenue, that is otherwise due, is foregone or not collected (e.g., fiscal incentives, such as tax credits);

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<sup>4</sup> Compliments of [www.earthtrack.net](http://www.earthtrack.net)

(iii) a government provides goods or services other than general infrastructure, or purchases of goods;

(iv) a government makes payments to a funding mechanism, or entrusts or directs a private body to carry out one or more of the type of functions illustrated in (i) to (iii) above which would normally be vested in the government and the practice, in no real sense, differs from practices normally followed by governments;

or

(a) (2) there is any form of income or price support in the sense of Article XVI of the General Agreement on Tariffs and Trade (GATT)<sup>5</sup> 1994;

and

(b) a benefit is thereby conferred.

30. The WTO definition excludes two forms of support:

- ***that part of market price support*** (MPS) — i.e., transfers between consumers and taxpayers to producers created as a result of one or more government interventions — provided through ***tariff and non-tariff barriers***; and,
- ***subsidies for general infrastructure***.

31. The first support element is not included in the ASCM definition for institutional reasons: tariffs and non-tariff barriers are normally addressed at the WTO through different disciplinary mechanisms other than subsidies. The second exclusion is consistent with the focus of the WTO on the trade-distorting effect of support measures. Subsidies to general infrastructure are presumed to have little specific adverse effects on a country's trade<sup>6</sup>.

32. An important condition in the WTO<sup>7</sup> definition is that subsidy exists only when benefit is conferred to a specific party. Unlike some other definitions (e.g. IEA), it is not required to prove the explicit impact of subsidy on prices. This stems from the fact that there are some subsidies that have little effect on prices (or when it is difficult to prove such effects), but at the same time they trigger choices that benefit agents. Some of these choices may be environmentally harmful. For example, risk transfer from producers to the government may have negligible impact on price levels, but may reveal important impacts on producers' behaviour (for example, in terms of technology choice).

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<sup>5</sup> GATT is a multilateral agreement regulating international trade. According to its preamble, its purpose is the "substantial reduction of tariffs and other trade barriers and the elimination of preferences, on a reciprocal and mutually advantageous basis." GATT was signed in 1947 and lasted until 1993, when it was replaced by the WTO in 1995. The original GATT text (1947) is still in effect under the WTO framework, subject to the modifications of GATT 1994.

<sup>6</sup> OECD (2010c).

<sup>7</sup> The EECCA countries which are WTO members include: Armenia, Georgia, the Kyrgyz Republic, Moldova, the Russian Federation and Ukraine. The governments of Azerbaijan, Belarus, Kazakhstan, Tajikistan and Uzbekistan have an observership status.

### 1.2. *OECD definition of government support*

33. In its *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels*, the OECD uses the broader concept of “support” rather than the term subsidy. It includes both direct budgetary expenditure and tax expenditure that in some way provide a benefit or preference for fossil-fuel production or consumption relative to alternatives<sup>8</sup>.

34. The OECD matrix of the classification of public support measures (with a focus on the energy sector) is presented in Annex 1 to this document. Table 1 below, based on the OECD matrix, summarises the types of mechanisms for transferring a subsidy to a recipient. Similarly to the WTO definition, the notion of “conferring benefit” is used in the OECD definition. Moreover, the OECD notion of support is captured by the indicators of Producer Support Estimate (PSE) and the Consumer Support Estimate (CSE) which provide the framework for calculating subsidies. The PSE incorporates all types of subsidies covered by the ASCM plus market price support in all its forms. The CSE, an analogous indicator, combines transfers affecting consumption.

**Table 1. Mechanism for subsidy transfer and its statutory or formal incidence**

Transfer mechanism	Statutory and formal incidence (legal basis of the subsidy)
Direct transfer of funds	Output returns
Tax revenue forgone (tax expenditure)	Enterprise income
Other government revenue forgone (provision of goods and services below market value)	Cost intermediate inputs
Transfer of the risk to government	Cost of production factors
Induced transfers (income or price support)	Direct consumption

Source: Based on the OECD Matrix.

### 1.3. *GSI definition of a subsidy*

35. The Global Subsidies Initiative (GSI) was established in 2005 by the International Institute for Sustainable Development (IISD), dedicated to analysing subsidies – transfers of public money to private interests – and how they support or undermine efforts to achieve sustainable development<sup>9</sup>. The GSI has launched extensive research programmes for identifying and measuring different subsidy schemes. According to the GSI<sup>10</sup> broad definition, largely based on the WTO ASCM definition, a “subsidy” should cover preferential treatment in all forms — financial and otherwise — provided to consumers and producers. Preferential treatment for producers can be provided in three ways:

- To selected companies;
- To one sector or product when compared with other sectors; and,
- To sectors or products in one country when compared internationally (e.g., government incentives to attract foreign investment).

<sup>8</sup> OECD (2011).

<sup>9</sup> Global Subsidies Initiative web-site: <http://www.iisd.org/gsi>

<sup>10</sup> GSI of the IISD (2010).

36. For the purpose of the G-20<sup>11</sup> work on energy subsidies, the GSI recommended the adoption of the WTO definition. In contrast to the WTO definition, the GSI definition of a subsidy does not require the benefits conferred to be specific to a company or an industry. The GSI considers benefits to be a subsidy if they confer a considerable advantage to the groups of market participants even if some other groups may receive the same treatment (e.g. accelerated depreciation allowance is not specific to the oil and gas industry, but the GSI would still consider it a subsidy). This GSI definition is further supplemented by an illustrative list of subsidy types to capture some of the transfers not covered by the WTO definition. This illustrative list is presented in Annex 2.

#### **1.4. EU definition of state aid**

37. The European Union legislation provides an extensive regulatory framework of state aid. State aid is a term which refers to forms of assistance from a public body or publicly-funded body, given to undertakings/enterprises engaged in economic commercial activity on a selective basis, with the potential to distort competition and affect trade between the member states of the European Union. In this context, state aid rules are designed to prevent market distortions by subsidy schemes. The definition of State aid is provided for in Article 87(1) of the European Community (EC) Treaty (1957) and it reads as follows:

“...Any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the common market...”

38. This definition translates into five tests or criteria, all five of which must be met for State aid to be present. These criteria include:

1. Aid is granted by a EU member state or through state resources (including e.g. lottery distributions and European funds);
2. Aid confers an advantage on the recipient;
3. It favours certain commercial undertakings or the production of certain goods (i.e. it must be selective in its nature);
4. It distorts or has the potential to distort competition; and,
5. The activity is tradable between Member States and the aid has the potential to affect trade.

39. Some exemptions with regard to state aid are allowed by the EC legislation, such subsidy schemes require notification and prior approval by the EC. If a subsidy scheme infringes the EC rules on state aid, there is a risk of court trials at the European Court of Justice.

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<sup>11</sup> G20 is a group of finance ministers and central bank governors from 20 major economies: 19 countries plus the European Union. Of all EECCA countries, only the Russian Federation is a member of the group.

## 2. IEA definition of an energy subsidy

40. The IEA's definition focuses specifically on energy subsidies. The IEA defines energy subsidy as any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lowers the price paid by energy consumers<sup>12</sup>. In other words, the IEA's approach means that subsidy would exist whenever energy price on the domestic market is below the price on the global market with adjustments for the costs of bringing these energy commodities to the world market (commonly known as the price-gap approach).

41. The IEA definition however does not include implicit subsidies that result from the lack of full cost pricing of electricity and heat services, badly allocated environmental subsidies or risk transfer mechanisms with non-visible impact on prices. Pieters<sup>13</sup> in 1997 proposed a slightly broader definition that defines subsidies as "deviations from full pricing". But this deviation is difficult to measure as we need to know how exactly to measure the externality and where to draw the baseline against which to measure the subsidy.

42. A useful way of considering energy subsidies is to recognise that "energy" actually involves several distinct goods and services: extraction of fossil fuels, energy generation, productive capacity for supplying and distributing the energy, actual use of energy, and underlying knowledge affecting the performance of both energy supply and energy efficiency. Different subsidy concepts can then be considered for each of these components to clarify distinctions.

43. Some energy subsidies have a direct impact on costs or prices, like grants and tax exemptions. Others affect prices and costs indirectly, such as regulations that skew the market in favour of a particular fuel or government-sponsored technology. How governments choose to go about subsidising energy depends on a number of factors. These include, among others, the overall cost of the subsidy programme, the transaction and administration costs, and how the cost of the subsidy affects different social groups<sup>14</sup>.

44. The definition of energy subsidy introduces an important aspect that relates to the subsidy impact on production costs and prices. When launching work on subsidies in the EECCA countries, two main questions ensuing from this analysis need to be taken into consideration:

- What is the impact of a subsidy scheme on production costs and prices received by producers and *what would be the likely response of producers to phasing-out the subsidy?*; and,
- What is the impact of a subsidy scheme on prices paid by consumers and *what would be the likely response of consumers to phasing-out the subsidy?*

## 3. Comparison of definitions developed by international organisations

45. In comparing the definitions developed by the international organisations, it is obvious that these definitions are largely compatible in reflecting the essential elements of a subsidy (see Table 2 below). However, until now, none of these organisations has developed an operational definition and approach for measuring the internalisation of externalities, which is of a particular interest to environmental policy makers. Given the difficulties with measuring such subsidies, the challenge is understandable. The task of identifying and measuring the other types of subsidies is daunting enough. It is also likely that reform of direct subsidies alone would generate many beneficial market shifts.

<sup>12</sup> IEA, Taxing and Subsidising Energy, [http://www.iea.org/papers/2006/oil\\_subsidies.pdf](http://www.iea.org/papers/2006/oil_subsidies.pdf)

<sup>13</sup> Pieters, J. (2002).

<sup>14</sup> UNEP (2008).

**Table 2. Definitional coverage of a subsidy as developed by different international institutions**

Essential mechanisms for transferring a subsidy	WTO	OECD	IEA	GSI
Direct transfer of funds and liabilities	√	√	covered partially or fully only if reflected in the domestic market price	√
Tax revenue forgone (tax expenditure)	√	√		√
Other government revenue forgone (provision of goods and services below market value)	partially (excludes subsidies for general infrastructure)	√		√
Induced transfers (income or price support)	partially (excludes support provided through tariffs and non-tariff barriers)	√		√
Transfer of the risk to government	√	√		√
Non-internalisation of externalities	-	-		√

Note: "√"- Yes, covered. "-"- No, not covered.

#### 4. Definition of an environmentally-harmful subsidy

46. Currently, there is no common definition of an environmentally-harmful subsidy (EHS). The OECD definition, developed in 2005, has been generally used by analysts. This definition states that an EHS is “*a result of a government action that confers an advantage on consumers or producers, in order to supplement their income or lower their costs, but in doing so, discriminates against sound environmental policies. All other things being equal, the EHS increases the level of waste, pollution and natural resource exploitation to those connected*”.

47. Determining the environmental harmfulness of subsidies is a major challenge. The definition alone is too generic and difficult to apply in practice. For this reason, the OECD and other institutions have developed various tools to help operationalise this definition when identifying and assessing environmentally-harmful subsidy schemes. A number of such tools are discussed in more detail in Chapter 3.

#### 5. Classification of subsidies<sup>15</sup>

48. The measures that governments use to provide support vary enormously in terms of their mechanisms and design, reflecting diverse domestic political and economic settings and, increasingly, obligations in the international economic arena. Various groups of subsidies are usually organised around one or more of the following characteristics and dimensions:

- *target*: consumers or producers, outputs, inputs, value-adding factors, type of energy commodity;
- *instruments*: e.g. budgetary expenditure, tax expenditure, market transfers, under-pricing of publicly-owned or managed assets;
- *pathway of benefit*: direct, indirect, explicit, implicit; and,
- *purpose*: e.g. regional development, energy conservation.

<sup>15</sup> This section draws heavily from OECD (2010e) and OECD (2010c).

49. When governments provide subsidies for a particular purpose they always impose some conditions, and these conditionalities can also serve as the basis for subsidy classification. Subsidies can be made conditional on a number of things, such as, for example, income level of the receiving household, the level of production (output) of, use of particular inputs or the introduction of a particular technology by an enterprise. When the point of impact (or the effect) of a subsidy is mainly on output, this measure increases the revenue of a sector, when it is on variable costs or raw materials and intermediate product inputs, the result is lower costs of production of the recipient. When the impact is on profit and income, this type of support actually has no direct impact on the input or output market. These main points of impact are also called subsidy **conditionalities**.

### *5.1. OECD Matrix of support measures*

50. Subsidies can be classified in many different ways. If we use the OECD Matrix of support measures with examples from the energy sector (Annex 1) as a starting point, one can see that the two broad lines along which subsidies are classified are the mechanism through which subsidies are channelled to recipients (called **transfer mechanism**) and the **statutory** or **formal incidence** of the subsidy (who receives the subsidy). Alternatively, one can say that the subsidy measures in the Matrix are organised in terms of targets and instruments.

51. In terms of transfer mechanisms to producers and consumers, the OECD has divided subsidies into five major groups. The main transfer mechanisms include: direct transfers of funds, tax expenditure (revenue foregone), other government revenue foregone, transfer of risk to government and induced transfers. Each of these groups is discussed in more detail below.

#### *5.1.1. Direct transfer of funds*

52. Direct, budgetary transfers are the most straight-forward and visible types of subsidies as they appear in a country's annual budget and normally undergo parliamentary scrutiny. They include, among others, grants to cover losses by state-owned enterprises, capital grants, interest rate subsidies, wage subsidies, consumption subsidies.

53. Direct budgetary transfers are relatively easy to observe and quantify. Data on direct budgetary transfers usually appear in national accounts and sectoral subsidy accounts (i.e. accounts that relate to a specific product, industry or sector) although this depends on how well reported they are in government budget documents. Experience shows however that government accounts differ in their level of transparency and accuracy in reporting actual expenditure, and this can add substantially to the difficulty of the data-collection task.

54. When accounting for budgetary transfers, specifically in the energy sector, it is important to capture all subsidy schemes, including those that may be outside the direct responsibility of energy ministries. This often concerns government expenditure on education, research and development, or infrastructure. Or environmental expenditure, for that matter, such as rehabilitation of coal mines which is often implemented with support managed by environment ministries. It is also important to look at expenditure at all levels of government as in many countries policy interventions are financed at multiple levels of government as well as at all types of public finance instruments, including environmental funds, which may not be formally part of the national budgets.

### 5.1.2. Tax expenditure

55. Public support may be provided in forms that do not imply actual budgetary transfers but rather at the cost of revenue foregone by the government or other economic agents. Tax expenditure<sup>16</sup> (e.g. tax exemptions, deductions, tax rate reductions, credits or deferrals to selected groups or specific activities that reduce the amount of tax that would otherwise be payable) can in theory be approached in the same way as budgetary transfers.

56. Tax expenditure represent deviations from benchmark tax structures that are analogous to public expenditure but delivered through the tax regime. Tax expenditure are less transparent and less visible. Unlike direct budgetary support, tax expenditure are not always observed. Sometimes governments publish separate tax expenditure budgets or estimates of government foregone as part of the budget drafting documents. In other cases, tax expenditure need to be estimated. The “revenue forgone” method, used by most OECD countries, measures the amount by which revenues are reduced because of a particular tax provision that allows preferential treatment for some sectors or activities. It should also be noted that tax expenditure are country specific as they stem from a country’s own tax regime which makes international comparisons across countries difficult.

57. Tax expenditure with respect to energy can be categorised into three broad areas:

- *Tax expenditure related to final consumption* – typically, such tax expenditure are targeted at households and generally provided through lower rates, exemptions and rebates with respect to two main types of consumption taxes (value-added tax (VAT) on energy consumption and excise taxes for certain groups of users or types of fuels or electricity).
- *Tax expenditure related to energy as inputs to production* – such tax expenditure are targeted at fuels or electricity that form an input to final production. They can include exemptions from excise taxes on fuels for certain types of businesses (e.g. agriculture, fishing, mining) or households and reductions in rates of energy taxes that are related to the energy intensity of firms’ production.
- *Tax expenditure relating to the production of energy* – such tax expenditure are targeted at the actual extraction and production of energy, including also refining and transport. They are usually provided through the corporate income tax system and provide for targeted measures to fossil fuels through accelerated depreciation allowances for capital, investment tax credits, or through resource-rent taxes, royalties and other fiscal instruments that apply to resource extraction.

58. Tax expenditures are estimates of what revenue would have been collected if the tax regime had been different. The challenge is to identify the **standard** or **benchmark** tax regime to be used to establish the nature and extent of any concession. A number of different approaches to deciding on the benchmark regime are possible (and approaches vary between countries). Many countries base their tax expenditure estimates on a conceptual view about what constitutes “normal” taxation of income and consumption, although they may often modify this for practical reasons. Even in a relatively straightforward case, like VAT, the different approaches could lead to different results. Thus, on one basis any tax rate less than the standard rate of VAT would give rise to tax “expenditures”, while others might regard lower rates of VAT as an inherent part of the regime and not giving rise to tax expenditures.

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<sup>16</sup> Also known as tax relief or tax concession, which reflect more the perspective of the recipient.

59. Thus, tax expenditure require an estimate of the size of the tax break and of the extent to which taxpayers take advantage of it. Since there is often no direct evidence on the latter, the quality of estimates will depend on what data on taxpayers and tax receipts the tax authorities collect; and on whether these data are captured, prepared and made available for statistical and economic analysis. As a result, tax expenditure are often under-reported into sectoral subsidy accounts. These practical considerations can have a big impact on the availability and quality of tax expenditure data and analysis.

#### *5.1.3. Other government revenue foregone*

60. Governments also forego revenue by offering the use of non-depletable (e.g., land) or depletable assets (e.g., fossil-fuel resources) under their control to a private company (or individuals) to exploit them for their own use or for sale. Through their policies, the government can reduce production or consumption costs and thereby encourage more production or consumption than otherwise (e.g. through reduced resource rent tax or reduced royalty payment). Apart from providing private sector with access to domestic resources of fossil fuels on concessional terms, governments also provide access to intermediate inputs, like water or electricity, at below market prices, and access to government buildings or land. Estimating the value of such transfers involves comparing the actual price charged for the use of the assets with the price that would be charged in an open market (e.g., through competitive bidding). And this is not an easy exercise.

#### *5.1.4. Transfer of risk to government*

61. Estimating the cost to government, or the value to beneficiaries, of government assumption of risk is potentially one of the most complex and controversial areas of subsidy analysis. Governments assume some of the risk of energy producers through all kinds of measures, but most commonly by guaranteeing loans, by becoming an equity participant in an energy company, by acting as the insurer of last resort in the case of an accident affecting workers or the general public, and by providing extra military or police protection to key energy facilities or energy-transport corridors.

62. In all of these cases, the actual cost to government of a risk-reducing measure depends on the probability that such a risk will occur (e.g. a loan default, an accident, or an attack) and that the government will have to incur such costs. The probability of having such events happen may be anywhere from low to highly probable in any given year. What matters in terms of effects on producer or consumer behaviour, by contrast, is the value of such assurance to the beneficiaries.

#### *5.1.5. Induced transfers*

63. Induced transfers are subsidies provided to consumers or producers indirectly, usually through some form of price support and control (price regulation) where, due to different policy measures, the end price of a good or a service is kept lower or higher than its actual market price. This group includes such measures as import tariffs and export subsidies, consumption mandates (e.g. blending mandates for biofuels), regulated electricity prices and cross subsidies, regulated wage and land prices.

64. There are a number of challenges in calculating induced transfers and particularly market price support of border protection measures. In order to determine the deviation of the border price of a certain good, one needs a benchmark (or reference) price. While for commodities traded internationally, this is often thought to be the international market price (e.g., as with oil, gas). For the goods produced and traded domestically, this benchmark is more difficult to establish. This issue is further discussed in the next chapter in the context of the price-gap approach, used to measure market-price support.

65. As experience shows, energy subsidies are widespread and they vary considerably in type. As seen from the OECD Matrix, governments across the world have designed and put into practice a significant number of measures that allow transferring support to recipients. This is particularly true for producer subsidies. The high number of transfer mechanisms does not necessarily mean that the largest subsidies, in absolute terms, go to producers. It rather means that producer subsidies are more difficult to capture and quantify.

### 5.2. *Other dimensions of subsidy classification*<sup>17</sup>

66. In addition, subsidies can be further distinguished according to their *pathway of benefit*: direct vs indirect, cash (explicit) vs implicit. They can also be classified as general or sector specific, on-budget or off-budget subsidies.

67. A **direct subsidy** is one which is generally provided through targeted (cash based) payments, such as loans or tax preferences. This subsidy may be implemented per unit of output or per unit of input into the activity, or per unit of output or input value. A subsidy fixed per unit is called a specific subsidy and a subsidy fixed per value is called *ad valorem*.

68. An **indirect subsidy** is one which is received indirectly by the recipient in the form of a higher market price for its output and/or lower market price charged for input goods and services purchased from an upstream industry that is able to discount its prices because of the subsidies it itself receives. An example of the latter would be a reduction in the cost of diesel fuel sold to fishing vessels as a result of subsidies to oil refiners.

69. A **cash (explicit) subsidy** is one that is paid out as a transfer to a recipient in the form of budgetary expenditure. Most analysts include tax expenditure in this category as well. An **implicit subsidy** is a specific category of input subsidy, generally provided in-kind by a government, at a price below its market value or insufficient to cover the costs of providing it. These subsidies are often difficult to identify and measure as their amounts are not routinely reported in government documents.

70. One important variant of an in-kind subsidy is privileged access to a government-owned or controlled natural resource. Primary industries benefit greatly from such access - e.g., to public lands for mining or grazing livestock, to state forests for logging, to rivers for irrigation, and to foreign seas (through so-called "access agreements") for fishing - for free or at a below-market price. International disputes over the subsidy element of privileged access to natural resources have been among the most contentious and long-running<sup>18</sup>.

71. **On-budget subsidies** are more easily identifiable, while **off-budget subsidies** are often hidden and elusive. They can be directed at both consumers and producers. Consumer subsidies are more on the budget side and they are often quasi-fiscal instruments<sup>19</sup> – as electricity tariffs provided at a price lower than the full supply cost. Producer subsidies are more often off budget and they are less visible.

72. The problem with using so many terms in analysing subsidies is that these terms can take different, even contradictory, meanings in different countries. Because some of these terms are used very loosely, they can cause a lot of confusion when interpreting them. Differences in classification systems explain partly the reason why it may be so difficult to compare subsidy schemes across countries. Another reason is the differences in the methods for quantifying subsidies used by countries. No systematic comparison has yet been made of such classification systems, methods and practices.

<sup>17</sup> This section is based on Bruce, N. (1990).

<sup>18</sup> Steenblik, R, GSI, Subsidy Primer.

<sup>19</sup> Quasi-fiscal instruments refer to implicit subsidies to the utilities sector which are not accounted for in the budget as government expenditures.

## 6. General concepts related to subsidy measurement<sup>20</sup>

73. A subsidy can be expressed in terms of its **total, average and marginal (or incremental) values**. Furthermore, the total value of a subsidy can be measured either as the total cost of the subsidy to the government, to the economy, or as the total benefit to the recipient. In general, these different measures of the total subsidy will yield different empirical magnitudes. The average and marginal values of a subsidy can be expressed per physical unit, or more conveniently, as a percentage of the value of the subsidised activity. The average value of the subsidy is the total value of the subsidy divided by the total value of the activity subsidised. The marginal value of the subsidy is the increase in the total subsidy divided by the value of an increment in subsidised activity.

74. It is important to make a distinction between **gross subsidies** and **subsidies net of taxes** in measuring how big they are and how they affect energy supply and use. Taxes reduce the effect of subsidies on final prices. In some cases, energy subsidies are more than offset by special taxes and duties that raise the price to end-users to above free-market levels. What matters in practice is the overall impact of all subsidies and taxes on the absolute level of prices and costs and the competitiveness of each fuel or technology.

75. A further distinction concerns the **effective** versus **nominal assistance rate**. In general, an effective subsidy rate is a more comprehensive measure. It may incorporate both direct and indirect subsidies. The indicator of the effective rate of assistance (subsidy) measures the relative difference, expressed as a per cent, in the value added per unit of output with and without a given assistance structure. A companion indicator, the nominal rate of assistance, measures the percentage change in gross returns<sup>21</sup> per unit of output relative to a (hypothetical) situation of no assistance. Many economists consider the effective rate of assistance to be the best indicator of the incentive effects of protection and support on production. The data needed to construct the effective rate of assistance is enormous and often difficult to collect. A simpler version of the effective rate of assistance, the Producer Support Estimate (PSE) and the Consumer Support Estimate (CSE), has been developed to cover cases where data are difficult to obtain.

76. For example, the data needed to construct the effective rate of assistance to producers include: (i) a reference (world) price; (ii) a domestic price received by producers; (iii) the volume of production; (iv) the expenditure on intermediate inputs; (v) the net effects of border measures, taxes and subsidies affecting the price of intermediate inputs; (vi) data on budgetary assistance to intermediate inputs; and (vii) data on assistance to value-adding factors (labour, land or other natural resource inputs, and capital).

77. The calculation of a total PSE requires all of this information except for (iv) the expenditure on intermediate inputs and (v) distortions affecting the prices of intermediate inputs. The data requirements for these two items can be huge which is why the PSE has been used more often than the effective rate of assistance in international subsidy accounting. Annex 3 to the report contains an example of how these indicators can be calculated with regard to production subsidies and practically reported in subsidy accounts. This example shows that the different subsidy measurement indicators actually generate different numbers of subsidy volumes. Which of these indicators will a government use, depends on the needs of the governance (policy analysis, transparency, reporting back to parliament and tax payers) but also on the availability of data. At a minimum, however, these indicators need to be applied and calculated in a consistent manner. Subsidy measurement is discussed further and in more detail in Chapter 3.

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<sup>20</sup> Based on Bruce, N. (1990).

<sup>21</sup> Gross returns are all of the money a business makes before they subtract the costs of doing their business (such as salaries, rent, utility bills, wholesale cost of products to be sold, etc.).

## 7. Summary conclusions

78. The major conclusions that emerge from the above analysis include:

- Defining what constitutes a subsidy is not a trivial matter. The notion of a subsidy has evolved significantly over time to include different support measures above and beyond direct budgetary expenditure. Given the wide range of government measures that can qualify as a subsidy, many economists now prefer to speak of “support” rather than a “subsidy”.
- There is no “perfect” single definition of a subsidy or of an environmentally-harmful subsidy, for that matter. Different international organisations have developed their own definitions but these share a lot of similarities. Currently, however, the WTO definition is the only legally binding and accepted definition that exists.
- While there is no “perfect” definition of a subsidy, there is an agreement among economists on the essential types of government support that constitute a subsidy. However, in the work in the EECCA countries (and in any other country for that matter), the starting point in defining and analysing subsidies should be the national legislation. In general however and to the extent possible, it is better to apply the broader definition of subsidies, as this will allow to create a fuller picture of public support measures in a country.
- There is a wide range of mechanisms for transferring support to producers and consumers. Direct budgetary transfers are the simplest and most straightforward type of a subsidy. When accounting for budgetary transfers in the energy sector, it is important to capture all subsidy schemes including those that may be outside the direct responsibility of energy ministries. It is also important to look at expenditure at all levels of government and at all types of public finance mechanisms as in many countries policy interventions are financed at multiple levels of government.
- A major difficulty in analysing tax expenditure is the identification of the standard or benchmark tax regime to be used to establish the nature and extent of any tax concession. Unlike budgetary transfers, tax expenditure are not observed, they are estimated. Because of this, tax expenditures are less transparent. As a result, statistics on such expenditure may be rather poor. In addition, due to the country-specific character of tax regimes and tax exemptions, international comparability of tax expenditure across countries is limited. Despite these challenges, experience shows that tax expenditure are often a more important source of subsidies than direct budgetary support.
- None of the other types of support measures can be observed, they all need to be estimated. Data needed to construct and calculate indicators of support may be massive. Lack of data and information may significantly hinder identifying and quantifying subsidy volumes and their effects on the economy and the environment.

## PART II. REVIEW OF APPROACHES TO SUBSIDY IDENTIFICATION, MEASUREMENT AND EVALUATION

79. If governments intend to rationalise their subsidy schemes and implement difficult subsidy reforms, they first need to have a very good understanding of what these schemes are, how much they cost the public purse and what their economic (trade, competitiveness), social and environmental impacts are. Various methods and tools to identify and measure subsidies and their impacts have been designed and applied by different governmental and non-governmental institutions. These methods serve different purposes and they vary in the level of detail and the depth of analysis. This chapter presents several such approaches.

80. What matters in studying subsidy schemes is the logical path in conducting analysis. Figure 2 below shows three major steps – from identifying and measuring a subsidy to evaluating its effects in economic, social and environmental terms and what they mean for policy decision-making. While this algorithm is logical, its practical implementation, as it will be discussed further below, is never easy or straightforward. Therefore some researchers only manage the two first steps and some even skip the first step and go straight to the second one (the IEA's price-gap methodology, see the discussion further below). But the third step – the evaluation of subsidies - is impossible without the previous two.

**Figure 2. Three-stage process of analysing subsidy schemes**



### 8. Identification of energy and, specifically fossil fuel, subsidy schemes

81. This section discusses two approaches most widely used for the **identification of energy** and, specifically **fossil fuel, subsidy schemes**. They include the OECD matrix and inventory of public support measures for fossil fuels and a similar subsidy classification framework, developed by the Global Subsidy Initiative (GSI) hosted at the International Institute for Sustainable Development in Geneva.

#### 8.1. *OECD Inventory of estimated budgetary support and tax expenditures for fossil fuels*

82. In 2011, the OECD published its first comprehensive inventory of support schemes to fossil fuels. The inventory covers 250 measures in 24 countries. The data in the inventory were collected from government documents and web-sites, complemented by information provided directly by government agencies themselves. The purpose was to present 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<sup>22</sup>.

<sup>22</sup> OECD (2011).

83. An example of subsidy of producer and consumer support estimates to coal utilisation in Spain is presented in Table 3 below. These subsidy schemes are based on the OECD Matrix (as shown in Annex 1). As can be seen from the Table, there are various types of schemes and support is generally conditional on output, inputs and income of producers. In addition, support measures are provided to either individual private producers, specific groups of producers or to the coal mining sector in general.

**Table 3. Producer and consumer subsidies to coal in Spain (million Euro, nominal)**

No	Support element	2008	2009	2010 provisional
I.	Producer Support Estimate			
I.1.	Support to unit returns			
I.1.1.	Operating aid to HUNOSA	85.30	80.38	76.00
I.1.2.	Operating aid to coal producers	266.50	252.52	250.00
I.1.3.	Subsidy for the interbasin transport of coal	11.35	14.04	12.80
I.2.	Income support			
I.2.1.	Adjustment aid to coal producers	40.00	40.00	10.20
II.	Consumer Support Estimate			
II.1.	Consumption			
II.1.1.	Funding for coal stockpiles	2.92	6.34	12.50
III.	General Services Support Estimate (GSSE)			
III.1	Inherited liabilities due to coal mining	302.55	328.00	335.60

Note:

Item I.1.1. includes transfers to HUNOSA, a major state-owned producer of hard coal in the Asturian basin.

Item I.1.2. presents transfer payments to private coal companies to compensate them for the difference between their operating costs and the prices at which they sell their output to local power plants.

Item I.1.3. is the programme that benefits private coal producers through budgetary transfers that support the transport of coal across basins whenever local supply conditions meet certain criteria.

Item I.2.1. comprises transfers made by the Spanish government to private coal producers to ease the decline of the coal-mining sector.

Item II.1.1. is the measure that provides funding to power plants to support their constitution of coal stockpiles. Those stockpiles are meant to guarantee over 720 hours of power generation. Plants are, however, specifically required to accumulate domestic coal.

Item III.1. relates to programme that provides certain non-profit organisations – along with coal miners and their families – with budgetary transfers to help address the social and technical costs that stem from the decline of the coal-mining sector. The measure is allocated to the General Services Support Estimate (GSSE)<sup>23</sup> as it does not increase the current production or consumption of coal.

Source: OECD (2011).

## 8.2. Global Subsidy Initiative

84. In 2012, the WWF-Russia and the Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development (IISD) issued the first comprehensive study on public support to oil and gas production in Russia: “*Fossil Fuels – At What Cost? Government support for upstream oil and gas activities in Russia*”. The WWF-Russia/GSI initiative was intended to initiate a broad debate on the reform of energy subsidies in Russia.

<sup>23</sup> For a definition of GSSE see the section on the PSE/CSE framework.

### Box 1. The WWF-Russia/IISD-GSI study

At the federal level, the study has identified 30 schemes conferring subsidies to oil and gas producers in 2009 and 2010. Without diminishing the value of future investigations in this area, this list is likely to cover all major channels of providing government support to upstream oil and gas activities<sup>24</sup> in Russia. Some of the identified government support schemes serve as umbrella categories for several subsidy programmes. Of these 30, the study has been able to quantify the value of 17 subsidy schemes totalling USD 8.1 billion in 2009 and USD 14.4 billion in 2010. The top 10 most sizeable federal subsidy schemes supporting upstream oil and gas activities in Russia were (in order of their diminishing value in 2010):

- The export duty exemption for East Siberian oil (approx. US\$4 billion);
- Tax holidays with respect to the mineral extraction tax on East Siberian oil (approx. US\$2 billion);
- The property-tax exemption for trunk oil and gas pipelines (approx. US\$1.9 billion);
- Tax holidays with respect to the mineral extraction tax on oil produced at new on-shore fields in the Nenets Autonomous Okrug and of the Yamal Peninsula in the Yamalo-Nenets Autonomous Okrug (approx. USD1 .5 billion);
- The reduced tariff for transportation of oil through the East Siberia-Pacific Ocean pipeline (approx. USD 1.1 billion);
- The reduced rate of the mineral extraction tax on oil from mature fields (approx. USD 1 billion);
- The export-customs duty exemption for natural gas exported through the Blue Stream pipeline to Turkey (approx. US\$0.8 billion);
- The deduction of research and development and exploration costs from taxable profits (at least USD 0.6 billion);
- The accelerated depreciation allowance (at least USD 0.6 billion);
- Federal budget spending on oil and gas exploration (USD 284 million).

85. Box 1 provides a list of the 10 most sizeable federal subsidy schemes supporting upstream oil and gas activities in Russia, as identified in the study, whereas Table 4 provides more detailed information on one of the specific subsidy measures discussed in the report.

<sup>24</sup> Oil and gas companies can generally be divided into three segments: upstream, midstream and downstream. Upstream field activities involve exploring for crude oil and natural gas, drilling and completing wells, and bringing the resources to the surface. Midstream activities involve gathering, refining, processing, storing and transporting crude oil and natural gas. Downstream activities bring oil and gas products to the consumer, e.g. selling and distributing fuels like gasoline, natural gas and propane, as well as products made from oil and gas.

**Table 4. Example of an up-stream oil subsidy identified in the WWF-Russia/IISD-GSI study**

Tax holidays with respect to the extraction tax levied on newly developed onshore oilfields in East Siberia	
Subsidy category	Provision of goods or services below market value → Government-owned energy minerals → Royalty relief or reduction in other taxes due on extraction
Stimulated activity	Development, production, export through the East Siberia-Pacific Ocean pipeline
Subsidy name	Tax Holidays with respect to the extraction tax levied on newly developed onshore oilfields in East Siberia
Jurisdiction	Federal
Legislation / Endorsing organisation	Tax Code of the Russian Federation (Article 342, p.1.8) passed by the Russian Federal Assembly (Parliament)
Policy objective(s) of subsidy	To encourage capital investment in and development of new onshore oilfields in the harsh conditions of East Siberia which supply oil to the East Siberia-Pacific Ocean pipeline bound to China and other consumers in the Far East
End recipient(s) of subsidy	Oil-extracting companies: primarily Rosneft, Surgutnetgaz and TNK-BP
Time period	From January 1, 2007 until specified production levels are reached
Background	<p>Temporary exemption from the extraction tax applies to oil deposits wholly or partially situated within the boundaries of the Republic of Sakha (Yakutia), Irkutsk region and Krasnoyarsk Territory until cumulative production from a particular field reaches 25 million tonnes. Tax holidays are granted for the period of 10 years from the start of the field's exploitation in the case of the license for exploration and production and for 15 years in the case of the license for simultaneous geological survey (prospecting and exploration) and production.</p> <p>The subsidy has applied to 13 oil fields, the exploitation of which has started both before and after its introduction (1 January 2007): Vankorskoe, Yurubchenko-Takhomskoe, Talakanskoe, Alinskoe, Srednebotuobinskoe, Dulisminskoe, Verchnechonskoe, Kuyumbinskoe, Severo-Talakanskoe, Vostochno-Alinskoe, Verchnepeleduiskoe, Pilyudinskoe and Stakhanskoe. As of 1 September 2011, the Vankorskoe oilfield, developed by the state-owned company Rosneft, is the only oilfield in East Siberia for which the tax holidays have been terminated due to the cumulative production exceeding the threshold of 25 million tonnes on 1 May 2011. In accordance with the Russian Ministry of Finance approach, the subsidy estimates below have been obtained using the maximum rate of the extraction tax as a benchmark.</p>
Amount of subsidy conferred	2008 (1.3 million tonnes) = USD 180 million
	2009 (7.5 million tonnes) = USD 630 million
	2010 (20 million tonnes) = USD 2 billion
Information sources	Tax Code of the Russian Federation (Article 342, p. 1.8); Geltishchev (2009); Ministry of Finance of the Russian Federation (undated).

Source: Gerasimchuk (2012).

86. The study adopted a four-step approach: 1) identification of programmes providing government support to upstream oil and gas activities in Russia, 2) categorisation of the identified subsidy programmes, 3) quantification of the subsidies where possible and 4) brief discussion of the identified subsidies in a broader economic, social and environmental context. Data collection was carried out mainly through investigating open sources of information: such as public accounts and official documents related to subsidy monitoring and budget planning and reporting, academic literature and media items. As can be seen from Table 4, even one single measure can be classified in different categories.

87. While the GSI methodology<sup>25</sup>, used also in preparing the Russia report, covers all stages of subsidy analysis, we focus here on the part related to subsidy identification, namely the GSI inventory. The main applications of such inventories are summarised in Table 5 below. Thus, energy subsidy inventories constitute a good starting point for organising the analysis and launching debates on subsidy reforms. Such inventories can help measure the scale of subsidies and the change of the subsidy over time in a given country. However, inventories are only collecting an integral part of information that will be needed at the next stage to measure environmental, social or economic impacts of subsidies. Preparation of such inventories is done based on the detailed verification of budgetary documents (budgetary codes, tax regulations, etc.). In some cases, however, the quantification of the identified measures may prove impossible.

88. In doing an inventory of major subsidy measures with regard to particular fuels/sectors in the EECCA countries, it will therefore make sense to use structured questionnaires and distribute them among experts and government officials in these countries. This will help to have more focused discussions as well as will allow all participants develop the same understanding of the specifics of the discussed issues.

## 9. Quantification of the subsidy level

89. Economists recommend that in principle subsidies should be measured with respect to a counterfactual situation in which they do not exist rather than as a deviation of the subsidy from its optimal value<sup>26</sup>. However, for a number of reasons, this measurement approach may not always be possible to apply, therefore other more practical approaches have been developed to quantify subsidies. Three main such approaches are discussed in this section. These include the Price-gap approach, the Producer Support Estimate and the Consumer Support Estimate approaches.

### 9.1. Price-gap approach

90. Price-gap is a generic term referring to a family of indicators based on the calculation of the gap between domestic energy/fuel price and world reference prices. In principle, price-gap may be used in calculating both consumer and producer support.

91. This method has been widely used by the OECD, the IEA and the World Bank to determine the magnitude of energy subsidies. The IEA database on subsidies contains estimates for 37 emerging and developing countries (in 2009). The method has been also used by the IEA in some EECCA countries<sup>27</sup>.

92. The price-gap is the most commonly applied methodology for quantifying consumption subsidies. The IEA, for example, estimates subsidies to fossil fuels that are consumed directly by end-users or consumed as inputs to electricity generation. It compares average end-user prices paid by consumers with reference prices that correspond to the full cost of supply. The price gap is the amount by which an end-use price falls short of the reference price and its existence indicates the presence of a subsidy. Box 2 shows, in simplified terms, how a price gap can be calculated. The most difficult part in the price-gap approach is establishing the reference price. There are different ways for doing so depending on whether a commodity is internationally traded or not. This issue is discussed in more detail further below.

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<sup>25</sup> The GSI methodology for estimating producer subsidies was first described in two policy briefs in 2010: [http://www.iisd.org/gsi/sites/default/files/pb5\\_defining.pdf](http://www.iisd.org/gsi/sites/default/files/pb5_defining.pdf) and [http://www.iisd.org/gsi/sites/default/files/pb7\\_ffs\\_measuring.pdf](http://www.iisd.org/gsi/sites/default/files/pb7_ffs_measuring.pdf)

<sup>26</sup> Bruce, N. (1990).

<sup>27</sup> Azerbaijan, Kazakhstan, the Russian Federation, Turkmenistan, Ukraine, Uzbekistan, namely those EECCA countries that provide data on fossil fuel prices.

**Box 2. Price-gap approach formula**

$$\text{Price gap} = \text{Reference Price} - \text{End User Price}$$

*9.1.1. Determining and calculating the reference (world) price<sup>28</sup>*

93. The concept of a world price against which to compare domestic prices is alluring, though not so simple to calculate in practice. The common approach to calculating the price gap for an **internationally-traded commodity** is to measure the difference between a **domestic market price** (or end-user price) (when there are policies known to distort domestic prices) and a border price that represents the opportunity or **reference price** (cost) for domestic market participants. When making price comparisons for exported or import-competing products, the standard practice in the energy sector is to measure the **domestic price** of a product at the point it leaves the producers' property. In the case of energy products, this point would be as follows: (i) for bituminous coal and anthracite – at the mine mouth; (ii) for crude petroleum – at the well-head; and (iii) for petroleum products – at the refinery gate. When producer prices are not available, analysts have made comparisons on the basis of wholesale or consumer prices. If no other method appears feasible the import tariff is usually used as a proxy for estimating the price gap in the case of traded fossil fuels, such as coal and petroleum fuels, .

94. The **reference price** for goods that are traded (like oil) is usually the international or border price but it needs to be adjusted for a number of factors. These include, among others, market exchange rates, transport and distribution costs and country-specific taxes. In addition, the domestic market and border prices used to estimate the price gap should represent products of similar quality. In the case of fossil fuels, quality relates to such product attributes as impurities (e.g. ash and sulphur), moisture level and heating value. Differences in these attributes can cause price differentials independent of government policies. Where such differences exist, the reference price needs to be adjusted so as to eliminate that element of the price difference arising from differences in the quality characteristics of a product.

95. The reference price also needs to be adjusted for the differences arising from the ways traded energy commodities are sold on market. Petroleum products, for example, are sold either on exchange or spot markets<sup>29</sup>, and providing there are no government interventions in price formation over the course of a year, end-user prices will follow closely the movements in spot markets. In the case of coal, however, most of the transactions take place within the framework of long-term contracts, with periodic adjustments to reflect changing market prices. Therefore, published domestic prices for coal need to be adjusted to the extent possible for the actual prices paid for the purchase of coal.

96. The rules, as applied by the OECD in calculating reference prices for oil, gas and coal (that is, in internationally-traded goods), are presented in Box 3 below<sup>30</sup>.

<sup>28</sup> This discussion largely draws from OECD (2010c).

<sup>29</sup> A spot market is a public financial market in which financial instruments or commodities are traded for immediate delivery. It contrasts with a futures market in which delivery is done at a later date.

<sup>30</sup> IEA, OECD the World Bank (2010).

### Box 3. OECD rules for calculating reference prices for oil, gas and coal

For an *importing country*, the reference price:

- Includes the price of a product at the nearest international hub, adjusted for quality differences, **plus**:
- The costs of freight and insurance to the importing country, **plus**:
- The costs of internal distribution and marketing, **plus**:
- Value-added tax (VAT).

For an *exporting country*, the reference price:

- Includes the price of a product at the nearest international hub, adjusted for quality differences, **minus**:
- The costs of freight and insurance to the importing country, **plus**:
- The costs of internal distribution and marketing, **plus**:
- Value-added tax (VAT).

97. With **non-traded energy commodities**, such as electricity or natural gas (and sometimes even coal), the reference price is based on the cost of domestic supply. In contrast to traded goods, there is no need for adjusting the reference price for quality differences. Practices, regarding the choice of the reference price in this case, differ. In the past, the IEA has based the reference price on the estimated long-run marginal cost<sup>31</sup> of delivery electricity to end-users. The World Bank and the IMF estimates have been based on the average cost of production<sup>32</sup>, including necessary maintenance and replacement of depreciated capital. The average cost of production is generally a lower benchmark for a pricing policy than the long-run marginal cost.

### Box 4. Reference prices for electricity

A different procedure is applied for setting electricity reference prices as electricity is not extensively traded over national borders<sup>33</sup>. For electricity, the reference prices :

- Are based on annual average-cost pricing for electricity in a country (weighted according to output levels from each generating option);
- Take into account costs of production, transmission and distribution;
- Are determined using reference prices for fossil fuels and annual average fuel efficiencies for power generation;
- Are capped at the levelised cost of a combined-cycle gas turbine (CCGT) plant to avoid over-estimation.

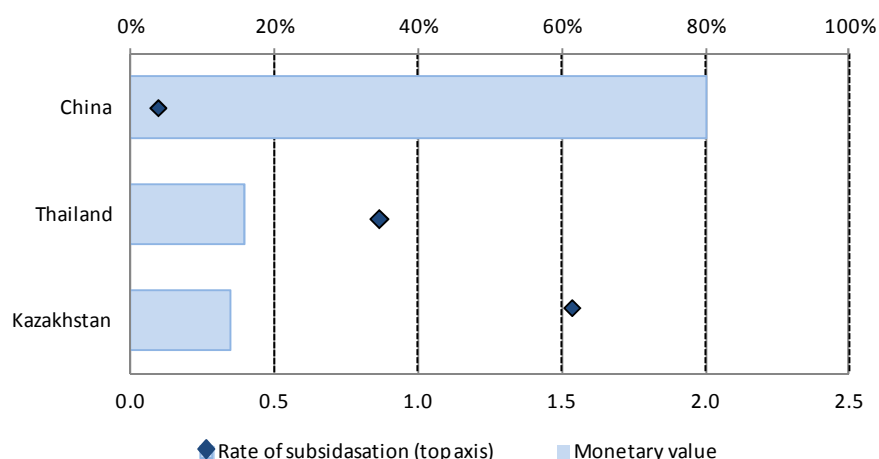
<sup>31</sup> Long-run marginal cost (*LRMC*) is the added cost of providing an additional unit of service or commodity from changing capacity level to reach the lowest cost associated with that extra output.

<sup>32</sup> In economics, average cost or unit cost is equal to total cost divided by the number of goods produced.

<sup>33</sup> IEA, OECD and the World Bank (2010).

98. Figure 3 presents the calculation of coal consumption subsidies for China, Thailand and Kazakhstan in 2010, using the price-gap approach. The rate of subsidisation is the subsidy expressed as a percentage of the full economic price. As can be seen in Figure 3, in monetary terms, China has the biggest coal consumption subsidies (measured as the differences between actual prices and the full economic cost of supply), amounting to around \$2 billion, though the rate of subsidisation (measured as a percentage of the full economic price) is less than 5%. In Kazakhstan, the coal subsidy was about USD 400 million, which translates into a much higher subsidisation rate, a little bit above 60%.

**Figure 3. Coal consumption subsidies for selected countries, 2010**



Source: IEA (2011).

99. The price gap-approach is designed to capture the net effect of all subsidies that reduce final prices below those that would prevail in a competitive market. For countries that import a given product, subsidy estimates, derived through the price gap approach, are explicit. That is, they represent net expenditures resulting from the domestic sale of imported energy (purchased at world prices in hard currency), at lower, regulated prices. In contrast, for countries that export a given product – and therefore do not pay the world prices – subsidy estimates are implicit and usually have no direct budgetary impact. Rather, they represent the opportunity cost of pricing domestic energy below market levels, i.e. the rent that would be recovered if consumers paid world prices. For countries that produce a portion of their consumptions themselves and import the remainder (such as Iran, for example), the estimates represent a combination of opportunity costs and direct government expenditures<sup>34</sup>.

100. According to some critiques of the price-gap approach in the case of large importers the international prices do not constitute a good reference price (i.e. they do not reflect the true opportunity costs) as: (i) these prices would change in result of in-country demand reactions resulting from subsidy reform, and (ii) international prices are frequently volatile and they are determined by other external factors.

101. According to Koplow (2009)<sup>35</sup>, some of the main advantages of this model include:

<sup>34</sup> IEA, OECD and World Bank (2010).

<sup>35</sup> Koplow, D. (2009).

- The primary benefit of the price-gap approach is its relative simplicity compared with other subsidy valuation methods. Rather than having to analyse hundreds of individual energy-related policies in specific countries, analysts can focus instead on market-clearing prices and a handful of adjustments to improve the comparability of the pricing data. This simplification is particularly important in countries that lack the capability or will to provide accurate information on energy-related government activities.
- Another advantage of this method consists in the fact that by looking into information on subsidies that alter end-user prices only, price-gap data provide insights into the factors most likely to affect short-term energy supply and demand decisions. The format of price-gap outputs can be fed fairly easily into global macroeconomic models. This enables broader testing of how subsidy reforms might affect energy markets (including inter-fuel substitution), consumer welfare and trade flows.

102. Some of the main challenges and limitations of the price-gap method are summarised in Box 5 below.

#### **Box 5. Major challenges and limitations of the price-gap methodology**

It should be recognised that the price-gap method relies on a number of assumptions:

1) Identifying the appropriate cost. Many different measures of cost exist, including average cost, marginal cost and opportunity cost. Exporting countries with large energy endowments prefer to use cost of production as a benchmark. What is more, energy costs are highly variable as not all commodities are widely traded.

2) Identifying the appropriate price. Although the price quoted in global markets is typically used as a measure of opportunity cost, international prices may be distorted by a variety of factors and can experience a high degree of volatility.

3) Price-gap estimates do not capture producer subsidies. Therefore, subsidy estimates based only on price-gap measurements tend to underestimate the level of subsidies in developed countries.

Other caveats also necessitate exercising caution when interpreting or explaining market transfers (to consumers) and market price support (to producers) in any given year. In international markets, U.S. dollar prices, especially of crude oil and petroleum products, have been highly volatile in recent decades, as has the value of the U.S. dollar against other currencies. These two elements combine to make estimates of market transfers from one year to the next also highly variable.

Source : IEA, OECD and World Bank (2010).

103. Table 6 below provides a summary of some of the major application of the price-gap approach.

**Table 5. Main applications of the price-gap approach**

Is applicable when	Is not applicable when
Measuring the scale of subsidies in a given country	Measuring environmental, social and economic impacts
Making cross-country comparisons	Measuring impacts on GHG emissions
Monitoring changes over time	Formulating detailed policy recommendations for specific subsidy programme reforms
	Assessing if a subsidy is an effective measure to meet a certain policy objective (e.g. energy poverty reduction)

104. In conclusion, the price gap is a relatively simple method that allows comparability across different countries and in addition can be used to feed other global macroeconomic models. At the same time, this method has a number of limitations, particularly related to the type of data and assumptions needed for accurate price-gap measurements, that is world reference prices. Besides, the price-gap does not capture such subsidies, as production subsidies, rebates to consumers, the effect of cross-subsidies, the cost of investing in new capacity (electricity). However, the ability of this method to quantify important pricing distortions quickly across countries is important even if the results are not perfect.

105. Therefore, as part of the work on EHS in the EECCA countries, it will be necessary to review existing price-gap studies in these countries and use the results of these studies as complementary information for selecting fuels/sectors for which more detail evaluations will be conducted. Where such studies exist, it will not be necessary to repeat price-gap calculations for these countries within the scope of the project.

## 9.2. *The PSE-CSE framework*

106. The price gap approach does not capture the subsidy schemes that do not affect final prices. The Producer Support Estimate (PSE) and the Consumer Support Estimate (CSE) framework integrates price-gap calculations with subsidy measurements based on transfers from governments to producers and consumers.<sup>36</sup>

### 9.2.1. *Producer Support Estimate*

107. The Producer Support Estimate (PSE) is an OECD indicator that measures the annual monetary value of gross transfers from consumers and taxpayers to producers, measured at the producer property, arising from policy measures that support producers by creating a gap between domestic market prices and border prices of the specific commodities. Box 6 below provides the formulae and the method of detailed calculation of the PSE.

#### **Box 6. Producer Support Estimate (PSE) formula**

$$PSE = MPS + BOT$$

Where,

PSE - Producer Support Estimate;

MPS – Market Price Support [to producers];

BOT – Budgetary and other transfers.

MPS is a price-gap indicator measured as:

$$MPS = (DP - BP) * PV$$

Where

DP – domestic price (usually measured at the factory gate i.e. mine-mouth, well-head, refinery gate);

BP – border price (reference price);

PV – produced volume of good.

<sup>36</sup> Initially, this measurement framework was developed by the OECD and applied in the agriculture sector. For a detailed discussion of all possible measurement indicators, see OECD's "Producer support estimate and related indicators of agricultural support - Concepts, Calculations, Interpretation and Use (The PSE Manual), September 2010". This section is based on the analysis developed in the PSE Manual.

108. The PSE comprises both price-gap method indicators (measuring market price support to producers, MPS) as well as other transfers (such as actual budgetary transfers and revenue forgone by the government and other economic entities).

### 9.3.2. *Consumer Support Estimate*

109. The Consumer Support Estimate is an OECD indicator that measures the annual monetary value of transfers from taxpayers to consumers arising from policy measures that support consumers. Box 6 below provides the formula and the method of detailed calculation of the CSE.

#### **Box 7. Consumer Support Estimate (CSE) formula**

$$\text{CSE} = \text{TCT} - (\text{TPC} + \text{OTC})$$

Where,

TCT – transfers from taxpayers to consumers of a commodity;

TPC – transfers from consumers to producers of a commodity (mirror image of MPS);

OTC – other transfers from consumers of a commodity.

110. TCT are budgetary payments to consumers (including tax concessions) to reduce the effective price they have to pay for energy (e.g., to compensate them for the higher prices they pay for energy prices resulting from policies that support producer prices, to favour a particular industry or to address energy poverty). The TCT is obtained from the information on budgetary or tax expenditure. The sum of the other two components (TPC + OTC), corresponds to price transfers from consumers which include transfers both to domestic producers and to the government (providing some of the energy demand is met through imports subject to an import tariff).

### 9.3.3. *Other support indicators*

111. In addition to the PSE and the CSE, there are other support indicators that can be used in the policy analysis of support transfers. The two major ones include: the General Services Support Estimate (GSSE) and the Total Support Estimate (TSE).

112. The General Services Support Estimate (GSSE) measures the value of transfers provided through policies that support energy producers or consumers collectively rather than as individuals. Possible measures targeted at general services include support for research, development, training, inspection, marketing and promotion in the sector.

113. The Total Support Estimate (TSE) gives the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support the energy sector, net of associated budgetary receipts, regardless of their objectives and impacts on production and income, or consumption of energy products.

114. Two methods exist to calculate the TSE for a country, and both can be used to help to ensure that all indicators of support are correctly calculated. The first method sums up the transfers distinguished by recipient (i.e., transfers to producers, PSE), transfers to general services (GSSE), and transfers to consumers from taxpayers (i.e. consumer subsidies, TCT). The second method sums up the transfers distinguished by source - i.e. transfers from consumers and transfers from taxpayers. It should be noted that both methods for calculating the TSE involve the assumption that the total value of transfers from consumers to others is received as budget revenue (e.g., as import duties).

115. When, as part of these indicators, budgetary transfers and revenue foregone are measured, there are a few issues the need to be carefully considered. First, **with regard to budgetary transfers**, when measuring the PSE, particular care needs to be taken in order to avoid double counting of support in MPS and BOT indicators. Second, there is the question of treatment of administrative expenditure of ministries (e.g. salaries, material, buildings) that are associated with the design, implementation and evaluation of subsidy policies – should they be included in the PSE/CSE estimation or not. The general rule suggests excluding these costs. The rationale is that such expenditure are common to any public structure and are not policy transfers as such.

116. With respect to **tax expenditure**, there are some particular issues related to fossil fuel subsidies and their calculation that require special attention. The first issue relates to excise duties on fossil fuels consumption. In many countries, excise duties may be significant. Some of these problems may be a result of conceptual difficulties. As for tax expenditure for primary energy development industries, some complications may arise due to the government's failure to accurately measure and capture natural resource rents. For instance, the development of some oil and gas fields can generate supernormal profits that can be taxed at significantly higher rates than the standard rate of corporate income tax, without distorting production decisions. However, for other smaller and more marginal fields where exploration and production decisions may be distorted by very high tax rates, governments may provide some tax breaks compared to the standard tax regime. Nevertheless, the overall corporate tax payments to government budgets may still be very high. Whether or not, this can be considered as tax expenditure needs detailed analysis and makes tax expenditure values highly dependent on the chosen benchmark rate of the tax. This is an area where detailed knowledge of the country's tax regime would be needed to establish if there is indeed a tax expenditure and if so how it should be quantified.

117. Table 7 summarises the main applications of the PSE – CSE framework.

**Table 6. Main applications of the PSE – CSE framework**

Is applicable when	Is not applicable when
Measuring the scale of producer and consumer subsidies in a given country	Measuring environmental, social and economic impacts
Monitoring changes over time	Measuring impacts on GHG emissions
Identifying particular subsidy schemes	Assessing if a subsidy is an effective measure to meet a certain policy objective (e.g. energy poverty reduction)

118. Although the PSE and CSE are relatively easy to calculate and the PSE-CSE framework may provide a more accurate picture of subsidies in a given country, it requires a much more significant data collection effort compared with the simple price-gap methods (see next section on data requirements). Therefore, its application may be limited in countries where access to necessary data to measure the magnitude of particular transfers is not easily available.

119. In general, the PSE-CSE approach is not recommended at the initial stage of launching the work on EHS in the EECCA region. The reason is the probable lack of necessary data that would allow accurate calculations under the PSE-CSE framework. At the initial stage of analysis, the price-gap and programmatic measurement approaches (based on evaluating clear-cut budgetary support programmes) may be more appropriate. If, however, there is a possibility to collect relevant data, at least for specific subsidy schemes, it is preferable to apply the PSE/CSE framework in subsidy quantification.

#### 9.3.4. *Data and information requirements for calculating support indicators*<sup>37</sup>

120. Aggregating detailed data into composite indicators makes the information more readily understandable. No single indicator however can serve equally well all purposes.

121. The aggregated support indicators can be calculated on an annual basis. The time scale (*i.e.* the number of years) over which the indicators are calculated will, accordingly, increase the magnitude of information required.

#### *Requirements for calculating price transfers and price gaps*

122. Information required on the domestic market:

- Value and volume of production of individual commodities and (if of interest) energy production by major companies.
- Producer prices, clearly indicating the unit that they are based on. For consistency within the transfer calculation, either the value of production is found by multiplying quantity by price, or alternatively the total value is divided by quantity to derive a producer price.
- Consumption data are also required. These can be obtained directly, or as a result of adding the volume of production and imports and subtracting exports.

123. Sources that can be used to obtain the above mentioned information include:

- Estimations published by national authorities. However, such data are relatively rare, since the information is often commercially sensitive.
- Estimations obtained on a regular but often *ad hoc* basis from national authorities, industry organisations or major private companies.
- Using estimates of marketing margins available from other countries if no domestic information is available.

Trade data includes:

- Values and volumes for both exports and imports of energy commodities and products.
- Tariff schedule for the country – to understand the profile of tariffs imposed on imports.
- Export subsidy budgetary information (if applicable).
- Exchange rates – information on official exchange rates, on an annual basis, and, if relevant, on a monthly basis so that seasonal calculations can be made.

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<sup>37</sup> Adapted from the PSE Manual.

*Requirements for calculating budgetary and other transfers*

124. Data on budgetary transfers related to the implementation of energy policies can typically be found in reports on execution of national budgets and reports by relevant agencies. This information is mostly publicly available on the internet sites of the ministries of finance, energy and economic development of the countries concerned. There are also administrative databases which provide detailed information on current expenditures by specific government programmes. However, this information is often not available publicly.

125. It is generally preferable to use a single source of budgetary information; however, this does not often provide sufficient detail, thus making it necessary to use several sources. It is therefore important to understand the composition of the budgetary data reported in various sources used. Care should be exercised to avoid double counting when budgetary information is compiled from several sources. For instance, some sub-national expenditures may be reported both independently and as part of the expenditures made at higher administrative levels. Further, public spending can be reported by agencies and by specific programmes/activities.

126. Estimation of support based on revenue foregone requires the use of official documents describing the relevant mechanisms. For example, to estimate transfers related to preferential lending, one needs official documents (regulations) describing the conditions of lending, including time terms of loans, repayment schedules and interest rates applied.

127. In general, using public domain data makes the outcomes of analysis less controversial. In terms of potential other sources of information, official materials of fiscal planning, such as national budget laws, reports on budget execution, clarification notes prepared by ministries of finance as part of the budget drafting process, materials of parliamentary budget committees, tax expenditure reports (that cover, for example, corporate and personal income taxes, VAT, excise taxes), tax policy guidelines, tariff and customs policy guidelines could be used. Other sources can include: official subsidy monitoring reports of accounting chambers/auditors general, academic papers, media reports. Where appropriate, production-sharing agreements may also be worth looking at. As data will be often disaggregated, there is a need for discussion and close communication with experts from the government to better understand how different subsidies should be classified and calculated.

**10. Approaches to identifying environmentally-harmful subsidy schemes, assessing subsidy impacts and evaluating subsidy effectiveness**

128. As noted earlier, the definition of environmentally-harmful subsidies (EHS) is rather generic. To operationalise the identification of EHS and the assessment of their impacts on the environment and the economy, the OECD and other international institutions have developed various analytical tools, such as the OECD Quick scan model, Checklist and Integrated assessment model. In addition, there are different models that estimate the impact of subsidy removal on the economy and the environment, such as the OECD Environment-Linkages model as well as other general equilibrium or regression models that can be used to this effect.

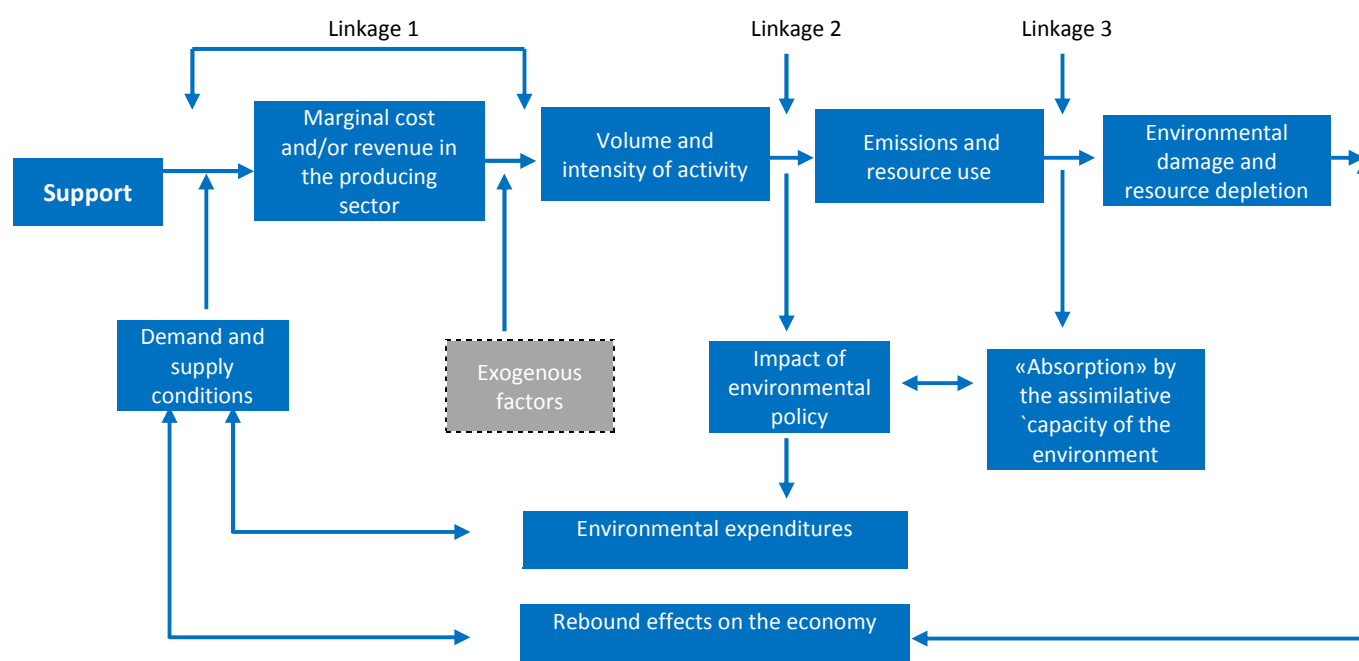
**10.1. Quick scan**

129. The OECD has developed a “Quick scan” model (OECD 1998) to enable governments to evaluate the environmental impacts of subsidies and prioritise support measures that need to be eliminated or reformed. The Quick scan describes the relationship between a support measure and the resulting environmental impact through the examination of three partial linkages. These linkages, as visualised in the flowchart in Figure 4 below, include:

- Linkage 1: the impact of the support on the volume and composition of output in the economy;
- Linkage 2: the mitigation environmental policies in place; and,
- Linkage 3: the assimilative capacity of the affected environment.

130. The model shows, among other things, that there is not necessarily a direct link between the volume and nature of the subsidy and the environmental impact, as the environmental impact depends not just on the subsidy but also on other conditions, that is other environmental policies in place (in the model, these environmental policies are called “environmental filters”).

**Figure 4. Linkages assessed in the quick scan model**



Source: OECD (2005).

131. The **first linkage** is the extent to which a support measure affects the composition of production in the economy. The linkage identifies the type of relationship between a given measure, its point of impact (input or output) (also called conditions of the support), the price elasticity of demand and supply associated with the subsidised activity and, ultimately, the impact of the subsidy on the levels of production and consumption, which in turn creates pressure on the environment. The size of the subsidy determines the subsidy’s distortionary impact on the marginal costs and revenues of the recipient. Price elasticities of demand and supply of the subsidised activity determine the magnitude of volume responses to price changes and the proportion that leaks away to other non-targeted sectors. The **second linkage** measures the emissions that result from a certain volume of activity, excluding the impact of environmental policies and their impact on environmental expenditure by the industry. The **third linkage** is a dose-response relationship, describing the assimilative capacity of the environment, which shows the extent to which the increased emission levels or resource depletion lead to actual environmental damages. To analyse this specific linkage will require dedicated studies as of the highly site-specific effects of some emissions. However, with global effects, such as CO<sub>2</sub> emissions that are not site-specific, the assimilative capacity issue is no longer relevant.

Table 7. Applying the Quick scan tool

Steps in the analysis	Definitions and guidance
<b>Linkage 1: Support-Output in the economy</b>	The impact of the support measure on the volume and composition of output in the economy. This part of the analysis examines the link between the <b>type of subsidy</b> , its <b>point of impact</b> (stimulated factors such input, output, profit or income), the <b>price elasticity of supply and demand</b> associated with the subsidised activity and finally the <b>subsidy impacts on the levels of production and consumption</b> . This in turn is the factor that ultimately exerts pressure on the environment
Step 1: Describe the type of subsidy	Subsidy types: Support that increases the marginal revenue of a sector through market price regulation; Support that is conditional on the purchase of a product or the use of a production process; Support that is non-conditional on input or production.
Step 2: The point of impact (conditionality) of the subsidy	Subsidies are always conditional on something, e.g. level of production, use of particular inputs, introduction of a mandated technology, etc. The main points of impact within the firm are on output, input use, profit and income, while the main point of impact outside the firm are on demand. These main points of impact are also called conditionalities.  Different conditionalities or points of impact of the subsidy will cause different responses from producers and consumers in terms of their modes of production and levels of production and consumption, as well as differences in levels of pollution and rates of exploitation. It is important to identify all conditionalities of a subsidy in order to explore the differences in potential responses of firms to removal of the subsidy.
Step 3: Intended recipients of the subsidy	Who are intended subsidy recipients? Input producer, finished product producer, input consumer, or finished product consumer.
Step 4: Describe the intended recipient sector, including demand and supply conditions, exogenous factors acting on the sector and the degree of market openness	It is important to understand how different forces in the sector interact and the choices open to the affected sectors, including the possibilities for substitution. In describing the sector, describe the type of industry being subsidised, as well as the upstream and downstream markets and how these are linked to the levels of input and output of the recipient sector.  <i>Upstream markets</i> are the preceding stages of production that supply inputs. While <i>downstream markets</i> are the subsequent stages of production or the market for the finished product.  <i>Demand and supply conditions</i> take into account the choices open to the affected sectors and the possibility for substitution.  <i>Exogenous factors</i> are external factors affecting the sector such as competition and trade.
Step 5: Price elasticity of demand and supply of the input and output markets	In principle what is needed to assess the effects of a support measure or its removal is data on the price elasticities of demand and supply for the relevant markets. This information gives an indication of how effective the support is in changing the composition of production of the entire economy and can aid the identification of support measures that are a priority for reform.  <i>Price elasticity of demand and supply</i> is the sensitivity of supply and demand to changes in price. Elasticities determine the magnitude of volume responses to price changes and the proportion of the support that leaks away from the intended recipients to other sectors.
Step 6: Size of the subsidy	The monetary value of the financial subsidy, and also its share relative to turnover or product price.

<b>Linkage 2: Output – Emissions and or resource depletion</b>	This part of the analysis is concerned with the emissions or environmental impacts that result from a volume of activity excluding those “filtered” by environmental policies.
Step 7: Environmental policies in place or emission abatement techniques that mitigate the impacts of the support	Environmental policies may be put in place in an attempt to reduce the negative impact on the environment of a particular support measure. However, these policies may have specific aims that do not encompass all possible environmental impacts of the support. Furthermore, it could be more expensive to implement certain environmental policies than to reduce the underlying causes of negative impacts on the environment.
Step 8: Impacts of the environmental policies in place on emissions and volume of activity	Environmental policies in place may not be as effective as they are intended to be. It is important not to assume that the introduction of an environmental policy will address all possible environmental impacts of the support.
Step 9: Describe the impact of environmental policies in place on environmental expenditures by the industry, if possible	Environmental expenditure can have a rebound / multiplier effect on the economy.
<b>Linkage 3: Emissions / Depletion – actual environmental damage</b>	This part of the analysis examines the extent to which increased emission levels or resource depletion lead to actual environmental damage (‘dose-response’ relationship). This is often highly site-specific, particularly when the emissions have predominantly local or regional effects and therefore must be evaluated through dedicated studies. However, in the case of pollutants that have global effects (like CO <sub>2</sub> emissions or chlorofluorocarbon (CFCs) effects are not site specific and general conclusions can be drawn.
Step 10: Describe the size of the environmental damage	Environmental damage refers to the increased emissions, waste, pollution, resource depletion caused as a result of the support measure.
Step 11: Provide insights on the assimilative capacity of the environment to these impacts	<i>Assimilative capacity</i> refers to the capacity of the environment to absorb a certain amount of emissions, depletion or damage, without suffering (irreversible) degradation. The actual environmental damage caused by changes in levels of pollution and resource depletion that results from the support depends on the assimilative capacity of the environment. If this capacity is high, more damage can be tolerated by the environment before it becomes a significant problem.

Source: Adapted from IEEP, IVM, Ecologic et al. (2009).

132. Table 8 provides some guidance on the application of the Quick scan tool.

133. The quick scan can help identify which subsidies should be removed first, but, ideally, a partial or general equilibrium model will be required to take into consideration all linkages and effects on the economy. The Quick scan has been used to identify EHS schemes for removal in selected EU countries. However, it was mainly used to produce qualitative assessments and identify gaps where additional in-depth analysis was needed. If applied properly, this tool is a very resource consuming task. Despite its name, the Quick scan was considered rather demanding. For this reason, a simplified Checklist was developed building on the main linkages identified in the Quick scan.

### 10.2. *Decision trees for identifying environmentally-harmful subsidies*

134. Decision trees are decision support tools that use a tree-like graph or model of decisions and their possible consequences. Decision trees provide analytical frameworks that facilitate discussion and decision making with regard to subsidy reform. These frameworks are helpful in understanding if a subsidy scheme is effective in reaching its objectives.

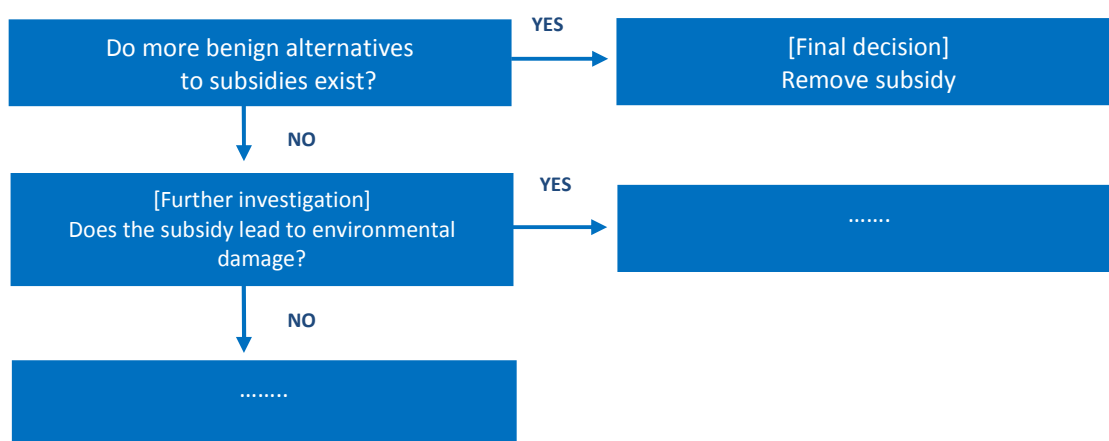
135. Whilst decision trees help to shape the discussion on a given subsidy scheme, they do not measure the subsidy scale or impacts. The process, based on a decision tree, may require using additional techniques to answer the questions that need to be considered in order to take a decision (e.g. the use of a cost-benefit or cost-effectiveness analysis).

136. Decision trees have been developed to particularly shape the discussion on EHS by various institutions. The main ones, that we briefly discuss here, include:

- OECD checklist (J.Pieters, 2002) based on the OECD Quick Scan;
- World Bank (World Bank, 2010a);
- Integrated Assessment (OECD, currently).

137. In a decision tree, each answer triggers a certain chain of consequences until a final decision is reached, as in the Quick scan model, schematically presented in Figure 5 below.

**Figure 5. Example of a decision tree**



#### 10.2.1. OECD Checklist

138. The “Quick scan”, considered not-so-easy to-apply, has been developed into a “Checklist”, a tool which would enable governments to assess whether the removal of a subsidy would benefit the environment<sup>38</sup>. The OECD Checklist, developed by J. Pieters, served two main purposes<sup>39</sup>:

1. Pointing out the conditions under which subsidy removal could have significant beneficial environmental effects; and,
2. Ranking subsidies by their environmental impact in order to support governments on making the choice of subsidies that need to be eliminated first.

<sup>38</sup> IEEP, Ecologic, FEEM and IVM (2007).

<sup>39</sup> Pieters, J. (2002).

139. The Checklist procedure (see Figure 6 below) starts with a subsidy description, including information on the name of the programme, its objectives, the subsidy design scheme and the scale of the subsidy. Next, the analyst needs to investigate the question if existing policies (i.e. policy filters) are effective in mitigating the environmental impact caused by the subsidy. If the answer is affirmative, then subsidy removal is not likely to have a significant environmental effect. The next step is to answer the question if more benign alternatives to subsidy exist (in the short and in the long term), if the answer is “No”, then, again, subsidy removal is not likely to have a significant environmental effect. The next step requires the assessment of the response to subsidy removal (i.e. how recipients react when a subsidy scheme is removed). Then the analyst investigates if the subsidised sector is exposed to significant market power of suppliers or consumers. If suppliers or customers or both wield much market power, the outcomes of removing any type of subsidy will be hard to predict<sup>40</sup>.

140. The Checklist usually describes the economic characteristics of subsidies that may serve to predict the first order effects on those industries that are directly affected by the removal of a certain subsidy. The environmental impact of a subsidised activity can be assessed using, for example, an environmental impact assessment. However, it is beyond the scope of the Checklist to estimate the effects of subsidy removal using general or partial equilibrium models which take the responses of other sectors into account. However, the Checklist can provide reference for a more detailed analysis, eventually leading to deploying economic modelling.

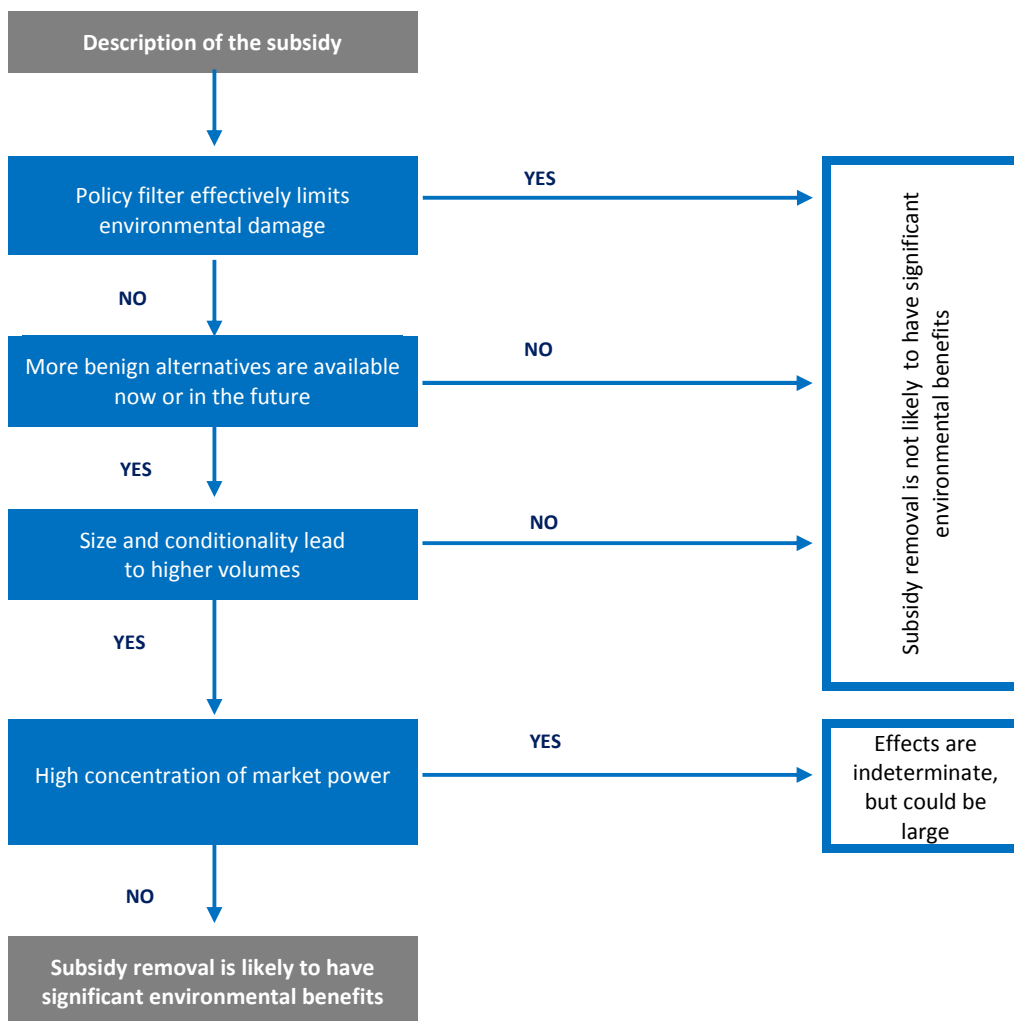
141. The Checklist is a tool which rests on the idea that decision-makers already have access to the relevant data and information in order to assess each linkage that it contains. The Checklist has been applied to and tested in several EU and OECD countries. It basically provides a qualitative analysis.

142. The Checklist does not include an analysis of social impacts or the implications of subsidy removal in social terms. The model also excludes considerations of political economy of subsidies (such as lobbying of interest groups, leadership and communication). In order to address these concerns, the OECD has developed a more detailed approach, which integrates the social, economic and environmental dimensions of subsidy removal. These aspects are reflected in the Integrated assessment framework.

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<sup>40</sup> Idem.

Figure 6. Checklist procedure



Source: Pieters, J. (2002).

### 10.2.2. Integrated assessment framework

143. The Integrated assessment framework (OECD, 2005) is the most recent of the OECD tools and is meant to represent an “advancement” in the methodology that builds on the belief that considering social and environmental aspects separately leads to trade-offs and fails to highlight synergies<sup>41</sup>.

144. The aims of the integrated assessment are:

- To highlight the costs and benefits, winners and losers, intended and unintended effects of a subsidy in the environmental, economic and social spheres, and any associated trade-offs; and,

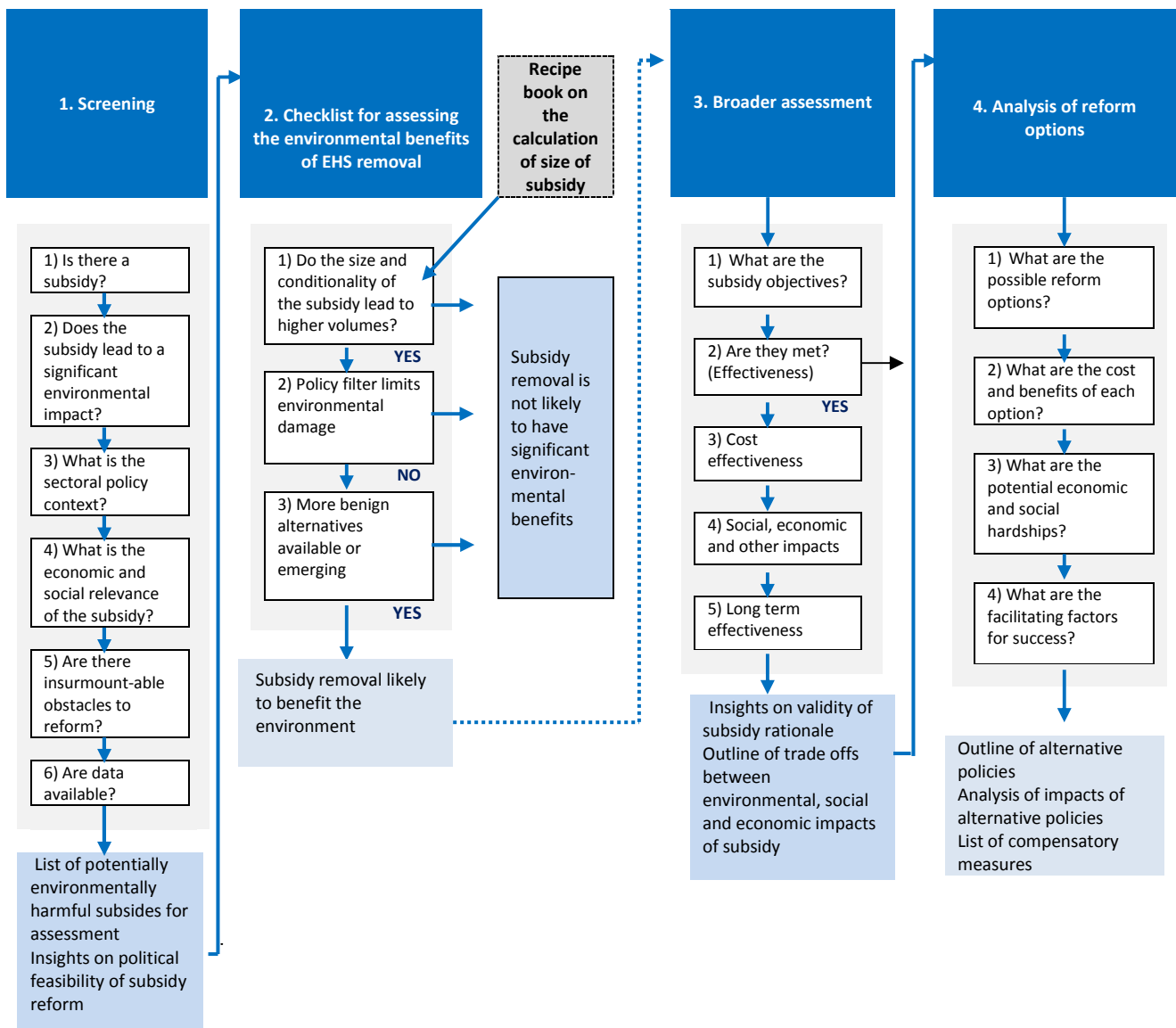
<sup>41</sup> IEEP, IVM, Ecologic et al. (2009).

- To provide information that is understandable to the general public, as broader communication is considered essential for successful reform.

145. The framework is intended to be broad enough to be applied to subsidies of any type (excluding uncompensated externalities) and to be applicable to both *ex ante* and *ex-post* analyses.

146. The framework works as a checklist (see Figure 7) of information that policy makers need to gather in order to make an informed assessment of the impacts of subsidies in environmental, social and economic terms.

**Figure 7. Integrated Assessment decision-tree approach**



Source: IEEP, IVM, Ecologic et al. (2009).

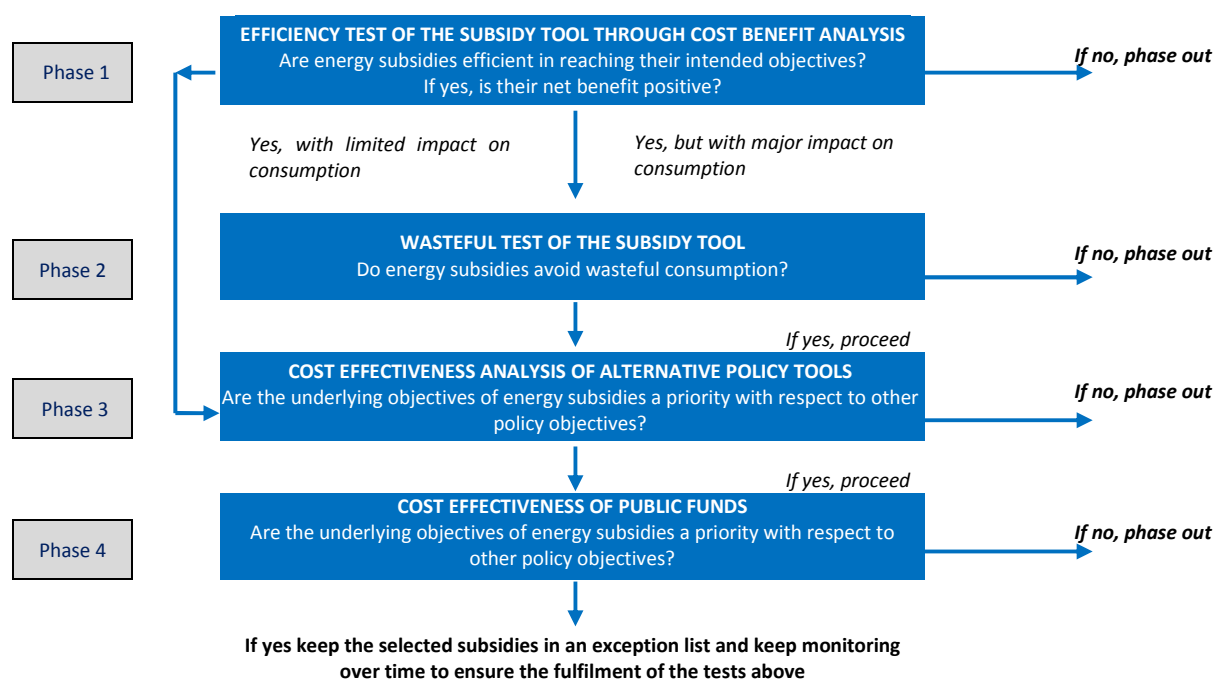
147. Testing the applicability of the OECD tools in practice<sup>42</sup> has shown that, generally, these tools:

- Are effective initial screening tools;
- Avoid the resource intensiveness / rigidities of general equilibrium models or cost-benefit analysis;
- Can be applied at different levels of detail;
- Can help identify and un-bundle linkages;
- Highlight areas where further detailed empirical analysis is required;
- Prioritise EHS reform on the basis of benefits of removal;
- Are applicable to all sectors and to all subsidy types.

### 10.2.3. World Bank Checklist

148. The World Bank decision-tree is yet another flowchart model specifically designed to identify and assess wasteful energy subsidies. The stepwise approach allows for a transparent assessment and decision-making process. However, like other similar models, the World Bank Checklist is also very data intensive and time-consuming and requires major analytical efforts such as the use of cost-effectiveness and cost-benefit analyses for each individual subsidy scheme (see Figure 8 below). Both are time and resource-consuming exercises.

**Figure 8. World Bank decision tree**



Source: World Bank (2010a).

<sup>42</sup> IEEP, IVM, Ecologic et al. (2009).

149. Table 9 summarises the applicability of the decision-tree approaches in the analysis of subsidy schemes.

**Table 8. Applicability of the decision-tree approaches in subsidy analysis**

Is applicable when	Is not applicable when
Understanding the subsidy mechanism	Measuring, quantifying impacts (additional support methods are necessary e.g. Cost Benefit Analysis)
Supporting the decision making process	Measuring the magnitude of subsidies
Formulating policy recommendations e.g. indicating alternative proposals to subsidies to meet certain policy objectives	
Prioritising which subsidies should be removed first	

150. Decision trees provide useful conceptual frameworks to shape discussions on the effects of subsidies. Despite limitations and difficulties with application, the OECD checklists are well placed to identify and assess (at least qualitatively) the likely impacts of specific subsidy schemes in the EECCA countries, particularly on GHG emissions and fuel switch.

151. At the same time, experience shows that when there are large subsidies with significant indirect impacts there is a need for the use of economic models and micro/macroeconomic studies. Such models help to quantify the impacts of subsidy reforms. However, even the best models cannot capture all effects of subsidy removal. In this case the support of expert judgement is needed. Some issues related to modelling the effects of subsidy removal are discussed further below.

### **10.3. Using economic models to quantify the impacts of subsidy removal**

152. In recent years, sophisticated economic tools have been brought into service to help understand the effects of subsidies on the environment, economy and welfare at the global level and within groups of countries. Most of the large-scale efforts to date - by the World Bank, the OECD, the Institut national de la recherche agronomique (IINRA) (National Institute of Agricultural research), the Carnegie Endowment, and a few independent analysts - have involved the use of computerised general equilibrium (CGE) models.

153. At their core, fossil-fuel subsidies have an economic impact by distorting prices and therefore affecting production and consumption decisions. Increases in coal, oil and natural gas prices would ripple throughout other sectors of the economy, affecting the costs of production, and therefore the prices of other goods, particularly energy-intensive ones. In turn, this may affect the competitiveness of goods from certain sectors and countries in the global economy, and could result in changes in trade flows. All of these changes have effects on global emissions from fossil-fuel combustion. Many of the environmental and social impacts of fossil-fuel subsidies stem from this economic distortion - both through increased consumption in countries where fossil-fuel prices are kept artificially low, and through the continued operation of less-efficient, and often less-clean fuel producers in countries where prices are kept artificially high to support domestic producers. Subsidies also affect government budgets by imposing fiscal burdens, which in turn reduce the amount of money available to spend on social programmes. (For a more detailed discussion on the economic, environmental and social impacts of fossil fuel subsidies in particular, see Annex 4.)

### Box 8. Partial and general equilibrium models used in quantifying the impacts of energy subsidy removal

**Partial-equilibrium models** consider *only the product market in which subsidy reform is occurring* (in this case, the energy market), and estimate price, demand and production changes in fossil fuels as a result of subsidy removal based on simple supply-and-demand curves and economic assumptions.

Partial-equilibrium models can provide some useful insights into the impacts of subsidy reform. However, they cannot address questions relating to economic sectors that use energy as a significant input. Raising energy prices will result in higher production costs in other sectors and therefore higher resulting prices of many goods in addition to energy. Partial-equilibrium models also do not address macroeconomic questions relating to international competitiveness effects. To answer these kinds of questions, general-equilibrium models are required.

**Computable general-equilibrium (CGE) models** simulate markets for production factors and goods using sets of equations that specify supply-and-demand behaviour across a multitude of markets. In theory, general-equilibrium analysis is supposed to look at the economy as a whole and therefore take account of linkages between all markets, including labour markets and markets for all goods that require energy as an input. Numerous CGE models are currently in use, each containing a set of complex non-linear equations that must be solved for, based on assumptions regarding economic behaviour, including price elasticities of supply and demand. The models are first run using values with the subsidy in place, and then again with the subsidy removed to estimate the overall net benefits and costs associated with subsidy removal.

The data requirements for general equilibrium modelling are massive. Although CGE models provide a wider scope of numerical results than partial-equilibrium models, the accuracy of the results is dependent on the accuracy of the assumptions and data. Energy is a fairly ubiquitous input to the production of most goods in the market, changes in energy prices will affect almost all goods. Some key industries, particularly energy-intensive ones, should be included in the model in a disaggregated manner. However, in practice, most of the CGE models that have been used to simulate fossil-fuel subsidy reform require the modeller to make choices as to what is modelled in detail and what is left in aggregated form, and the disaggregation of markets is not always undertaken.

General-equilibrium models can be static or dynamic. Static CGE models look at the economy at only one point in time, in response to some policy change. The results are usually reported as some percentage difference in each variable between the base case and the reform case for some set future year for example 2015 or 2020. Dynamic CGE models trace what happens to each variable from the base year through the forecast year, usually at annual intervals.

Most general-equilibrium models forecast changes in various factors such as GDP, GHG emissions and real income over a set period of time, such as 20–50 years into the future. In order to provide comparable data, the baseline “business as usual” scenario must also be modelled out 20–50 years into the future. This creates additional uncertainty that must be addressed.

However, there are a wide range of decisions associated with calculating price wedges such as whether to include or exclude taxes, which prices to use as the reference price, whether to incorporate positive as well as negative price distortions and whether to use market exchange rates or exchange rates adjusted for purchasing power parities.

**Elasticities** are critical for determining demand and supply responses to price changes. Demand for a product is inelastic if consumers will pay almost any price for the product. Demand is very elastic if consumers will only pay a narrow range of prices and will consume markedly less if the price rises. Elasticities are a key component in models but their values are highly uncertain. This clearly adds uncertainty into the results the models generate.

The **environmental impacts** of fossil-fuel subsidy reform are generally analysed through an environmental add-on to an economic model. Changes in fuel consumption are used to calculate potential changes in GHG emission levels. What is required is the projected consumption and carbon-emission factors for each fuel. As a result, most economic models of subsidy reform include estimates of changes in CO<sub>2</sub> or GHG emission levels.

If other environmental impacts are to be considered, such as local air pollution levels, other models are required in addition to the partial- or general-equilibrium analysis. Local air pollution assessments generally need to account for the geographic generation and dispersion of pollutants. The results of the dispersion model are then used to provide information on the impacts of local air pollution on human health, ecosystems and buildings. Sometimes a monetary value is placed on these impacts, estimated by various approaches: valuing productivity losses; valuing expenditures on preventing damage; people’s willingness to pay for less damage; or people’s willingness to accept compensation for damage.

Nevertheless, while local air pollution and resource depletion impacts provide interesting information about the overall environmental impact of fossil-fuel subsidies, due to the huge data collection needs, generally changes in CO<sub>2</sub> or GHG emissions are the only environmental impacts considered in studies of fossil-fuel subsidy reform.

Although many fossil-fuel subsidies are regressive, reform could have negative **impacts on the poor**. The ripple-through effects of higher fossil-fuel prices throughout the economy, for example in terms of higher production costs, might increase the prices of other goods and decrease incomes. Moreover, while the poor may benefit from fossil-fuel subsidy reform in aggregate, there may be certain sectors of the population that suffer the negative impacts. Nevertheless, if redistribution of the budgetary surplus from subsidy removal is well-targeted to these affected groups, they could gain.

Source : Adopted from EllisI (2010).

154. It should not be assumed that removing all fossil-fuel subsidies would necessarily have positive economic, environmental and social effects across the board. The results of removing fossil-fuel subsidies are highly complex and some groups within certain countries would be negatively affected. To quantify the effects of subsidy removal on the economy and the environment, analysts have designed different economic and econometric models (see Box 8 for details on such models).

155. Such models can show that fossil fuel reform is good for countries and reduces GHG emissions and other pollutants, But the models also demonstrate that the reform leads to a structural change in the economy making some industries non-competitive and leaving some people jobless. Therefore, models alone cannot suggest the right decisions. They can support decision-making but reform measures need to be supported by a political process and expert judgement.

#### 10.3.1. OECD ENV-linkages and other general equilibrium models

156. An example of an economic model is the OECD ENV-Linkages model. It is a recursive<sup>43</sup> dynamic neo-classical general equilibrium model developed by the OECD Environment Directorate. It is a global economic model built primarily on a database of national economies. In its most recent version of the model, the world economy is divided into 12 countries/regions, each with 25 economic sectors, including five different technologies to produce electricity. Each of the 12 regions is underpinned by an economic input-output table (usually sourced from national statistical agencies)<sup>44</sup>.

157. The ENV-Linkages model has been used to quantify impacts of the subsidy reform. In simulations of subsidy reforms, the price gaps estimated by the IEA (2008) for 2007 are used. These price gaps are gradually phased-out over the period 2013 to 2020<sup>45</sup>.

158. Computable general equilibrium models use actual economic data to estimate how an economy might react to changes in policy, technology or other external factors. The CGE models are useful to model the impact of policies on economy, especially on consumption. From this perspective, the CGE model would be useful to determine what would be the impact of the subsidy reform on the reduction of GHG emissions. On the other hand, the CGD model does not distinguish between general and environmentally-harmful subsidies. In fact, it does not identify subsidy schemes or their scale, either. In addition, the OECD Env-Linkages model is designed to be used at a regional and global level and cannot be easily applied at a country level.

<sup>43</sup> Models which are recursive are hierarchical in nature. All causal effects in the model are “unidirectional” in nature, i.e. no two variables in the model are reciprocally related, either directly or indirectly. Hence, the first endogenous variable is affected only by the exogenous variables. The second endogenous variable is affected only by the exogenous variables and the first endogenous variable; and so on.

<sup>44</sup> OECD (2010a).

<sup>45</sup> OECD (2010d).

159. Table 10 summarises the applicability of general equilibrium models.

**Table 9. Applicability of general equilibrium models**

Is applicable when	Is not applicable when
Computing the impact of the subsidy phase-out on the economy	Identify the subsidy scheme
Computing the impact of the subsidy phase-out on GHG emissions	Identify the subsidy scale

### 10.3.2. Other models

160. There are some criticisms of computable general equilibrium models in the literature. General equilibrium models pay no attention to time-series data. “They include explicit specification of the behaviour of several economic actors (i.e. they are general). Typically, they represent households as utility maximisers and firms as profit maximisers or cost minimisers. Through the use of such optimisation assumptions, they emphasise the role of commodity and factor prices in influencing consumption and production decisions by households and firms which may not always be the case”<sup>46</sup>.

161. Some sectors of the economy, especially electricity production, already use other models, especially based on stochastic methods. An interesting example of such a method is the forecasting of electricity prices, using data mining<sup>47</sup>, which may give better results than regression models<sup>48</sup>. Theoretically, dynamic stochastic general equilibrium (DTGE) models could be used instead of computable general equilibrium models. However, the stochastic model requires the collection of far more data, thus its usefulness for the EECCA countries may be even more limited.

#### **Box 9. Dynamic stochastic general equilibrium models**

Like other general equilibrium models, DSGE model aims to describe the behaviour of the economy as a whole by analysing the interaction of many microeconomic decisions. The decisions considered in such models correspond to some of the main quantities studied in macroeconomics, such as consumption, saving, investment, and labour supply and labour demand. The decision-makers in the model, often called “agents”, may include households, business firms, and possibly others, such as governments or central banks. The DSGE models are dynamic, studying how the economy evolves over time. They are also stochastic, meaning they take into account the fact that the economy is affected by random shocks such as technological change, fluctuations in the price of oil, or changes in macroeconomic policy-making.

162. The main conclusion is that despite the limitations and difficulties with using economic models, the quantitative relationships between subsidy removal and environmental or welfare volume effects can only be established using some kind of partial or, preferably, general equilibrium models. For this reason, in the work in the EECCA countries, a model that will focus at least on GHG emissions effects from subsidy removal needs to be developed and applied.

<sup>46</sup> Grassini, M. (2007).

<sup>47</sup> Data mining refers to the extraction of hidden predictive information from large databases.

<sup>48</sup> Fijorek, K. et al (2010). In Polish.

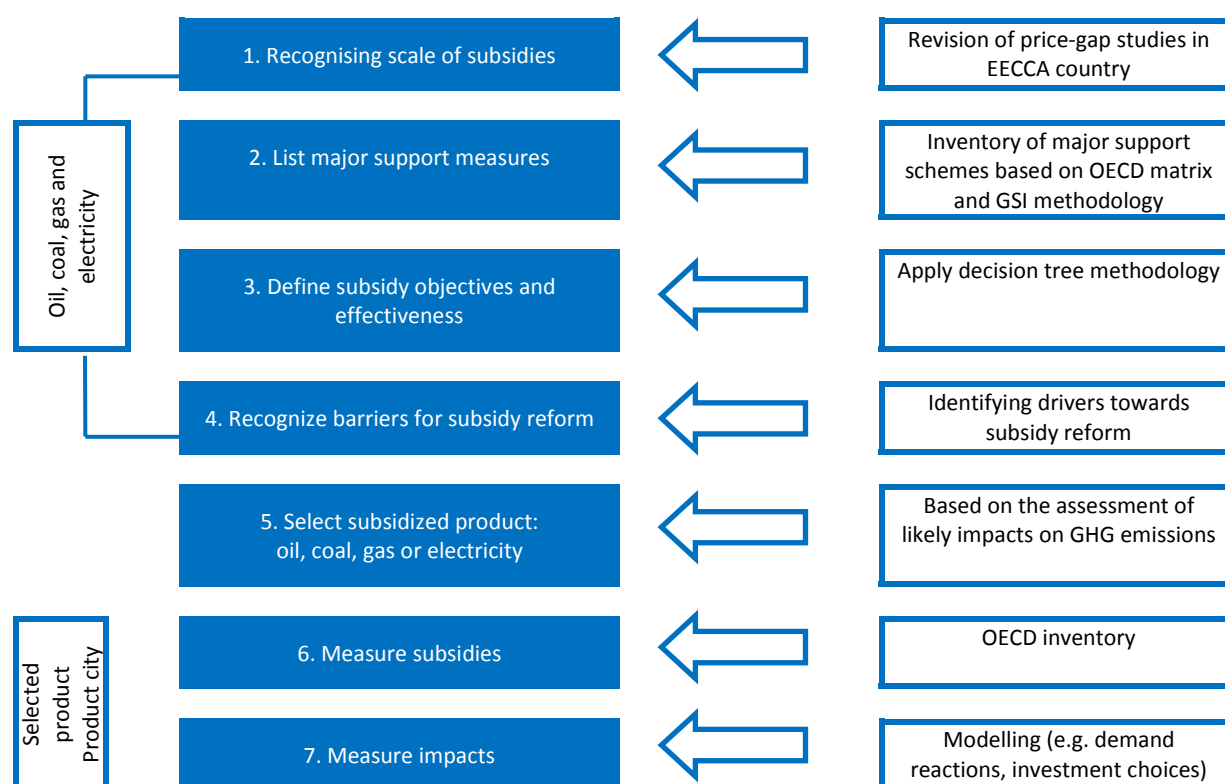
163. It is also worth noting that modelling of the impact of the phase out of fossil fuel subsidies, regardless of their nature, makes sense at a national level only if the model is recognised by national experts in the government. If this is not the case, the model risks to remain an academic exercise, not accounting for the specifics of the local context. Evidence shows that existing economic models in the EECCA countries are often based on shaky local data, disregarding the share of grey economy, energy leakages and actual social stratification. For this reason, whichever modelling approach is selected, it needs to be approved by the country's government before actual work begins.

164. It is also worth mentioning that in analysing and evaluating the impact of subsidies, one should also apply a social cost-benefit analysis (CBA). Given that CBA is a topic of discussion of many other papers and that at least EECCA environmental authorities are generally well familiar with this analytical tool, we have chosen not to cover it in this paper. Like with other tools, applying CBA in a proper way requires a significant effort and resources both in terms of time, money and data and information.

## 11. Possible approaches to organising the analytical work in the EECCA region

165. Following the logic of the analysis carried out for this project, a possible framework for launching and organising the work on energy subsidies and climate change in the EECCA countries has been developed. It consists of six major steps and the procedure is visually presented in Figure 9 below.

**Figure 9. Procedure for launching work on EHS in the EECCA countries**



166. **Step 1** consists of the review of the results of existing price-gap studies carried out by different international institutions (IEA, IMF) in selected EECCA countries. This step is intended to provide initial information of the magnitude of subsidies in a given country.

167. **Step 2** consists of obtaining data on major subsidy schemes with regard to the production and consumption of oil, coal, gas, electricity and heat. This step will be done based on structured in-depth interviews with energy experts and public servants in the EECCA countries. The OECD Matrix and the IISD-GSI list of subsidies will be used in drafting questionnaires.

168. **Step 3** comprises the identification of key barriers to energy subsidy reform in a selected EECCA country.

169. **Step 4** involves the selection of fuels/commodities for further analysis (e.g. electricity, heat, coal).

170. **Step 5** measures the transfers to producers and consumers. This step requires a detailed review of budgetary documents and tax codes. Close co-operation with public administrations will be required.

171. **Step 6** incorporates the assessment of the likely impacts of subsidy removal. Likely reactions to subsidy removal will be subject to discussion during focus group meetings with energy experts and civil servants.

172. Step 6 comprises the assessment of the likely effects of subsidy removal on public finance, GHG emissions and resource use.

173. The assessment of the response to phasing-out a given subsidy requires the recognition of:

- The impacts of subsidy removal on production costs e.g. coal, electricity, heat (in case of producer support measures);
- The likely impacts on prices (both producer and consumer support measures);
- The likely change in the energy mix (e.g. less emission intensive processes are feasible and more cost-efficient);
- The likely impact on resource use;
- The likely impacts on emissions;
- Impacts on budgets, other environmental effects, and social consequences.

174. In many cases, the removal of subsidies may not be a sufficient incentive to achieve the reduction of GHG emissions. This may occur when alternatives to emission-intensive processes are not easily available. In this context, the change in GHG emissions may result from:

- Changes in the energy mix (e.g. a gradual shift from coal to gas and renewables);
- The application of cleaner or more efficient technologies (e.g. building more efficient units or introducing carbon capture and storage equipment at coal-fired plants);
- The demand response in result of changes in prices (e.g. higher electricity prices trigger demand-side<sup>49</sup> response).

175. In step 6, the focus will be placed on the likely impacts of subsidy removal on the energy demand and energy mix using the decision tree approach, where both consumer support and producer support measures will be analysed.

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<sup>49</sup> Energy demand management, also known as demand side management, is the modification of consumer demand for energy through various methods such as financial incentives and education.

### 11.1. *Determination of impacts as a result of subsidy removal*

176. The focus of this paper is on environmentally-harmful subsidies, especially on energy subsidies that support producers and consumers and particularly on public support for fossil fuels. Subsidies to electricity and heat generation will also be considered. However, nuclear power and bio-fuel subsidies are not included in the analysis at that stage.

177. The following impacts of energy subsidies are proposed for consideration in the initial work on energy subsidies in the EECCA countries:

- Impacts on wasteful consumption and practices;
- Impact on GHG emissions;
- Impacts on environmental quality (ambient air, water pollution etc.);
- Impact on (energy) poverty alleviation;
- Impacts on public budgets.

#### 11.1.1. *Wasteful practices and wasteful consumption*

178. In the statement concluding the G-20 summit in Pittsburgh, Pennsylvania (2009), the G-20 leaders noted that “Inefficient fossil fuel subsidies encourage **wasteful consumption**, distort markets, impede investment in clean energy sources and undermine efforts to deal with climate change”.

179. The definition of wasteful consumption, however, is not a straightforward task. As noted in the OECD report<sup>50</sup>, the consumption used to satisfy human basic needs (such as basic heating in cold seasons) surely cannot be treated as wasteful. If subsidies lead to an increase in consumption that is not related to such basic needs, they are then considered as wasteful. The example provided in Box 11 below shows that under certain conditions the lack of proper regulation can actually translate into support of wasteful energy activities.

#### **Box 10. Example of wasteful practices in the Russian Federation**

Wasteful practices of burning natural gas at domestic thermal power stations results in losses of 40–50 billion cubic meters of gas per year, which is more than the annual gas needs of the Moscow megacity (30 billion cubic meters). Another conspicuous and widely discussed inefficiency is flaring associated gas. Due to deficiencies in the technological processes and insufficiencies in the gas processing and transportation infrastructure in Russia, oil companies mainly dispose of gas associated with oil as a by-product rather than using it as a valuable raw material. As a result, despite of the companies' obligations to utilise 90–95 per cent of the extracted associated gas under their oilfield licenses, 25–30% of it (12–16 billion cubic meters) is flared.

According to the estimates of the IEA, if, in 2008, Russia had used energy as efficiently as Canada, Sweden, Norway and some other comparable northern countries of the OECD, it could have saved more than 200 million tonnes of oil equivalent from its primary energy demand, equal to 30% of its consumption that year and an amount similar to the total primary energy used by the United Kingdom. With these savings, Russia's energy intensity would have still been about 60% higher than the OECD average (or 85% higher than the European Union), due to Russia's more energy-intensive industrial structure and the large share of its population living in areas with high heating requirements.

Source : IEA World Energy Outlook 2011

<sup>50</sup> IEA, OECD and World Bank (2010).

180. As such, this example provides a good picture of the thin boarder between a subsidy and more general government support schemes, i.e. where government inaction becomes a support to environmentally harmful activities.

181. In the context of launching work on EHS in the EECCA countries, inaction (e.g. lack of proper regulation) needs to be considered in line with other subsidy schemes that have impact on wasteful practices.

#### *11.1.2. Impacts on GHG emissions*

182. Subsidies may trigger higher GHG emissions as compared with the situation where these subsidies do not exist. As a result of the subsidy, there may be two main responses:

- Lower (subsidised) prices lead to an increase of the consumption of fuels (e.g. oil, coal and gas) which translates into higher GHG emissions, and,
- Subsidies to certain fuels e.g. coal (or their producers) influence the country's energy mix.

183. As far as the assessment of the impact of the subsidies to prices on GHG emissions is concerned, it is necessary to evaluate, on the one hand, what is the impact of a given subsidy on prices offered to consumers, and what would be the short, medium and long-term response of consumers to changes in prices (in case the subsidy was removed).

184. Knowledge of price elasticity<sup>51</sup> for a given commodity provides useful information. It should be noted, however, that price elasticities vary from country-to-country and they are different in the short, medium and long term.

185. Moreover, demand reactions are not straightforward to predict. For example, the rise in oil prices in an oil producing country (that result from a subsidy removal) may result in larger quantities of oil available for international markets. This may lower international oil prices and increase the consumption in oil importing countries. Such reactions have been studied within the OECD ENV-Linkages model which was discussed in the previous chapter of this report.

186. The impact of subsidy removal on the country's energy mix may result from the anticipation of less favourable conditions for using a given fuel (e.g. coal) in the future when government support is eliminated. An example of such a case is provided in Box 12 below.

#### **Box 11. Hypothetical example – Removal of support to coal industry**

The major part of electricity production (more than 80%) in a country comes from coal-fired units. For decades, consecutive governments have subsidised coal production, making coal-based electricity more competitive. Currently, over 50% of the generation units are obsolete (and they approach the end of their economic life), new investments in generation capacity are required.

The government announces its plans to phase-out support to coal production. Energy producers/investors anticipate consequences of this policy. Various response scenarios are possible. For example:

- Investment alternatives to coal-based units are available and feasible;
- Phasing out subsidies will change electricity generation costs in coal-based power plants in the way that other fuels (e.g. natural gas) become more competitive;
- Investors anticipate that long-term risks of investing in power plants (using fuel other than coal) are acceptable.

If the answer to these questions is positive, it is likely that subsidy removal will have a significant impact on the country's energy mix in the medium and long term.

*Source* : EAP Task Force's own example.

<sup>51</sup> Demand or supply response to the change in prices e.g. by how much the use or production of oil decreases as a result of a price increase.

### 11.1.3. Budgetary impacts

187. The budgetary impacts of some subsidy schemes may include, among others:

- direct budgetary impacts (e.g. transfer from state budget to producers);
- indirect budgetary impact (e.g. revenue forgone, that is the revenue that would normally be generated if the subsidy scheme was phased-out);
- potential budgetary impacts (e.g. when the government takes risks related to certain activities undertaken by individual producers).

188. Such budgetary impacts could be considered as part of the subsidy analysis in the EECCA countries as well.

## 12. Summary conclusions

189. The major conclusions that may be drawn from the above analysis include:

- There are different tools and approaches to identifying and measurement of subsidies in general, and to environmentally-harmful subsidies, in particular. None of these methods is ideal and can cover all aspects of all kinds of subsidies. For this reason, these tools need to be used in a targeted manner depending on the subsidy scheme that is being analysed. Therefore, a mix of analytical tools is needed to properly conduct the analysis.
- Conducting inventories based on open sources can help the initial identification of major energy subsidy schemes. These could be coupled with detailed questionnaires for discussions with government officials.
- The three major subsidy quantification approaches are the Price-gap approach, the Producer Support Estimate and the Consumer Support Estimate. Each of these methods has its advantages and limitations.
- The Price-gap approach, which is designed to capture the net effect of all subsidies that reduce the final prices below those that would prevail in a competitive market (that is market price support and market transfers), is best applied in quantifying energy consumption subsidies. However, special care needs to be taken in determining and calculating the reference price that is key in quantifying such subsidies. One of the main advantages of this approach is that it is relatively simple to calculate and can be used in cross-country comparisons. For this reason, the price-gap approach is recommended to be used in initial subsidy calculations in the EECCA countries.
- The PSE-CSE aggregate indicators have the advantage to integrate the price gap calculations with subsidy measurements based on transfers from governments to producers and consumers (or direct budgetary transfers and tax expenditure). As such, the PSE/CSE framework provides a more accurate picture of subsidies in a given country. But the data requirements to construct these indicators are significant and are often not readily available and difficult to collect. Despite these difficulties, and if there is a possibility to collect relevant data, at least for specific subsidy schemes, it is preferable to apply the PSE/CSE framework in subsidy quantification.

- The decision trees and other analytical tools (such as the OECD Checklist and Integrated assessment approach) used to assess the environmental harmfulness of selected subsidy schemes are effective initial screening tools and provide a useful conceptual framework to shape national discussions on subsidy effects. Despite limitations and difficulties with application, they are well-placed to assess, at least qualitatively, the likely impacts of specific subsidy schemes in the EECCA countries, particularly on GHG emissions and fuel switch.
- To properly account for the environmental, economic and social welfare effects from subsidy removal, there is a need to apply economic modelling. But quantifying the costs and benefits of subsidy removal is extremely difficult and judgemental. Because of the importance of energy to economic activity, the removal of energy subsidies have complex general equilibrium effects that are hard to predict and measure. There are however a number of sophisticated economic tools that involve the use of computerised partial or general equilibrium models. Despite challenges with using such models, they can provide some useful insights into the impacts of subsidy reform that can inform policy makers.
- Besides, these models are the only ones that can establish some quantitative relationships between subsidy removal and environmental or welfare volume effects. For this reason, in the work in the EECCA countries, at least some kind of partial equilibrium model needs to be used in the quantification of the broader effects from subsidy reforms (that is a model that will focus at least on GHG emissions effects). Experience shows however that even the best models cannot capture all effects of subsidy removal. This is the reason why the support of expert judgement is absolutely crucial.
- Modelling of the impact of the phase out of fossil fuel subsidies, regardless of their nature, makes sense at a national level only if the model is recognised by national experts in the government. If this is not the case, the model risks to remain an academic exercise, not accounting for the specifics of the local context. For this reason, the modelling approach needs to be approved by the country's government before actual work begins.
- In launching the debate on energy subsidy reforms in the EECCA countries, the discussion needs to be supported by robust analytical studies. Such an analysis needs to make the best use of available tools and approaches which implies using a mix of tools according to the types of subsidies that will be studied. However, in doing in-country work, and in order to understand well the specifics of different subsidy schemes, the political economy of providing subsidies may be as important as the measurement and quantification methods applied.

### PART III. POLITICAL ECONOMY OF SUBSIDY REFORM

190. Most government interventions, including subsidy policies, have multiple effects on the economy. Subsidy reform is typically beneficial to the economy as a whole in the longer term, but may have negative effects on some stakeholders, including the poor and vulnerable groups of society in the short term. Therefore, political barriers hold up reform plans.

191. This chapter looks into issues related to the political economy of energy subsidy reforms. It discusses major benefits from as well as challenges to reform efforts. It ends with a discussion of the possible approach to organising the work of energy subsidies analysis in the EECCA countries.

#### 13. Benefits from reforming energy subsidies

192. Subsidies to fossil-fuel production or use can increase environmental problems, but they often aim to boost regional opportunities, create jobs, or reduce poverty. Overall, the very inception, design and success of EHS reform depends on government's own priorities.

193. With the current economic and financial crisis and if countries want to get serious about reducing greenhouse emissions and move towards a greener path of development, sooner or later they need to take a good look at these environmentally damaging subsidies - and make some hard choices regarding where to invest taxpayer money. Unless there is a clear case and justification for the subsidy scheme, subsidies need to be phased out and replaced by other less environmentally-harmful policy instruments.

194. As analysts often point out, reforming energy subsidies can help:

- ***In relation to environmental policy goals:*** reduce the use of resource intensive inputs / activities (such as extraction, production, distribution, transformation, use), thus saving resources (e.g. water, energy) and causing less pollution (hence saving on policy measures).
- ***In relation to economic goals:*** increase competitiveness by exposing subsidised sectors to competition and supporting future competitiveness by improved resource efficiency; fix market distortions by making resource prices reflect resource value, and making polluters pay for their pollution; overcome technological 'lock-in' whereby more environmentally-friendly technologies/practices are unable to compete on an equal basis with the subsidised sector;
- ***In relation to fiscal goals:*** improve the (cost)-effectiveness of meeting objectives, including social objectives, and release public funding, thus enabling governments to re-allocate budget to other areas e.g. education, energy saving and / or reducing debt.

195. However, it is often difficult to demonstrate the economic cost of subsidy in a way that the public can understand. Those who want to keep the subsidy usually find it easier to speak of the social advantages that a subsidy can provide, such as the number of jobs supported or the financial savings to poor people. Benefits that involve mainly indirect gains in economic efficiency are rather abstract and more difficult to explain. Where the environmental benefits are global, such as reduced GHG emissions, the public may not care much, especially where poverty is widespread. For this and other reasons, it can be very hard for policy makers to remove subsidies once they have been introduced.

196. Generally, governments understand the need for such reforms and the potential economic, social and environmental benefits for society, should such environmentally-harmful subsidy schemes be eliminated. Experience shows that, in general, politicians tend to be more willing to tackle difficult subsidy issues immediately after elections in the hope that opposition to reform will have diminished by the time new elections come around<sup>52</sup>. Communicating to the general public the overall benefits of the reform to the economy and society as a whole and consulting with stakeholders in formulating reform measures is crucial to the success of the reform measures.

#### 14. Challenges to reforming energy subsidies<sup>53</sup>

197. Subsidies create or maintain economic activity that people become dependent on. Hence, a subsidy reform will change income distribution amongst individuals and their broader economic opportunities. Those who stand to gain from the *status quo* and those who lose from the reform have a significant incentive to lobby for the retention of the existing regime.

198. Experience shows that subsidy programmes, once established, long outlast the emergency or other need that was the occasion for their adoption. Vested interests quickly develop and vigorously fight proposals that would adversely affect them. Such interests tend to develop inside as well as outside the government, so that a mutually supporting bureaucracy and industrial establishment may command a great deal of political power.

199. There are a number of challenges to the reforms of energy subsidies. These range from purely technical, to institutional to political. But there is a general agreement that the main barrier to more rational energy subsidy policies is not economics, but politics.

##### *Political and economic barriers*

200. Experience shows that energy subsidies may be highly politicised and for this reason difficult to remove. Different studies show that energy subsidies tend to gravitate to the largest, most economically powerful recipients (and not to the poorest), thus reducing the risk and increasing the profits for well-connected private investors or industries. While not unique to environmentally harmful subsidies, the key political and economic obstacles to energy subsidy reform can be summarised in the following way:

- ***Strength of special interests and rent-seeking behaviour***<sup>54</sup>. The resistance in parliament and the lack of political will more generally to undertake reform of energy subsidies is often linked to the strength of special interests, and to their rent-seeking behaviour in gaining and retaining subsidies. The powerful industries get the subsidies and reinvest in the political process in order to keep the subsidies. The objective of the lobby is not just to receive immediate cash but to ensure a future increase in expected returns for the industry. More attractive than direct cash can be all kinds of special loans or tax breaks or opportunities to shift risks to the government and to taxpayers as these may be even more lucrative and less transparent.

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<sup>52</sup> Morgan, T. (2007).

<sup>53</sup> Adapted from OECD (2005) and a presentation by D. Koplow.

<sup>54</sup> In economics, rent-seeking is an attempt to obtain economic rent by manipulating the social or political environment in which economic activities occur, rather than by creating new wealth, for example, spending money on political lobbying in order to be given a share of wealth that has already been created. Many current studies of rent-seeking focus on efforts to capture various monopoly privileges stemming from government regulation of free competition.

- ***Divergence in the concentration of benefits and costs of energy subsidies.*** The benefits of subsidies tend to be highly concentrated in the hands of smaller specific well-organised groups, while their costs are spread widely across (less organised) taxpayers and consumers. This diffusion of costs across many players makes it much harder for them to form coalitions that can organise a meaningful opposition against environmentally-harmful energy schemes. Thus, the divergence in the concentration of benefits and costs increases the incentive for powerful industries to lobby to attain and retain subsidies. The less visible and transparent subsidy schemes are, the fewer possibilities exist to oppose them. Empirical evidence also suggests that older and declining industries, which are more environmentally damaging (e.g. coal industry), tend to secure most support and trade protection.
- ***Fear of change.*** Politicians often fear that unpopular subsidy reforms may disrupt social peace. Subsidy removal may raise concerns regarding affordability e.g. when this would lead to higher prices of essential goods like drinking water, electricity and heat. Such unrests have occurred in several countries when governments announced reducing energy subsidies (e.g., India, Iran, Malaysia, Nigeria). Experience shows that these fears may be mitigated with appropriate policies that can minimise social impacts (e.g. transitional assistance, progressive energy tariffs that allow low charges for low usage and thus addresses the needs of lower income households). There are also very substantial fears of inflation (for example, in Iran it skyrocketed after the subsidy reform).
- ***Subsidies reforms do not come free of charge which may also scare politicians.*** There are private and social costs that politicians need to consider in reforming large subsidy schemes. For example, the private costs of adjustment for firms and workers as reform forces some industries to downsize or close to allow others to expand can be significant. The social costs include social safety net provisions (e.g., unemployment payments plus training grants to build up new skills so displaced workers can earn the same wage as before), and perhaps increased costs of crime as crime rate can increase with transitional unemployment reform. All these costs and benefits need to be carefully estimated before a reform is launched. However, the private and social costs of adjustment tend to be smaller and the transition periods smoother, the longer the phase-in period or smaller the tariff or subsidy cut per year.
- ***Competitiveness and distributional concerns, particularly with respect to regional interests.*** Despite the demonstrable benefits from unilateral subsidy reform, policy makers are often reluctant to undertake such reforms unless forced to by either economic or environmental crisis, or in response to external pressures (such as those that might occur through new multilateral or regional trade agreements). Fears over the loss of competitiveness are particularly related to energy-intensive industries such as metals, transport and manufacturing. Similarly, distributional concerns (including concerns over regional interests) can hamper moves to reform subsidy programmes. In this regard, there is scope for learning from experiences with other policy reforms such as higher environmental taxes, privatisation of state-owned enterprises, or tariff reform.
- ***Establishment of a culture of “entitlement” to subsidies.*** Long-term provision of subsidies generates perceptions of “entitlement” that may be hard to break, as they become capitalised into the prices of factors of production (for example, in the value of land or low energy prices). The expectation that subsidy programmes will continue almost forever can also become embedded in the expectations of producers and consumers, leading to resistance to change and incentives to lobby for the retention of subsidy programmes.

- **Corruption concerns.** If governance is poor and people do not trust their governments, they may oppose the reform because they will not trust the governments to do anything good with the support they are taking away. Corruption concerns are very important in this respect.
- **Subsidy reforms in net energy exporters and importers.** There is one more issue for energy producing countries: people think that they are entitled to low energy prices because their country has the reserves unlike others. Therefore, one has to distinguish between net energy exporters and importers, including in the EECCA: their political economy will be different. For the said reason, it is easier to reform fossil-fuel subsidies in energy-importing countries

*Technical and institutional barriers*

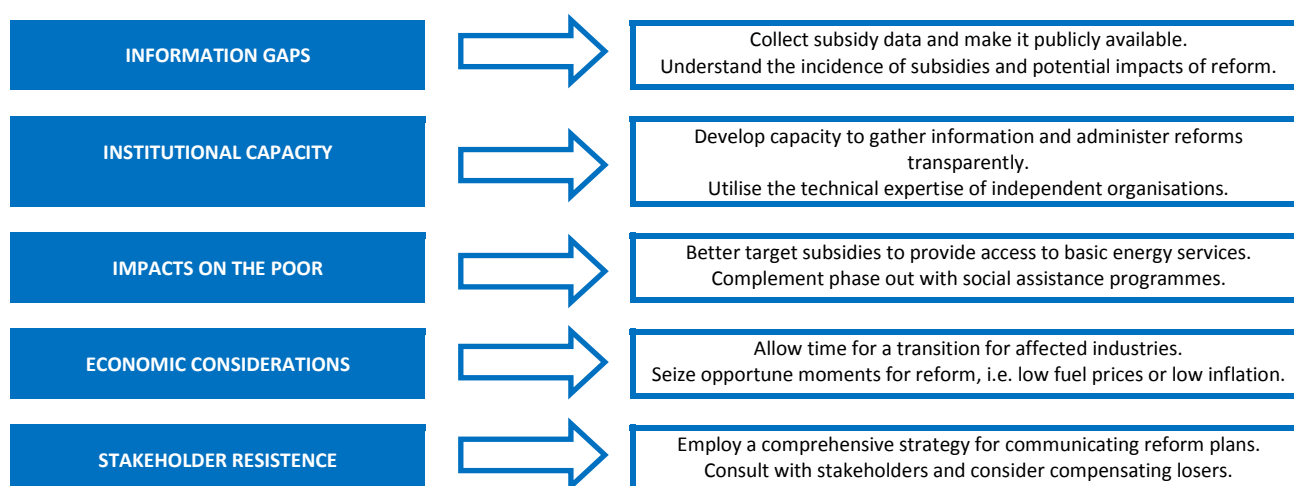
- **Institutional constraints.** Unsurprisingly, institutions and bureaucracies that manage subsidy schemes will rarely push for their removal, either because of vested interests or because they lack vision that things could be done differently. The sheer number of players at both national and sub-national level can also create barriers. Information on all sources of energy subsidies is often so fragmented and dispersed across many government agencies that, often, practically, nobody in the government has a full picture of all support schemes in the energy sector. The challenges in mapping subsidy schemes significantly impede the reform process. Improved coordination across various government agencies is key to overcoming such obstacles.
- **Complexity of interactions between subsidy schemes and other policy instruments.** There are often complex interactions between different subsidy schemes and other policy tools. Sometimes, subsidy impacts are mitigated by tax policies or other complementary measures. Careful assessment is therefore needed to disentangle the complexities arising from multiple policy goals and instruments in order to quantify current costs and potential benefits of selected subsidies and to identify priorities and opportunities for reform.
- **Lack of transparency.** Transparency may refer to information on the size of subsidy programmes, their beneficiaries, and their economic, environmental and social effects. The lack of transparency can be caused by two reasons. First, the lack of government's capacity to report subsidies (institutional constraints, complexity of interactions). Second, the government's unwillingness to report and reform subsidies. Asymmetries in the review process for environmental and economic measures can also reduce transparency. In most cases, new environmental measures are subject to a "regulatory impact assessment" while, in many countries, existing subsidy programmes are not subject to such an evaluation. And if this is true for direct budgetary transfers, indirect and less visible subsidy programmes which are not even monitored and reported, practically lack any such analysis. On the other hand, poorly defined subsidy estimation methods and imprecise classification systems significantly add to the lack of transparency. As a result, different studies, analysing the same type of subsidy scheme, may generate large variances in estimates of subsidy impacts and the potential benefits from their reforms. Such inconsistencies may largely undermine the credibility of such estimates in the eyes of politicians and the public at large. All this shows the need for further work in improving in-country subsidy valuation methodologies and practices.
- **Information and data gaps.** The lack of relevant data is a major technical barrier to subsidy analysis and subsequent reforms. Even for the most straightforward subsidy schemes, such as direct budgetary transfers, experience shows that budget data cannot easily be sorted topically and broken down by types of subsidies. With other types of subsidies, most data exist (if at all) in an aggregate form only. As a result, existing data are inadequate and they cannot support meaningful subsidy analysis that can be used to inform policy makers' judgements with regard to

needed subsidy reforms. On the other hand, data collected by international organisations (such as IEA) are usually based on reports by their member countries and are presented at a highly aggregated form which does not help detailed subsidy analysis either. Improving data collection and making data publicly available should be a major objective for governments interested in undertaking subsidy reform measures.

201. A multi-pronged strategy is required to overcome these factors. Recognising that apart from subsidies, there is a range of other policy options available to meet societal objectives is important, as it contributes to the understanding that subsidies are generally inefficient tools for achieving policy goals. Other ingredients of successful reforms include better targeting of existing subsidies to improve their cost effectiveness and reduce any harmful environmental impact; and improved subsidy design, to improve the efficiency of subsidies granted to correct environmental problems.

202. Figure 10 below identifies some of the main barriers particularly to fossil fuel subsidy reforms and possible strategies for their successful implementation.

**Figure 10. Summary of common barriers to fossil-fuel subsidy reform and strategies for successful implementation**



Source: IEA (2011).

## 15. Building political support for subsidy reform domestically and internationally

203. Political economy considerations are crucial for successful reform. Windows of opportunity which may enable governments to undertake reform should be seized when they materialise. In some countries, reforms have been driven by the need to respond to a fiscal crisis (e.g. fossil fuel subsidy reform in Indonesia) or environmental disaster (e.g. in the fisheries sector in Canada) while in others they have been part of wider economic reforms (e.g. reform of agricultural subsidies in New Zealand), and in yet others, a convergence of political forces agreeing on the need for change were the major factors in driving energy policy reforms (e.g. Sweden).

204. **Domestically**, in all cases, a major factor in the push for reform of environmentally harmful subsidies has been increased transparency. Transparency can stimulate voter opposition to subsidies and make subsidy reform less politically damaging for governments. In this regard, identifying who benefits from subsidies, and highlighting their relative “bargaining power”, can provide a powerful motivating force for change. Structural impediments and rigidities in the legal and administrative framework should also be addressed. This requires a holistic approach to policy, as such legal impediments may not always be apparent when designing reform packages.

205. Transitional measures may be required when phasing out or reducing subsidies. Such measures involve not only payment or compensation to assist in structural change, but also the provision of information, advice and retraining to affected workers and businesses. The appropriate speed of adjustment will depend on the resilience of the community to change and external pressures, and on the availability of alternative sources of employment and income. However, care needs to be taken to ensure that transitional measures not become entrenched in the expectations of beneficiaries of the measures.

206. It is also important that subsidy reform should be considered within the overall context of the economy. For example, increased competition and the opening up of economies to international forces may reduce the lobbying power of special interest groups and create opportunities for reforming environmentally harmful subsidies. Most importantly, it is the sovereign right of every country to decide whether to keep up or dismantle subsidies as the economic and social circumstances in each country may differ significantly. There is no “one-fit-all” solution. It is a rule of the thumb that countries must decide energy subsidy policy for themselves.

207. Building political support for subsidy reform depends also on the existence of grass-root and citizens’ organisations in a country that can participate in the debate on reforming environmentally-harmful subsidies. Different policy think-tanks have been set up around in different countries to monitor energy subsidies independently from government agencies responsible for policy assessment.

**Box 12. International environmentally-harmful subsidy watchdogs**

A number of NGOs all over the world have started looking closely at and monitoring governments’ energy subsidy schemes that have a particular impact on the environment. Some of the NGOs, playing the role of subsidy watchdogs, are Greenpeace, Friends of the Earth, WWF, IISD-GSI, World Resources Institute, 350.org, Avaaz, Oil Change International, EarthTrack also perform this function.

The Friends of Fossil Fuel Subsidy Reform, in particular, is a group of non-G20 countries that support the reform of inefficient fossil fuel subsidies. Current members include Costa Rica, Denmark, Ethiopia, Finland, New Zealand, Norway, Sweden and Switzerland.

The Friends group was formed in June 2010 to support G20 and APEC leaders’ commitments to phase out inefficient fossil fuel subsidies. The Friends encourage the G20 and APEC to implement their initiative as soon as possible, with maximum ambition and transparency.

The USA-based EarthTrack, which was mentioned several times in this report, is one of the oldest non-governmental institutions that works on energy subsidies. It has served as a model to similar organisations in other countries. Other USA-based non-governmental organisations working on similar issues include the Taxpayers for Common Sense, Corporate Subsidy Watch, Public Citizen.

Source : [http://www.iisd.org/gsi/sites/default/files/sw42\\_feb\\_11.pdf](http://www.iisd.org/gsi/sites/default/files/sw42_feb_11.pdf)

208. The efforts of the non-governmental sector are now being supplemented by a major push at the **international political stage**. The debate on rationalising and phasing-out fossil fuel subsidies has particularly intensified in the context of the climate change negotiations and the G-20 discussions. The call to phase out fossil-fuel consumption subsidies was directed at all nations that subsidise fossil fuels, not only at the G-20 countries themselves, taking into account the specific circumstances of each economy. Similarly, the issue of wasteful energy subsidies has come up in the discussions held at the Asia-Pacific Economic Cooperation (APEC) meetings.<sup>55</sup> In the EU context, the “Roadmap for a resource efficient

<sup>55</sup> APEC is a forum for 21 Pacific Rim countries that seeks to promote free trade and economic cooperation throughout the Asia-Pacific region. Established in 1989 in response to the growing interdependence of

Europe” calls on member states to phase out EHS by 2020, with due regard to the social impact of such reforms, in particular on the poor. As part of this process, the member states should identify the most significant EHS, prepare plans and timetables to phase out EHS, and report on progress by 2012-13. In addition, subsidies are a particularly hot issue in the framework of WTO trade negotiations and are a particular concern for those EECCA countries that have chosen to join the WTO. All these international processes are helping to raise the profile of the environmentally-harmful subsidies in general and energy subsidies in particular on the international agenda.

209. While there is an on-going debate in the OECD and some developing countries, there is, generally, little discussion of the need to reform specific energy subsidy schemes in EECCA. Despite some assessment of the magnitude of energy consumption subsidies (done by the IEA, using the price gap approach) and except for Russia, where a first inventory of subsidies to upstream oil and gas activities has been prepared, comprehensive studies on the identification, quantification and impact measurement of environmentally-harmful subsidies in the EECCA countries are lacking. Therefore, there is a need for a more consistent subsidy analysis in these countries that can support a meaningful policy debate on energy reforms.

## **16. Summary conclusions**

210. Historically, energy subsidy reform has been difficult. There is a general agreement that energy subsidies need to be phased out, coinciding with the implementation of energy efficient strategies. However, experience shows that the political economy of subsidy support is as important as the technical analysis of EHS schemes.

211. Reforming energy subsidies must take account of practical barriers to reform. Energy subsidy reforms are highly politicised and to be successful they need a high-level political support and the concerted efforts of the whole government. Reforming existing energy subsidies calls for a strong political will to take tough decisions that benefit society as a whole.

212. In launching the debate on energy subsidy reforms in the EECCA countries, the discussion needs to be supported by robust analytical work. In organising the work in the region, the following issues need to be taken into account:

- Price-gap approaches have been used to determine the magnitude of subsidies in some EECCA countries (work done by the IEA, IMF). During the first phase of the project, it will be necessary to review the most recent results of price-gap calculations available for the EECCA countries. Since often officially published documents are not of sufficient level of detail, more information behind assumptions, methodologies and data need to be obtained from the institution that has made the calculations.
- The outcomes of price-gap studies can be useful in prioritising sectors/products for further studies in the EECCA countries. Price-gap studies, however, do not allow selecting those support measures where the subsidy impacts on GHG emissions is the most significant.
- The identification of major subsidy schemes is a pre-condition for initiating debates on subsidy reform. An initial inventory of support schemes for oil, gas, coal, electricity and heat needs to be prepared, based on structured in-depth interviews with energy experts and public servants in the

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Asia-Pacific economies and the advent of regional trade blocs in other parts of the world. Of all EECCA countries, only Russia is a member of APEC.

EECCA countries. The OECD matrix and the GSI list of subsidies will be used in developing the questionnaires.

- Decision trees (OECD checklist, Integrated Approach and the World Bank flowchart) are bottom-up analytical frameworks that allow for the assessment of selected subsidy programmes, without the need to make comprehensive inventories of subsidies. An initial screening of subsidies is needed in order to select the subsidy schemes to be considered under a decision tree framework. However, decision trees do not provide a comprehensive picture of existing support policies for the energy sector.
- Measuring the impacts of particular schemes on GHG emissions remains a major analytical challenge. At this stage of the project, an assessment based on the review of open sources and structured interviews with stakeholders (directors of energy companies, energy experts, public servants, scientists, etc.) is preferable, while developing computable models (e.g. CGE) can be postponed. Such an assessment can provide useful information on the likely responses to subsidy removal.
- More informed decision of the implementation of computable models (e.g. a general or partial equilibrium model for impact assessment) can be done once inception phase is completed and sufficient information on data availability and quality exists.

## MAJOR ISSUES IN ANALYSING ENERGY SUBSIDIES IN THE EECCA COUNTRIES

213. The main conclusions and recommendations that have emerged from the review of the existing tools for and approaches to identifying, measuring and evaluating EHS and their current and possible application in the context of the EECCA countries are as follows:

- ***Policy consensus needs to be reached on the subsidy definition which will be used in the analysis of environmentally-damaging energy subsidy schemes.*** Achieving policy consensus on the subsidy definition before actual country analysis is launched will play a decisive role in understanding the conundrum of economic, social and environmental problems related to ill-conceived subsidy schemes. Using internationally-recognised definitions, which have gradually evolved to comprise subsidisation beyond direct cash payments, will be necessary. Capacity and consensus building within the government on what constitutes a subsidy is necessary as a first step towards effective subsidy reform.
- ***A mix of analytical tools is needed to properly guide policy analysis and reform of subsidies.*** Identification and quantification need to be separated from assessing social or environmental impacts of a subsidy programme. It is obvious that there is a need to combine the bottom-up (technical and expert analysis) and top-down approaches (policy analysis): or a type of price-gap or CSE/PSE approach to quantify the size of the subsidy on the one hand and policy advice that will focus on the effects from subsidy (removal), on the other. As no approach is perfect, whichever model is chosen to use for the analysis, its limitations need to be clearly spelled out.
- ***The complexity of subsidy programmes is an important impediment to improved transparency in reporting and measurement of subsidies, disbursed at a national, but also regional and local, level.*** Achieving transparency is complicated by the existence of many mechanisms for transfer of funds, ranging from direct spending programmes to more opaque instruments (such as special taxation rules, credit subsidies, etc.) as well as the large number of institutions involved in providing subsidy support including, among others, ministries responsible for resource extraction, public finance and taxation, economic development, energy, environment, commerce. In addition, the complexity of subsidy measures is often rooted in the multiplicity (and sometimes incompatibility) of policy objectives that such schemes are designed to achieve. Also, the reform process will generally depend on the availability of other policy tools in a country for achieving a specific policy goal. All this makes the assessment of the size and effectiveness of subsidies even more difficult.
- ***Evaluating subsidy effectiveness and efficiency is yet another problem.*** There are different evaluation approaches, including social cost-benefit analysis, macro modelling (through a general equilibrium model), micro modelling (calculating the Net Present Value of the subsidy level) or “soft” evaluation. Each of these approaches has its advantages and disadvantages but they are generally time and resource-consuming. Macro modelling often suffers from this same criticism due to the problems of “no ideal definition – no ideal measurement – no ideal modelling” state of affairs. The “soft” evaluation approach, on the other hand, can be used to encourage public debate on EHS reforms through the provision of systematised information on the existence and size of such subsidies.

- ***Modelling of the impact of the phase out of fossil fuel subsidies, regardless of their nature, makes sense at a national level only if the model is recognised by national experts in the government.*** If this is not the case, the modelling analysis risks to remain an academic exercise, not accounting for the specifics of the local context. Evidence shows that existing economic models in the EECCA countries are often based on poor local data, disregarding the share of grey economy, energy leakages and actual social stratification. In addition, price elasticity of demand for energy also requires much more research, as price elasticities depend on the individual country.
- ***Using public domain data makes the outcomes of analysis less controversial.*** In terms of potential sources of information, national accounts and tax expenditure reports (that cover, for example, corporate and personal income taxes, VAT, excise taxes), official materials of fiscal planning, such as national budget laws, reports on budget execution, clarification notes prepared by Ministries of Finance as part of the budget drafting process, materials of the budget committees of parliaments, tax policy guidelines, tariff and customs policy guidelines could be used. Other sources can include: official subsidy monitoring reports of accounting chambers (auditor generals), academic papers, media reports. Where appropriate, production-sharing agreements may also be worth looking at. As data will be often disaggregated, there is a need for discussion and close communication with experts from the government as well as monitoring media reports.
- ***Existence of alternative technologies.*** One particular issue in subsidy reform is the existence of alternative benign technologies. There is no point to waste “political capital” in launching reforms if benign alternatives are not viable.
- ***Subsidy reform plans need to be developed in order to guide a process that is intrinsically complex.*** Useful insights into how such plans could be developed may be provided by the work within the framework of the EU’s “Roadmap for a resource efficient Europe”, which calls on member states to phase out EHS by 2020, with due regard to the social impact of such reforms, in particular on the poor. As part of this process, the member states should identify the most significant EHS, prepare plans and timetables to phase out EHS, and report on progress by 2013.
- ***The political economy of subsidy support is as important as the technical analysis of EHS schemes.*** It is worth investing time to understand the politics behind energy subsidies, particularly if the government is willing to cooperate. In talking to policy makers it is important to stress the benefits and opportunities from subsidy reforms rather than the negative effects from their phase-out. The key rationale behind subsidy phase out may be saving public money and eliminating marketing distortion (e.g. making energy efficient technologies more efficient) rather than achieving environmental objectives. As with any reform, there may be reform winners and losers. Therefore, designing compensation measures for those negatively affected by the reform should be an integral part of the reform package.

## REFERENCES

- Aldy, J. E. (2011), *Fossil fuel subsidies in developing countries: Economic, energy, and environmental impacts*, Harvard Kennedy School.
- Auty, R. M. (2008), *Resource depletion, oil dependence and Kazakhstan's development prospects*, Lancaster University.
- Bruce, N. (1990), *Measuring industrial subsidies: some conceptual issues*, OECD Economics Department Working papers, No.75, OECD Publishing, Paris.
- Beers, C. van (2011), *World Bank's work on the removal of energy subsidies*, Delft University of Technology.
- Cox, A. (2005), *An Overview of OECD work on environmentally harmful subsidies*, OECD, Paris.
- Dansie, G., M. Lanteigne and I. Overland (2010), *Reducing energy subsidies in China, India and Russia: Dilemmas for decision makers*.
- Dellink, R., et al. (2012), *"The ENV-Linkages model: Applications and directions"*, OECD Internal Launch Seminar, Paris.
- Ellis, J. (2010), *The Effects of Fossil-Fuel Subsidy Reform: A review of modelling and empirical studies, "Untold billions: fossil-fuel subsidies, their impacts and the path to reform"*, IISD-GSI, Geneva.
- European Commission (EC) (2011), *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - Roadmap to a resource efficient Europe*, COM(2011) 571 final, EC, Brussels.
- Fijorek, K. et al. (2010), *Rynek Energii – 12/2010, Prognozowanie cen energii elektrycznej na rynku dnia następnego metodami "data mining"*, Warsaw (in Polish).
- Franz, P. (2005), *Outline of the German case study on subsidy reform experiences on energy*, Federal Ministry for the Environment, Nature Conservation and Nuclear Safety.
- Gerasimchuk, I (2012), *Fossil fuels – At what cost? Government support for upstream oil and gas activities in Russia*. Ivetta Gerasimchuk. WWF-Russia & IISD-GSI, Moscow-Geneva.
- Grassini, M. (2007), *Studi e Note di Economia, "Rowing along the computable general equilibrium modelling mainstream"*, Anno XII, n. 3-2007, Rome.
- Jones, D. and Steenblik, R. (2010), ed., *Subsidy Estimation: A survey of current practice*. <http://www.iisd.org/gsi/subsidy-estimation-survey-current-practice>
- IISD-GSI (2010), *Defining fossil-fuel subsidies for the G-20: Which approach is best?* GSI Policy Brief, Geneva.

IEA (International Energy Agency) (1999), *World Energy Outlook - Looking at energy subsidies: Getting the prices right, 1999 Insights*, IEA, Paris.

IEA (2011), *World Energy Outlook*, IEA, Paris.

IEA, OECD and World Bank (2010), *The Scope of fossil fuel subsidies in 2009 and a roadmap for phasing out fossil-fuel subsidies*.

IEA, OECD, OPEC 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*.

Institute for European Environmental Policy (IEEP), Ecologic, FEEM and IVM (2007), *Reforming environmentally harmful subsidies*. Final report by Valsecchi C., ten Brink P., Fergusson M., Bassi S., Pallemarts, M., Best A., Blobel, D., Berglund, M., Markandya, A., Sgobbi, A., Longo, C., and, Oosterhuis F. for the European Commission's DG Environment, March 2007, Brussels.

IEEP, IVM, Ecologic et al. (2009), *Environmentally harmful subsidies: Identification and assessment*. Final report by Valsecchi C., Bassi S., Best A., Dias Soares C., Kaphengst T., Lewis M., Oosterhuis F., Rogers-Ganter H., ten Brink P., and, Withana S. for the European Commission's DG Environment, November 2009, Brussels.

International Monetary Fund (IMF) (2012), *Petroleum product subsidies: Costly, inequitable, and rising*, IMF Staff Position Note.

Kjellingbro, P. M. and M. Skotte (2005), *Environmentally-harmful subsidies: Linkages between subsidies, the environment and the economy*, Environmental Assessment Institute.

Koplow D. (2009), *Measuring Energy subsidies using the price-gap approach: What does it leave out?*, International Institute for Sustainable Development, Earth Track, Inc.

Koplow, D. (2010), "*Quantifying support to energy – Why is it needed?*", Expert Workshop on Estimating Support, 18-19 November, Earth Track Inc.

Morgan, T. (2007), *Energy subsidies: Their magnitude, how they affect energy investment and greenhouse gas emissions, and prospects for reform*, UNFCCC Secretariat.

OECD (Organisation for Economic Co-operation and Development) (1996). *Subsidies and the Environment: Exploring the Linkages*, OECD, Paris.

OECD (2002), *Subsidy measurement and classification: Developing a common framework*, OECD Workshop on environmentally harmful subsidies, OECD, Paris.

OECD (2005), *Environmentally-harmful subsidies (EHS): Identification and assessment. Challenges for reform*, OECD, Paris.

OECD (2010a), *Background report: An Overview of the OECD ENV-Linkages model*, Jean-Marc Burniaux and Jean Chateau, OECD, Paris.

OECD (2010b), *Macro-economic and environmental impacts of eliminating consumer subsidies to fossil-fuels: OECD modelling work on phasing-out fossil fuel subsidies for a G20 report*, OECD, Paris.

OECD (2010c), *Measuring support to energy*, Version 1.0, OECD, Paris.

- OECD (2010d), *Mitigation potential of removing fossil fuel subsidies: A general equilibrium assessment*, Jean-Marc Burniaux and Jean Chateau, OECD, Paris.
- OECD (2010e), *OECD's Producer Support Estimate and related indicators of agricultural support - Concepts, calculations, interpretation and use (The PSE Manual)*, Trade and Agriculture Directorate, OECD, Paris.
- OECD (2011), *Inventory of estimated budgetary support and tax expenditures for fossil fuels*, OECD, Paris.
- Pieters, J. (2002), *What makes a subsidy environmentally harmful: Developing a checklist based on the conditionality of subsidies*, OECD Workshop on Environmentally Harmful Subsidies, 7-8 November 2002, OECD, Paris.
- Resources for the Future (2010), *Issues of the day 100 commentaries on climate, energy, the environment, transportation and public health*, Resources for the Future, Washington DC.
- Steenblik, R. (n.d.). A subsidy primer. IISD-GSI, Geneva.
- United Nations Development Programme (UNDP) (2012), *Fossil fuel fiscal policies and greenhouse gas emissions in Viet Nam. Subsidies and taxes in Viet Nam's energy sector, and their effects on economic development and income distribution in the context of responding to climate change*, UNDP, Ha Noi.
- UNEP (UN Environmental Programme) (2008), *Reforming energy subsidies opportunities to contribute to the climate change agenda*, UNEP, Division of Technology, Industry and Economics, UNEP, Paris.
- World Bank (2010a), *Phasing out energy subsidies: A decision tree and evidence from case studies*, World Bank, Washington DC.
- World Bank (2010b), *Subsidies in the energy sector: An Overview*, Background paper for the World Bank Group Energy Sector Strategy, July 2010, World Bank, Washington DC.
- WTO (World Trade Organization), *Agreement on Subsidies and Countervailing Measures*, WTO, Geneva.

**ANNEX I. OECD MATRIX OF PUBLIC SUPPORT MEASURES WITH EXAMPLES**

		STATUTORY OF FORMAL INCIDENCE (to whom and what a transfer is first given)								
		Production							Direct consumption	
		Output returns	Enterprise income	Cost of intermediate inputs	Cost of production factors				Unit cost of consumption	Household or enterprise income
					Labour	Land	Capital	Knowledge		
TRANSFER MECHANISM (how a transfer is created)	Direct transfer of funds	Output bounty or deficiency payment	Operating grant	Input-price subsidy	Wage subsidy	Capital grant linked to acquisition of land	Capital grant linked to	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 output	Reduction in social charges (payroll taxes)	Property-tax reduction or exemption	Investment tax credit	Tax credit for private R&D	VAT or exercise-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

## ANNEX II. GSI ILLUSTRATIVE LIST OF SUBSIDY TYPES

Direct transfer or potential direct transfer of funds	Government revenue foregone
<ul style="list-style-type: none"> <li>• Direct payments linked to production volumes or sales</li> <li>• Deficiency payments (the difference between target price and actual price)</li> <li>• Grants for the acquisition of capital or land</li> <li>• Subsidies to intermediate inputs</li> <li>• Wage subsidies to assist individuals in preparing for and maintaining employment (e.g., training)</li> <li>• Government loans: provided at below-market rates, low collateral requirements, lengthy repayment periods or deferred repayments*</li> <li>• Government spending on research and development</li> <li>• Guarantees for loans, security or credit*</li> <li>• Government-provided insurance or indemnification*</li> <li>• Assumptions of occupational health and accident liabilities</li> <li>• Assumption of liabilities for closure and post-closure risks (e.g., site cleanup)</li> <li>• Caps on commercial liability</li> <li>• Government use tax-free bonds to fund private investments</li> <li>• Government expenditure on creating and maintaining stockpiles</li> </ul>	<ul style="list-style-type: none"> <li>• Tax expenditure: reduced tax rates, tax credits, exemptions or deferrals (e.g., on income tax, VAT, excise tax, property tax)</li> <li>• Accelerates depreciation allowances</li> <li>• Reduced royalty payments</li> <li>• Reduces resource rents</li> </ul>
Government-provided or government-purchased goods or services	Income or price support, or relief from normal costs or procedures
<ul style="list-style-type: none"> <li>• Underpricing of government-provided goods or services</li> <li>• Government procurement at above-market rates</li> <li>• Government-provided infrastructure specific to the sector (e.g., private roads, storage facilities)</li> <li>• Access to government-owned natural resources or land</li> <li>• Government transfer of intellectual property rights</li> </ul>	<ul style="list-style-type: none"> <li>• Prices set at below-market rates for consumers (including where there is no financial contribution by government)</li> <li>• Above-market rate prices for producers via government regulations or import barriers (e.g., tariffs)</li> <li>• Mandated feed-in tariffs</li> <li>• Consumption mandates</li> <li>• Export taxes or restrictions</li> <li>• Relief from costs enterprises normally bear in the normal course of business (e.g., labour, environmental, health and safety)</li> <li>• Exemption from government procedures normally followed by enterprises</li> </ul>

\*Government-provided loans, loan guarantees and investment insurance are referred to as “export credits” when granted for exports or foreign investment

Source: IISD-GSI (2010).

### ANNEX III. GENERALISED FRAMEWORK FOR THE PRODUCTION SIDE OF SUBSIDY ACCOUNTS

The Table below shows how a generalised system of subsidy accounts might be constructed on the production side. It is offered as an illustrative example and is not meant to be definitive or comprehensive.

The main purpose served by aggregating detailed data into composite indicators is to provide information that is more readily understandable than in detailed form. And no single indicator can serve equally well all purposes. The different indicators in the Table generate different numbers of subsidy volumes. Which of these indicators will a government use, is a matter of a political choice. At a minimum, however, these indicators need to be applied and calculated in a consistent manner.

	Variable	Units	Hypothetical example	
A	Production volume	tonnes		1 000 000
B	Value of output	USDm**		100
C	Expenditure on intermediate inputs	USDm		45
D	<i>Value added*</i>	USDm		55
E	Assistance to value-adding factors (= 1 + 2 + 3)	USDm		5
	1. Land	USDm	1	
	2. Labour	USDm	2	
	3. Capital	USDm	2	
F	<i>Assisted value added = D + E</i>	USDm		60
G	Assistance to outputs (= 1 + 2)	USDm		15
	1. Market price support	USDm	15	
	2. Payments based on outputs	USDm	0	
H	Assistance intermediate inputs	USDm		4
I	Miscellaneous payments	USDm		1
J	Unassisted value added = F – (G + H + I)	USDm		40
K	General services	USDm		
L	Producer support estimate (PSE) = E + G + H + I	USDm		25
M	Percentage PSE = $(L / ([B - G2] + [L - G1]) \times 100$	%		23
N	Net subsidy equivalent = F - J	USDm		20
O	Effective rate of assistance = $(N / J) \times 100$	%		50
P	Nominal rate of assistance = $(G / [B-G]) \times 100$	%		18

Source: OECD (2002).

Note: \*Value added: In economics, the difference between the sale price and the production cost of a product is the value added per unit. Summing value added per unit over all units sold is total value added. Total value added is equivalent to revenue less outside purchases (of materials and services).

\*\* - "m" – stands for Million.

## ANNEX IV. OUTLINE OF THE ECONOMIC, ENVIRONMENTAL AND SOCIAL IMPACTS OF FOSSIL-FUEL SUBSIDIES

### *Economic impacts*

Subsidies distort prices, fail to reflect the true costs of supply and therefore affect resource allocation decisions, production and consumption. The precise economic impacts of fossil-fuel subsidies are in part related to whether they take the form of: a) producer supports that lower prices for consumers by lowering production costs for producers; b) consumer supports that lower prices for consumers but also reduce returns for producers; or c) price support, which increases revenues for producers but increases prices for consumers.

The main economic impacts of fossil-fuel subsidies are:

- **Subsidies can increase energy consumption and reduce incentives for energy efficiency.** Subsidies that reduce prices for consumers promote higher consumption of energy, and reduce incentives to use energy efficiently. Subsidies that reduce production costs for producers reduce producer incentives to minimise costs and increase efficiency.
- **Subsidies can decrease foreign exchange revenues.** Subsidies that encourage greater consumption reduce export opportunities for fossil-fuel-producing nations and revenues from those lost exports.
- **Subsidies are a drain on government finances** through direct financial transfers from government budgets, government expenditures on infrastructure or research and development or reduced government income from taxation. This can lead to fiscal deficits and debt accumulation.
- **Subsidies can increase countries' dependence on imports.** Subsidies that increase fossil-fuel consumption in non-fossil-fuel-producing countries increase those countries' dependence on imports.
- **Subsidies undermine investment in alternative energy sources and alternative energy technologies.** By increasing consumer demand for fossil fuels, or decreasing production costs for producers, subsidies distort the market and reduce investment in alternative energy sources or alternative energy technologies that are potentially more efficient or less environmentally harmful.
- **Subsidies encourage energy-intensive production at the expense of labour.** Subsidies that lower prices for consumers can result in a concentration of economic activity on energy-intensive production, perhaps at the expense of labour-intensive production.
- **Subsidised fuels are used for purposes for which they were not intended.** By lowering prices for certain fuels, subsidies can result in misuse of those fuels for purposes that were not intended. For example, in India and Indonesia subsidized kerosene intended for household cooking has been used illegally or as a cheap addition to transport fuel.

- **Subsidies can lead to shortages or costly rationing systems.** Subsidies that lower prices for consumers but also lower returns to producers can lead producers to produce less or export more, resulting in shortages or the requirement for rationing systems. Likewise, merely by lowering prices and increasing consumer demand, shortages and rationing can also result.
- **Subsidies can reduce producers' ability to invest in cleaner or more efficient technology.** Subsidies that lower prices for consumers but also lower returns to producers can limit producers' ability to invest in cleaner or more efficient technology, resulting in greater costs of production and greater environmental impacts.
- **Subsidies can promote smuggling and corruption.** Subsidies that lower prices for consumers but also lower returns to producers can encourage smuggling of the fuels to countries where prices are higher. This has occurred in Africa and Indonesia and benefits those selling the fuels while having negative economic impacts for the country as a whole. Corruption is another common consequence when fuels are subsidised and scarce as attempts are made to control distribution channels, in the case of LPG (Liquefied petroleum gas, also known as propane) and kerosene.

#### *Environmental impacts*

Although the impacts of subsidies are complex, and there are cases where subsidies have positive environmental impacts such as reducing pressure on forests by reducing biomass fuel use, there is little doubt that overall, fossil-fuel subsidies result in greater fossil-fuel consumption. Fossil-fuel production and consumption have a wide range of environmental impacts. The main impacts include:

- **Greenhouse gas emissions.** Fossil-fuel consumption is a key contributor to global GHG emissions. Fossil-fuel production and consumption (but primarily consumption) is estimated to contribute 97 per cent of all man-made CO<sub>2</sub> emissions in the OECD countries. Coal was responsible for 42 per cent of global emissions from fuel combustion in 2007 (IEA Online Energy Statistics, 2009).
- **Local air pollution.** Fossil-fuel combustion produces pollutants including sulphur dioxide, nitrogen oxides and particulates, which are released into the atmosphere and can cause long- and short-term health impacts as well as damage to structures, agriculture and natural environments.
- **Water pollution.** Fossil-fuel production and consumption can lead to water pollution through many avenues, including tanker accidents and oil spills, water pollution from runoff and leaching from tailings and coal washeries, and water contamination from flooding of closed mines that eventually contaminates groundwater.
- **Landscape destruction.** Fossil-fuel extraction often contributes to landscape destruction, particularly in the case of coal mining.
- **Depletion of non-renewable fossil-fuel stocks.** Subsidies that accelerate fossil-fuel consumption accelerate this depletion of non-renewable resources.

*Social impacts*

Subsidies to fossil fuels, particularly those that keep down the price of liquid fuels, natural gas or electricity, are often justified in non-OECD countries on the basis that they benefit the poor and reduce the cost of living. There is an argument to be made for subsidies of this kind, particularly with respect to electricity, which is considered key for reducing poverty and indoor air pollution. However, subsidies do not always accomplish this, and may not be the most efficient mechanism for poverty alleviation. Subsidies may be regressive, benefiting middle- and upper-income groups more than lower-income groups. Direct transfers to target groups rather than general subsidies may be more effective in reducing poverty. The main potential social impacts of fossil-fuel subsidies are considered to be:

- **Subsidies may benefit the rich more than the poor, who spend more money on energy and have greater access to energy than the poor.** A 2008 study by the World Bank (“*Climate Change and the World Bank Group: Phase I: An Evaluation of World Bank Win-Win Energy Policy Reforms*”) found that the bottom 40 per cent of the income distribution receive only 15 to 20 per cent of fossil-fuel subsidies. Even when the rate of energy consumption by the poorest quintiles increases as a result of subsidies, the wealthy derive larger absolute benefits from lower energy prices.
- **Subsidies may reduce energy available to the poor** because in an artificially low-price environment, producers may have little incentive to produce or supply more, and a higher percentage of what is produced may be consumed by the rich.
- **Subsidies often do not target types of energy that would be more beneficial to the poor.** Subsidies may favour larger capital-intensive projects, such as dams or power plants, at the expense of local labour-intensive means of providing energy services. Power plant and dam construction can displace or create negative environmental impacts that primarily affect poor communities, while not improving their access to energy.
- **Subsidies may divert government money that could be more effectively directed to social programmes** such as healthcare, free education, food coupons or targeted cash transfers.
- **Fossil-fuel consumption and production produce local emissions that cause many health effects that impact the poor** in particular, due to their more limited choices regarding where they live.

Source: Ellis (2010).

## GLOSSARY

<b>Accelerated depreciation</b>	A provision in a country's tax code that allows businesses to allocate the costs of past expenditures on fixed assets over a shorter accounting period than using straight-line depreciation.
<b>Ad valorem subsidy</b>	A subsidy fixed per unit of output or input value.
<b>Administered or regulated prices</b>	Prices set by the government in order to determine, directly or indirectly, domestic market or producer prices.
<b>APEC</b>	Asia Pacific Economic Cooperation is a forum for 21 Pacific Rim countries that seeks to promote free trade and economic cooperation throughout the Asia-Pacific region. Established in 1989 in response to the growing interdependence of Asia-Pacific economies and the advent of regional trade blocs in other parts of the world. Of all EECCA countries, only Russia is a member of APEC.
<b>Assimilative capacity of the environment</b>	Assimilative capacity refers to the capacity of the environment to absorb a certain amount of emissions, depletion or damage, without suffering (irreversible) degradation.
<b>Average cost of production</b>	Average cost or unit cost is equal to total cost of production divided by the number of goods produced (the output quantity). It is also equal to the sum of average variable costs (total variable costs divided by output quantity) plus average fixed costs (total fixed costs divided by output quantity).
<b>Bond</b>	A bond is a formal contract to repay borrowed money with interest at fixed intervals (semi annual, annual, sometimes monthly). The bond is like a loan or IOU (which stands for "I owe you", an informal document acknowledging debt), the holder of the bond is the lender (creditor), the issuer of the bond is the borrower (debtor), and the coupon is the interest. Bonds provide the borrower with external funds to finance long-term investments, or, in the case of government bonds, to finance current expenditure.
<b>Border tax adjustment</b>	The application of a domestic tax on imported goods while exempting exported goods from the tax in an effort to make the exported goods' price competitive both nationally and internationally.
<b>Bounty</b>	A direct payment linked to the volume of production or sales (e.g. in the USA, companies producing liquid biofuels receive direct subsidies for every gallon of ethanol they produce).
<b>Cap on commercial liability</b>	Commercial liability is a form of liability insurance. In many countries, liability insurance is a compulsory form of insurance for those at risk of being sued by third parties for negligence (e.g. injury or property damage). A company owning an industrial facility, for instance, may buy pollution insurance to cover lawsuits resulting from environmental accidents. In legislation, liability may be capped (limited) in certain proportion of the damage incurred. Standard general liability policies typically contain some general aggregate liability limits. These general aggregate limits place caps on the policy's obligation to pay claims.
<b>Capital grant</b>	A capital grant provides support to private sector entities for the acquisition of long-term fixed assets (e.g. the purchase of property, the construction of a facility, expansion of a facility or purchase of equipment).
<b>Combined-cycle gas turbines (CCGT)</b>	Combined Cycle Gas Turbines are a form of highly efficient energy generation technology that combines a gas-fired turbine with a steam turbine. The design uses a gas turbine to create electricity and then captures the resulting waste heat to create steam, which in turn drives a steam turbine significantly increasing the system's power output without any increase in fuel. The technology is typically powered using natural gas, but it can also be fuelled using coal, biomass and even solar power as part of solar combined cycle plants.

<b>Consumer support estimate (CSE)</b>	The CSE measures the annual monetary value of transfers from taxpayers to consumers arising from policy measures that support consumers.
<b>Countervailing measures</b>	Actions taken by the importing country, usually in the form of increased duties, to offset subsidies given to producers or exporters in the exporting country.
<b>Credit guarantee linked to capital</b>	Commitment by a government to reimburse a lender if the borrower fails to repay a loan. The lender pays a guarantee fee.
<b>Credit market</b>	A marketplace for the exchange of debt securities and short-term commercial paper. Companies and the government are able to raise funds by allowing investors to purchase these debt securities.
<b>Cross-subsidy</b>	A cross subsidy is a market transfer induced by discriminatory pricing practices within the scope of the same enterprise or agency. Typically, a cross-subsidy exists when a government-owned enterprise, such as a public utility, uses revenues collected in one market segment to reduce prices charged for goods in another.
<b>Debt forgiveness / debt relief / debt concession</b>	Any of these implies the partial or total forgiveness of debt, or the slowing or stopping of debt growth, owed by individuals, corporations, or nations.
<b>Debt rescheduling</b>	A practice that involves revision of structuring the terms of an existing loan in order to extend the repayment period.
<b>Debt restructuring</b>	Debt restructuring is a process that allows a private or public company – or a sovereign entity – facing cash flow problems and financial distress, to reduce and renegotiate its delinquent debts in order to improve or restore liquidity and rehabilitate so that it can continue its operations.
<b>Deficiency payment</b>	A cash payment to producers linked to prices. The deficiency payment makes up the difference between a target (administered) price for a good (typically an agricultural commodity) and the actual price received in the market.
<b>Depreciation</b>	A noncash expense that reduces the value of an asset as a result of wear and tear, age, or obsolescence. Most assets lose their value over time (in other words, they depreciate), and must be replaced once the end of their useful life is reached. There are several accounting methods that are used in order to write off an asset's depreciation cost over the period of its useful life. Because it is a non-cash expense, depreciation lowers the company's reported earnings while increasing free cash flow. Several standard methods of computing depreciation expense (specified in accounting and/or tax rules in a country) may be used, including fixed percentage, straight line, and declining balance methods.
<b>Direct subsidy</b>	A subsidy provided through targeted cash based payments, such as loans or tax preferences.
<b>Duty (= customs duty)</b>	A tax imposed on imports or exports at the border. Duties can be " <i>ad valorem</i> " (applied as a percentage of value), "specific" (applied on a quantitative basis, such as dollars per ton), or "compound" (a combination of both).
<b>Electricity generation</b>	Defined as the total amount of electricity generated by power only or combined heat and power plants including generation required for own use. This is also referred to as gross generation.
<b>Excise tax</b>	A special tax levied on a specific kind of goods, typically alcoholic beverages, tobacco and fuels; it may be imposed at any stage of production or distribution and is usually assessed by reference to the weight or strength or quantity of the product. Excises are distinguished from customs duties, which are taxes on importation. Excises are inland taxes, whereas customs duties are border taxes. An excise is considered an indirect tax, meaning that the producer or seller who pays the tax to the government is expected to try to recover the tax by raising the price paid by the buyer (that is, to shift or pass on the tax). Excises are typically imposed in addition to another indirect tax such as a sales tax or value added tax (VAT) to raise additional revenue to the budget since demand for excisable goods is inelastic with respect to the price.

<b>Export / import restriction/quota</b>	Export/import restrictions are limitations on the quantity of goods exported to/imported into a specific country or countries by a government. A quota set under an international commodity agreement that determines the volume that a producing country can sell abroad. Export quotas may also be set by governments on domestic producers of commodities or goods to combat shortages or high prices in domestic markets.
<b>Export / import tariff</b>	Tariffs are a tax or duty levied upon goods exported from or imported into a country or customs. Tariffs raise the overall prices of goods limiting their production and sale. Governments use tariffs to create economic barriers to trade and as a form of protectionism. Export tariffs raise the price for domestic companies to export their goods. Because they are perceived to hurt domestic business, export tariffs tend to be very unpopular. Import tariffs raise the price for foreign companies to import their goods.
<b>Export subsidy</b>	Any form of government payment or other benefit provided to domestic producers of goods destined for sale in foreign markets. Examples include preferential government financing, income tax holidays, and rebates of direct taxes on exported products. Export subsidies are thought to distort significantly normal trading patterns.
<b>Externalities</b>	Spillover benefits or costs arising from an economic activity that are not taken into account by producers, resulting in levels of production that are inappropriate from the standpoint of the economy as a whole. Negative externalities (sometimes called "diseconomies") imply overproduction unless the activity is appropriately taxed or otherwise constrained by governmental authorities. Unchecked pollution by manufacturers is a commonly cited example of negative externalities.
<b>Feed-in tariff</b>	A feed-in tariff is a policy mechanism designed to accelerate investment in renewable energy technologies. It achieves this by offering long-term contracts to renewable energy producers, typically based on the cost of generation of each technology. Feed-in tariffs often include "tariff degression", a mechanism according to which the price (or tariff) ratchets down over time. This is done in order to track and encourage technological cost reductions. The goal of feed-in tariffs is to offer cost-based compensation to renewable energy producers, providing the price certainty and long-term contracts that help finance renewable energy investments.
<b>Fossil fuel</b>	A fuel derived from the remains of ancient plant and animal life. Fossil fuels include peat, lignite, bituminous and sub-bituminous coal, petroleum (derived from conventional geological formations, oil sands or oil shale), and natural gas (derived from conventional geological formations, coal seams, natural-gas shales, or methane clathrate).
<b>G-20</b>	The Group of Twenty is an informal group of finance ministers and central bank governors from 19 major economies: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Korea, Mexico, the Russian Federation, Saudi Arabia, South Africa, Turkey, the United Kingdom, the United States and the European Union, with representatives of the International Monetary Fund and the World Bank.
<b>Gas</b>	Gas includes natural gas (both associated and non-associated with petroleum deposits, but excluding natural gas liquids) and gas-works gas.
<b>General agreement on tariffs and trade (GATT)</b>	GATT is a multilateral agreement regulating international trade. According to its preamble, its purpose is the "substantial reduction of tariffs and other trade barriers and the elimination of preferences, on a reciprocal and mutually advantageous basis." GATT was signed in 1947 and lasted until 1993, when it was replaced by the WTO in 1995. The original GATT text (1947) is still in effect under the WTO framework, subject to the modifications of GATT 1994.
<b>General services support estimate (GSSE)</b>	The GSSE measures the value of transfers provided through policies that support energy producers or consumers collectively rather than as individuals. Possible measures targeted at general services include support for research, development, training, inspection, marketing and promotion in the sector.

<b>Government buffer stock</b>	Buffer stock scheme (commonly implemented as intervention storage) is an attempt by the government to use commodity storage for the purposes of stabilising prices in an entire economy or, more commonly, an individual (commodity) market. Specifically, commodities are bought when there is a surplus in the economy, stored, and are then sold from these stores when there are economic shortages in the economy. Their usefulness is debated by economists.
<b>Grant</b>	A grant refers to a time-limited payment, either in connection with a specific investment, or to enable an individual, company or organisation to cover some or all of its general costs (operating grant), investment costs (capital grant) or costs of undertaking a specific activity, such as research.
<b>Heat energy</b>	Heat is obtained from fuel combustion, nuclear reactors, geothermal reservoirs, capture of sunlight, exothermic chemical processes and heat pumps which can extract it from ambient air and liquids. It may be used for heating or cooling or converted into mechanical energy for transport vehicles or electricity generation. Commercial heat sold is reported under total final consumption with the fuel inputs allocated under power generation.
<b>Indirect subsidy</b>	A subsidy received indirectly by a recipient in the form of a higher market price for its output or lower market price charged for input goods and services purchased from an upstream industry that is able to discount its prices because of the subsidies it itself receives.
<b>Input subsidies</b>	These may be implemented in a variety of ways, all of which have the essential effect of reducing the unit cost faced by producers in their use of intermediate inputs. They allow producers to produce more with a given amount of financial resources than would be the case without such subsidies.
<b>Intellectual property rights (IPRs)</b>	IPRs refer to the general term for the assignment of property rights through patents, copyrights and trademarks. These property rights allow the holder to exercise a monopoly on the use of the item for a specified period.
<b>Interest rate subsidy</b>	An interest rate subsidy is a special case of a direct grant. The interest rate subsidy is used to reduce the effective interest rate on a loan. Its value may be stipulated as a fixed amount (e.g. as a percentage of an investment or as an absolute amount) or more typically as the difference between total interest payments over the life of a loan at prevailing commercial interest rates minus interest payments for a lower subsidised rate. In some cases, the interest rate subsidy is pegged to a particular target interest rate (e.g., 5% or 10%) or specified as a percentage reduction, such as 2% or 5% below the commercial rate.
<b>Investment tax credit</b>	Tax incentive that permits companies or individuals to deduct a specified percentage of certain investment costs from their tax liability in addition to the normal allowances for depreciation. Investment credits are similar to investment allowances, which permit investors or businesses to deduct a specified percentage of certain capital costs from taxable income. Both investment credits and investment allowances differ from accelerated depreciation by offering a percentage deduction at the time an asset is purchased. In effect, the credits are subsidies for investment.
<b>Life-line electricity rate</b>	The lifeline rate is a subsidised electricity charge given to low-income residential power customers who are not able to pay the full cost of electricity. Lifeline rates are targeted subsidies based on the consumption level of households, i.e. subsidised rates for a first block of consumption, which is enough to cover basic needs. Anything above would be charged at a commercial rate, i.e. based on the marginal cost of service provision. The appeal of the lifeline rate is that it will provide for the basic needs of low-income customers at affordable prices and will encourage conservation of electric power among all customers.
<b>Loan guarantee</b>	A loan guarantee is a mechanism by which a third party assumes a legal responsibility to compensate a lender if the borrower defaults on a loan. Theoretically, loan guarantees can be provided by any legal entity with the necessary financial resources

	deemed acceptable to the lender. Depending on the credit risk associated with the proposed loan, the guarantor may be required to reserve or hold only a portion of the loan amount.
<b>Low-carbon technologies</b>	Refers to technologies that produce low- or zero- greenhouse-gas emissions while operating. In the power sector this includes fossil-fuel plants fitted with carbon capture and storage, nuclear plants and renewable-based generation technologies.
<b>Marginal cost</b>	Marginal cost is the change in total cost that arises when the quantity produced changes by one unit.
<b>Marginal revenue</b>	Marginal revenue is the additional revenue that will be generated by increasing product sales by 1 unit.
<b>Market price support</b>	Market price support is an indicator of the monetary value of gross transfers from consumers and taxpayers to energy producers arising from policy measures creating a gap between domestic producer prices and reference (world) prices of a specific energy commodity, measured at the mine-mouth or well-head.
<b>Means-tested (grant)</b>	A means test is a determination of whether an individual or family is eligible for help from the government (as in "welfare" programmes which make direct transfer payments to individuals to combat poverty).
<b>Monopoly and monopsony</b>	Monopoly is referred to a market condition when there is only one producer in a particular industry and the consumers really have no option but to buy his products or service. This is an ideal condition for the producer as he can dictate the terms and set the prices. The opposite condition is Monopsony where there are many sellers but a single buyer which is also an imperfect market condition (as in the defence industry where the government may be the only buyer of certain products or services).
<b>Non-tariff barriers (NTBs)</b>	NTBs include all the rules, regulations and bureaucratic delays that help in keeping foreign goods out of the domestic markets. There are different types of NTBs, such as: quotas, embargos, import licensing systems, sanitary regulations, testing and certification of the products, prohibitions, etc.
<b>Oil</b>	A collective term that refers to crude oil, condensates, natural gas liquids, refinery feedstocks and additives, other hydrocarbons (including emulsified oils, synthetic crude oil, mineral oils extracted from bituminous minerals such as oil shale, bituminous sand) and petroleum products (refinery gas, ethane, liquefied petroleum gas, aviation gasoline, motor gasoline, jet fuels, kerosene, gas or diesel oil, heavy fuel oil, naphtha, white spirit, lubricants, bitumen, paraffin waxes and petroleum coke)
<b>Opportunity cost</b>	The cost of an alternative that must be foregone in order to pursue a certain action. Put another way, the benefits one could have received by taking an alternative action.
<b>Price control</b>	Price controls are governmental restrictions on the prices that can be charged for goods and services in a market. The intent behind implementing such controls can stem from the desire to maintain affordability of staple foods and goods, to prevent overpricing goods during shortages, and to slow inflation, or, alternatively, to insure a minimum income for providers of certain goods. There are two primary forms of price control, a <i>price ceiling</i> , the maximum price that can be charged, and a <i>price floor</i> , the minimum price that can be charged.
<b>Price elasticity of demand</b>	Price elasticity of demand is a measure used to show the responsiveness, or elasticity, of the quantity demanded of a good or service to a change in its price. More precisely, it gives the percentage change in quantity demanded in response to a one percent change in price (holding constant all the other determinants of demand, such as income).
<b>Price elasticity of supply</b>	Price elasticity of supply is a measure used to show the responsiveness, or elasticity, of the quantity supplied of a good or service to a change in its price.
<b>Producer support estimate (PSE)</b>	The PSE is an OECD indicator that measures the annual monetary value of gross transfers from consumers and taxpayers to producers, measured at the producer property, arising from policy measures that support producers by creating a gap between domestic market prices and border prices of the specific commodities.

<b>Quasi-fiscal instruments</b>	Quasi-fiscal instruments refer to implicit subsidies to the utilities sector which are not accounted for in the budget as government expenditures.
<b>Quota</b>	A quota is a limit on the number of units that can be imported or the market share that can be held by foreign producers. Deliberate slow processing of import permits under a quota system acts as a further barrier to trade.
<b>Rebate</b>	A rebate is an amount paid by way of reduction, return, or refund on what has already been paid or contributed. It is a type of sales promotion marketers use primarily as incentives or supplements to product sales.
<b>Reference price</b>	For price-gap estimate, the reference price is most often defined as the price that would prevail in an undistorted market in the absence of subsidies. For traded forms of energy, such as oil products, the reference price corresponds to the export or import border price (depending on whether the country is an exporter or importer) plus internal distribution. For non-traded energy, such as electricity, the reference price is the estimated long run marginal cost. The reference price is used in calculating the price gap.
<b>Regressive / progressive tax</b>	A regressive tax is a tax imposed in such a manner that the tax rate decreases as the amount subject to taxation increases. A progressive tax is a tax by which the tax rate increases as the taxable base amount increases.
<b>Rent seeking</b>	Rent-seeking is an attempt to obtain economic rent by manipulating the social or political environment in which economic activities occur, rather than by creating new wealth, for example, spending money on political lobbying in order to be given a share of wealth that has already been created. If profit-seeking is the creation of wealth, rent-seeking is the use of social institutions such as the power of government to redistribute wealth among different groups without creating new wealth. An example of rent-seeking is when a company lobbies the government for loan subsidies, grants or tariff protection. These activities do not create any benefit for society, they just redistribute resources from the taxpayers to the special-interest group.
<b>Resource rent</b>	Rent is a surplus value after all costs and normal returns have been accounted for, i.e. the difference between the price at which an output from a resource can be sold and its respective extraction and production costs, including normal return. This concept is usually termed economic rent but when referring to rent in natural resources such as minerals, it is commonly called resource rent. It can also be conceptualised as abnormal or supernormal profit. In practice, identifying and measuring (or collecting) resource rent is not straightforward. At any point in time, rent depends on the properties of individual natural resource sites, availability of information, market conditions, technology and the system of property rights used to govern access to and management of resources.
<b>Royalty</b>	Regular payments made by the lessees of subsoil assets to the owners of the assets. The royalty is similar to a resource rent tax which is levied on the "super profits" obtained from the use of the asset (e.g. mineral resources). Royalties are typically agreed upon as a percentage of gross or net revenues derived from the use of an asset or a fixed price per unit sold of an item of such asset.
<b>Specific subsidy</b>	A subsidy fixed per unit of output or per unit of input into an activity.
<b>Spot market</b>	A spot market is a public financial market in which financial instruments or commodities are traded for immediate delivery. It contrasts with a futures market in which delivery is done at a later date.
<b>Tariff</b>	A tariff is a tax imposed on a good imported into a country. A tariff may be specific, when it is levied as a fixed sum per unit of the imported good, or <i>ad valorem</i> , when it is applied at a percentage rate with reference to the value of the import.
<b>Tax break</b>	Tax break is a slang term referring to any item which reduces tax, including any tax exemption, tax deduction, or tax credit.
<b>Tax credit</b>	A tax credit is a sum deducted from the total amount a taxpayer owes to the state. A tax credit may be granted for various types of taxes, such as an income tax, property tax, or VAT.

<b>Tax deferral</b>	Tax deferral refers to instances where a taxpayer can delay paying taxes to some future period. In theory, the net taxes paid should be the same. Taxes can sometimes be deferred indefinitely, or may be taxed at a lower rate in the future, particularly for deferral of income taxes. Corporations (or other enterprises) may often be allowed to defer taxes, for example, by using accelerated depreciation.
<b>Tax exemption</b>	Tax exemption occurs when a company is allowed not to pay a certain tax thus resulting in a lower tax burden for the company.
<b>Tax expenditure</b>	A tax expenditure programme is government spending through the tax code. Tax expenditures alter the horizontal and vertical equity of the basic tax system by allowing exemptions, deductions, tax rate reductions, credits or deferrals to selected groups or specific activities that reduce the amount of tax that would otherwise be payable (e.g. on income tax, VAT, excise tax, property tax).
<b>Tax holidays</b>	A tax holiday is a temporary reduction or elimination of a tax. It is similar to tax abatements or tax reductions. Governments usually create tax holidays as incentives for business investment. In developing countries, governments sometimes reduce or eliminate corporate taxes for the purpose of attracting Foreign Direct Investment or stimulating growth in selected industries.
<b>Tax relief</b>	Tax relief refers to tax breaks and write-offs that reduce the amount of tax due.
<b>Total support estimate (TSE)</b>	The TSE gives the annual monetary value of all gross transfers from taxpayers and consumers arising from policy measures that support the energy sector, net of associated budgetary receipts, regardless of their objectives and impacts on production and income, or consumption of energy products.
<b>Upstream industry</b>	The upstream oil sector is a term commonly used to refer to the searching for and the recovery and production of crude oil and natural gas. The upstream oil sector is also known as the exploration and production (E&P) sector.
<b>Value added tax (VAT)</b>	A VAT is a form of consumption tax. From the perspective of the buyer, it is a tax on the purchase price. From that of the seller, it is a tax only on the value added to a product, material, or service. The VAT is assessed on increments in the value of a product from the raw-material stage through the production process to final sale. At each stage, the tax is levied on the amount by which inputs purchased from the preceding stage have been augmented in value. The final sale price will incorporate all of the VAT payments made along the production chain.
<b>Wage subsidy</b>	A direct payment by the government used to assist individuals to prepare for, obtain and maintain employment. Many countries provide grants in order to encourage people who are out of work to undergo training in new skills, or to relocate.