

ENERGY SUBSIDIES

LESSONS LEARNED IN ASSESSING THEIR
IMPACT AND DESIGNING POLICY REFORMS



EDITED BY
ANJA VON MOLTKE,
COLIN McKEE
AND
TREVOR MORGAN

WITH A FOREWORD BY
KLAUS TÖPFER

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and Designing Policy Reforms**

Edited by Anja von Moltke, Colin McKee and Trevor Morgan



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Whereas the compilation of papers presented in this study addresses a number of important issues related to energy subsidies and their reform that arise in a variety of countries and regions, it does not strive for a common or comprehensive approach. Furthermore, the views expressed in the following chapters are those of the authors and do not necessarily reflect those of UNEP. The principal authors are as follows:

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Foreword

The need to reform energy subsidies was one of the pressing issues highlighted at the World Summit on Sustainable Development held in Johannesburg in September 2002. Many types of subsidy, especially those that encourage the production and use of fossil fuel, and other non-renewable forms of energy, are harmful to the environment. They can also have high financial and economic costs, and often bring only few benefits to the people for whom they are intended.

Removing, reducing or restructuring such energy subsidies is helpful for the environment and the economy at the same time. Potential social costs in terms of employment in the conventional energy industry or reduced access to energy could be addressed by redirecting the money formerly spent on subsidies to income support, health, environment, education or regional development programmes.

Of course, subsidies can have certain positive consequences, particularly where they are aimed at encouraging more sustainable energy production and use. Temporary support for renewable energy and energy-efficient technologies to overcome market barriers, and measures to improve poor or rural households' access to modern, commercial forms of energy, for instance, could be positive measures in support of sustainable development.

I hope that this book will be successful in raising awareness of the actual and potential impacts of energy subsidies and in providing guidance to policy-makers on how to design and implement energy subsidy reforms. It provides methodologies for analysing the impact of subsidies and their reform and reviews experiences with energy subsidies in a number of countries and regions. Drawing on these case studies, it analyses the lessons learned as well as the policy implications, and provides guidance on how to overcome resistance to reform.

A handwritten signature in black ink, appearing to read 'Klaus Töpfer', with a long horizontal line extending to the right.

*Klaus Töpfer
Executive Director
United Nations Environment Programme*

The United Nations Environment Programme

The United Nations Environment Programme (UNEP) is the overall co-ordinating environmental organisation of the United Nations system. Its mission is to provide leadership and encourage partnerships in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations. In accordance with its mandate, UNEP works to observe, monitor and assess the state of the global environment, and improve our scientific understanding of how environmental change occurs, and, in turn, how such changes can be managed by action-oriented national policies and international agreements. UNEP's capacity-building work thus centres on helping countries strengthen environmental management in diverse areas including freshwater and land resource management, the conservation and sustainable use of biodiversity, marine and coastal ecosystem management, and cleaner industrial production and eco-efficiency, among many others. UNEP, which is headquartered in Nairobi, marked its first 30 years of service in 2002. During this time, in partnership with a global array of collaborating organisations, UNEP has achieved major advances in the development of international environmental policy and law, environmental monitoring and assessment, and our understanding of the science of global change. This work has, and continues to support, successful development and implementation of the world's major environmental conventions. In parallel, UNEP administers several multilateral environmental agreements including the Vienna Convention's Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (SBC), the Convention on Prior Informed Consent procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention, PIC) and, most recently, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity as well as the Stockholm Convention on Persistent Organic Pollutants (POPs).

Division of Technology, Industry and Economics

The mission of the Division of Technology, Industry and Economics (DTIE) is to encourage decision-makers in governments, industry and business to develop and adopt policies, strategies and practices that are cleaner and safer, use natural resources more efficiently and reduce pollution risks to both human beings and the environment. The approach of DTIE is to raise awareness by fostering international consensus on policies, codes of practice and economic instruments through capacity-building and information exchange and by means of pilot projects.

Economics and Trade Branch

The Economics and Trade Branch (ETB) is one of the Branches of the Division of Technology, Industry and Economics (DTIE). The work programme of the Branch consists of three main components: economics, trade and financial services. Its mission is to enhance the capacities of countries, particularly developing countries and countries with economies in transition, to integrate environmental considerations in development planning and macroeconomic policies, including trade policies. UNEP's mission in the field of environmental economics is to promote the internalisation of environmental costs and enhance the use of economic instruments for environmental policy, at national, regional and international levels, including in the specific context of multilateral environmental agreements.

Executive summary

In principle, any measure that keeps prices for energy consumers below market levels, or for energy producers above market levels, or that reduces costs for consumers or producers may be considered a subsidy. An energy subsidy can take several different forms. Some subsidies can have a direct impact on price. These include grants, tax reductions and exemptions or price controls. Others affect prices or costs indirectly, such as regulations that skew the market in favour of a particular fuel, government-sponsored technology, or research and development (R&D).

Energy subsidies are widespread, but they vary greatly in importance and type according to the fuel and country. In the OECD, most energy subsidies are still concentrated on the production of fossil fuels and nuclear power, although the amount of these subsidies appears to have declined in recent years. In many European countries, subsidies to oil are often offset by special taxes and levies intended mainly to raise money for the national treasury. Remaining subsidies are aimed at protecting local industries from competition from imports for reasons of regional employment or energy-supply security, or both. The coal industry still benefits from large subsidies in a small number of countries, notably Germany, although these subsidies are being reduced gradually in most cases. Subsidies in support of transport projects that facilitate road, rail and water transit can also be substantial with direct benefit to the oil industry as they drive up the demand for oil products. They are not, however, considered in this report.

At the same time, subsidies to renewables and energy-efficient end-use technologies are growing in response to environmental concerns, particularly climate change and local pollution. In some cases, governments subsidise these technologies to enhance access to electricity in remote areas, to diversify the fuel mix or to promote decentralised generation. Certain countries are also seeking to obtain an early lead in the international market for such technologies. The most common forms of this type of subsidy are favourable tax treatment, grants and soft loans, regulations that favour a particular technology and R&D funding.

Energy subsidies in developing countries and countries with economies in transition considered in this report are generally much larger net of taxes than in

OECD countries, and take markedly different forms. The majority of them are aimed at consumers. Government price controls, which hold prices below the full economic cost of supply, remain the most widespread means of providing subsidies. They are most common for electricity, but are still important in some countries for oil products, coal and gas. The extent of under-pricing is generally bigger in countries where the energy sector is state-owned. State companies are usually treated as public-service entities and are not required to maximise profits. Energy subsidies are especially pervasive in energy-producing countries such as Iran and Indonesia, where the prices of almost every form of commercial energy are well below competitive market levels. India has taken important steps to raise oil and coal prices to economic levels in recent years, but massive electricity subsidies remain.

Economic theory says that social welfare is maximised when the price of each good and service is freely determined by the interaction of buyers and sellers in open, competitive markets. In practice, however, free markets in energy services left to their own devices do not work perfectly. In particular, they do not take account of any environmental and social benefits and costs that might be associated with certain types of energy activity. Barriers to market entry—for example, for demand-side technologies—may also cause markets to fail. So it can be argued that there exists a justification for governments to intervene in energy markets in pursuit of environmental and social objectives.

Subsidies can be justified if overall social welfare is increased. This situation occurs when the social gain or environmental improvement exceeds the economic cost. But experience in the countries analysed in this report provides evidence that, in many instances, the net effects of subsidies are negative. In other words, overall social welfare would be higher without subsidies. This may be the case if the rationale for the subsidy is invalid: for example, because too much emphasis is put on a particular policy goal to the detriment of others. The way in which the subsidy is applied may also be ineffective. Even where the net benefits are positive, energy subsidies may not be the most efficient way of achieving policy goals. Table 1 summarises evidence of the kinds of economic, environmental and social effects from the country case studies in this report.

The country case studies demonstrate that the economic costs of energy subsidies can be significant. They can place a heavy burden on government finances, weaken the foreign trade balance and stunt the potential of economies. These costs are especially large in Indonesia and Iran, where energy is very heavily subsidised. Depending on how they work, they can also undermine private and public investment in the energy sector, impeding energy conservation and the expansion of distribution networks. Electricity subsidies in India, for example, by undermining the financial health of the state electricity boards, undermine investment and the quality of electricity service. Subsidies to specific technologies can also hinder the development of competing technologies that might be more economic in the longer term. In other words, subsidies can ‘lock in’ inappropriate technologies. And, very often, it is more affluent socioeconomic classes that end up with the largest share of subsidies intended for the poor.

Many energy subsidy schemes are also harmful for the environment. Subsidies that encourage the production and use of fossil fuels inevitably have some harmful

<i>Country/region</i>	<i>Types of subsidy assessed</i>	<i>Economic effects</i>	<i>Environmental effects</i>	<i>Social effects</i>
OECD	All types	Studies show that removing fossil fuel subsidies would boost trade and economic growth.	Since most subsidies go to fossil fuels, removing them would reduce noxious and CO ₂ emissions.	Significant short-term distributional effects, mainly due to impact on employment and household spending on energy.
Czech and Slovak Republics	All types	Subsidies have held back economic restructuring and hindered innovation, resulting in high energy intensity and low energy efficiency.	Have exacerbated the harmful environmental effects of energy supply and consumption, including local and regional air pollution and CO ₂ emissions.	No detailed studies of social effects have been carried out even though household income support is primary reason for subsidising energy.
Russia	District heat	Large consumer subsidies, together with lack of metering and payment problems, cause waste and undermine investment and efficiency.	By encouraging over-consumption, underpricing contributes to pollution and greenhouse gas emissions.	Heat is a vital service to most households. But savings from subsidy removal can finance welfare payments to the poor and improved metering and billing.
India	Electricity	Subsidies encourage waste and hold back investment in the power sector—a major constraint on economic development. Removing subsidies would trim demand in the long run by 34%.	Removing electricity subsidies alone would cut CO ₂ emissions by 99 million tonnes, equivalent to a third of current power-sector emissions.	Subsidy removal would raise cost of service to households, but would improve quality of service and enhance utilities' ability to extend and expand capacity.
Indonesia	All types	Net economic cost of subsidies to kerosene, diesel, gasoline and heavy fuel oil amounted to \$4 billion in 2001.	Subsidies exacerbate pollution, especially particulates and lead.	Reducing subsidies would free up resources to support the poor in more effective ways.
Korea	All types	Coal subsidies of around \$500 million per year and large cross-subsidies in electricity and gas, together with the tax system, distort energy-use patterns.	Subsidies to coal and to industrial users of electricity and gas encourage over-consumption of fossil fuels and consequently boost emissions.	Removal of coal subsidies would have serious economic and social consequences for mining communities.
Iran	All types	Subsidies cause inefficient energy use, are a major burden on public finances and have resulted in poor energy-sector performance.	Excessive energy use has aggravated local and regional pollution, a major public health issue.	Mainly benefit higher-income groups, which consume larger amounts of subsidised energy. But eliminating subsidies would have a dramatic impact on household budgets.

Table 1 Summary of findings of country case studies: main effects
(continued opposite)

<i>Country/region</i>	<i>Types of subsidy assessed</i>	<i>Economic effects</i>	<i>Environmental effects</i>	<i>Social effects</i>
Senegal	LPG	Subsidies have successfully stimulated LPG use, bringing some economic benefits but at a significant financial cost.	Growth in LPG use has resulted in savings of about 70,000 tonnes of fuelwood and 90,000 tonnes of charcoal per year, relieving deforestation pressures and reducing pollution.	Subsidies have improved household comfort standards and safety, and have enhanced incomes.
Chile	Oil and coal	The elimination of coal subsidies in 1995 was economically beneficial. Removing remaining oil subsidies would incur short-term economic costs.	The environment clearly benefits from subsidies reform in both cases through large reductions in CO ₂ , particulate and CO ₂ emissions.	Removing oil subsidies completely would have a slightly larger negative impact on richer household incomes.

Table 1 (continued)

environmental effects. Consumer subsidies that lower the price paid for those fuels or the cost of using them almost always result in higher consumption levels. This can lead to higher emissions of noxious and greenhouse gases as well as other forms of environmental damage, such as water contamination and spoiling of the landscape. Recent international legal frameworks, such as the 1997 Kyoto Protocol, explicitly require a reduction of subsidies that encourage greenhouse gas emissions. In many developing countries, such as Iran, India and Indonesia, the more pressing environmental cost of subsidies relates to the health impacts of local pollution.

But the overall impact of fossil fuel and other energy subsidies on the environment is not always negative. For example, encouraging the household use of oil products can reduce pressure on forests in poor rural areas of developing countries otherwise dependent on firewood. Subsidies to oil products and electricity in poor countries can also reduce indoor air pollution, if they encourage a shift away from traditional biomass fuels, such as wood, straw, crop residues and dung. Similarly, the environmental effects of subsidies to nuclear power and renewable energy sources are mixed. By reducing the use of fossil fuels, they would normally lead to lower airborne emissions. But nuclear power production results in radioactive waste and the small but nonetheless real risk of contamination from accidental releases of radioactive substances. Some types of renewable may have adverse environmental consequences, too, such as the disturbance to regional ecosystems caused by dams. The production of biofuels, subsidised by several OECD countries, can also be harmful for the environment, since they usually result in greater use of mineral fertilisers and pesticides. Nevertheless, subsidies to other forms of energy such as wind and solar can often have positive environmental impacts.

Evidence from the case studies in this report of the net environmental effects of introducing or removing energy subsidies is generally qualitative. This reflects the immense practical difficulties in estimating quantitatively the different effects,

expressing them in consistent monetary terms and aggregating them. Nonetheless, partial analyses suggest that there is considerable scope in some countries for reducing environmental degradation by eliminating energy subsidies. In India, for instance, carbon dioxide (CO₂) emissions could be cut by around 100 million tonnes a year—equivalent to more than 10% of the country's total emissions—by removing electricity subsidies. Similarly, the removal of oil subsidies in Chile could lower sulphur dioxide (SO₂), nitrogen oxides (NO_x), particulate and CO₂ emissions each by around 5% in the short term.

Removing subsidies that are both economically costly as well as harmful to the environment would be a win-win policy reform. As many fossil fuel subsidies fall into this category, governments should prioritise removing them. But governments are often faced with awkward trade-offs between the economic and environmental benefits of reforming those subsidies and the social costs of higher fuel prices or of lower employment in indigenous energy industries. In some poor developing countries and transition economies, removing subsidies to modern household cooking and heating fuels has had a dramatic short-term impact on living standards. This factor has deterred the Russian government from addressing heat subsidies. And removing subsidies to coal can have a devastating effect on employment and incomes in local communities that depend heavily on mining.

But these subsidies have to be paid for—often out of general tax revenues. At the least, governments should think seriously about the opportunity costs of energy subsidies. The money saved by removing subsidies could be spent on other social welfare programmes, such as direct income-support payments, health and education. Moreover, it is doubtful that one could ever find overall net social benefits from protectionist policies aimed at maintaining employment in domestic energy industries such as coal mining. Such subsidies can hold back innovation and efficiency gains, and thus cost reductions. They furthermore can restrict economic growth and reduce employment in other sectors of the economy. And even the local communities concerned may not benefit in the long run. Experience in Europe shows that redirecting coal subsidies to retraining and regional economic development aid can boost higher-paid, safer and more desirable jobs to replace the jobs lost in the coal industry.

Not all energy subsidies are bad, however. There may be a good case for retaining subsidies in specific instances, especially where they are aimed at encouraging more sustainable energy use. Examples might include temporary support for new renewable and energy-efficient technologies to overcome market barriers, and measures to improve poor or rural households' access to modern, commercial forms of energy. But the way in which a subsidy is applied is critical to how effective it is in meeting policy objectives and its cost.

In practice, governments need to take account of national and local circumstances in reforming subsidy policies or designing new ones. These include the country's own policy objectives and priorities, its stage of economic development, market and economic conditions, the state of public finances, the institutional framework and the state of the country's environment. Nonetheless, there are a number of basic principles that countries need to apply in designing subsidies and implementing reforms to existing programmes. Experience shows that, when applied, subsidy programmes and their reform should meet the following key criteria: