

TECHNICAL NOTE

SUBSIDIES TO FOSSIL FUEL-BASED ENERGY [WORLDWIDE]

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Worldwide the generation of electricity using fossil fuels is the object of extensive subsidies. Since the earliest, provided to coal in England in the early 18th century, they have done nothing but expand in spread, scope and quantity. Their significance is that they are locked-in and they tilt the playing field against renewable energy. The cost of subsidies and support to electricity based on nuclear, coal, oil and gas is not known for the UK.

What subsidies do

Subsidies are very useful, if not essential. There is no functioning economy in the world without sectors which are protected from open competition and there is none without subsidies either. Such protection or ‘rents’ have enabled the fast-tracking of new technologies and innovations. They encourage learning. They protect natural resources. They are also commonly needed and used to secure political support and to pay-off opposition.¹

Once established, rents are hard to phase out because that increases the costs of the activities built up by them and the economic interests they serve. Rents require resources and these resources are commonly known as subsidies. There are two ways of finding the resources needed for subsidies. They have widespread impacts on the economy as a whole. If subsidies are resourced by public borrowing, there is continual upwards pressure on prices, interest rates and/or exchange rates which in turn affect investments, imports and exports of goods and flows of capital. Since such borrowing has to be repaid, there are knock-on consequences for tax policy too (choices between corporation and income taxes, VAT or duties on imports) which in turn affect competitiveness, output and employment. If subsidies are resourced through the re-allocation of existing budgetary resources, then there are further choices to be made about the benefits foregone from the alternatives to which such resources could be put (energy versus health, education, social services etc).²

¹ M. Khan and K.S. Jomo 2001 *Rents, rent seeking and economic development in Asia: Theory and Evidence* Cambridge University Press

² World Institute of Sustainable Energy (WISE) 2008 *Power drain: hidden subsidies to conventional power in India*, World Institute of Sustainable Energy, Pune, India www.wisein.org. Much of the argument in this note/appendix is summarised from the comprehensive review of research worldwide contained in this report. Permission is being sought from WISE to make use of this summary of their report.

In the case of energy, subsidies increase activity in both production and consumption. Because the life-cycle of investments in energy is relatively long, their lock-in effects create barriers to energy-efficient improvements in production and end-uses. Subsidies to fossil and nuclear fuels encourage environmentally damaging side effects to energy production such as acid rain, smog, exceptionally toxic waste, and the greenhouse gases causing climate change.

What subsidies are

The concept of a subsidy originated as the opposite of a tax. Though the idea is simple, the technical scope of modern subsidies is anything but that. This is because - over and above direct transfers from budgetary resources - a wide range of incentives and support is funded through resources got from tax. As a result there is no agreed definition of a subsidy; certainly no consensus has been reached among EU states, so few subsidies can be accurately compared between its member countries, let alone the rest of the world.

Subsidies and support to fossil fuels worldwide are known to include the following³:

Cash transfers from the state for R and D

for production [through grants; loans at subsidised interest and/or preferential conditions; equity infusions etc]

for consumption or end-use [in various sectors of the economy including homes and households; and including cross-subsidies between them]

Risk coverage / guarantees / insurance liability

Relief from the costs of externalities [e.g. pollution]

Other support measures:

Price controls [including those ensuring cross-subsidies between users]

Trade restrictions [including quotas; technical restrictions; embargoes]

Limits on competition [e.g. through preferential leasing; state ownership or control of ownership]

Guaranteed purchases

Planning controls

Infrastructure and its maintenance

Public services [e.g. subsidised water]

Technical assistance [e.g. the provision of information]; specialist training]

Protection and security [including the costs of holding strategic reserves]

Tax measures:

Credits [including for foreign tax payments]

Exemptions [whole or partial]

Delayed payments

Accelerated depreciation on taxable assets

Rebates or relief [on royalties, duties or levies]

Loss of revenue

³ WISE op.cit., pp 12-30.

The range of policies involved is extensive and scaled and practised at several different levels – local, regional, national and international. There is as yet no global policy involving subsidies.

Estimates of the magnitude of subsidies and support to fossil fuel

Electricity and energy are essential inputs to all productive activity [to construction, infrastructure, manufacturing, all kinds of services and their finance] as well as to households. Their prices affect activity in all other parts of the economy. That is why electricity has been regarded as a public good [or a ‘merit’ good] in many parts of the world – particularly when countries wish to transform their economies as rapidly as possible. The strict definition of a public good is one which is non-excludable [no one can be excluded from it] and non-rivalrous [one person’s consumption cannot reduce the availability of the good] [common textbook examples being defence or street lighting]. But public goods are *also* goods for which there is public agreement that they should be financed and produced in the public interest. Electricity is one such; food, water and education are other examples in many parts of the world; such goods are carefully planned and usually publicly owned and controlled. However, despite this fact, data enabling the estimation of public subsidies to electricity is not openly available. Wherever the electricity sector is privately owned, the data available to the public deteriorate. This is one reason why worldwide there are so few studies.

Problems of evidence and measurement

In their book on American energy subsidies Kent and Myers describe ‘trying to pin down essential information (as) like putting one’s foot on a dozen jelly fish’⁴. Here we need to note four ‘jellyfish’ in particular. First, evidence for subsidies and support is scattered through policy documents in departments of government responsible for power/energy, industry, infrastructure and regional development. These policies are made [and found in documents] at the national, regional and local level. Second, rarely are energy and electricity distinguished. Electricity is a subset of energy which in turn involves many sectors managed or regulated by the state. All of these sectors have mutual feedback relations on prices - so departments or ministries with responsibilities for defence, infrastructure, water, transport, environment and power/energy take decisions which have consequences for the others. As a result there is a severe ‘systems boundary’ problem with the identification of relevant information.⁵ Third, rarely is electricity generation broken down by its source, let alone by technology. Fourth, it is next to impossible in any country of the world to find costs of production and consumption together with costs of the relevant policies broken down systematically and transparently according to the ‘life-cycle’ of the entire process. This life-cycle would involve: dedicated R and D, extraction, production, consumption, accidents and risks and post-consumption activity [physical waste, decommissioning, reclamation, and externalities].

⁴ J Kent and N Myers 2001 *Perverse subsidies: how tax dollars can undercut the environment and the economy* Alliance to Save Energy, Washington DC [p28 in WISE, 2008]

⁵ WISE op. cit., p30.

Then there are currently three broad approaches to calculating subsidies. The first is called the ‘price gap approach’ and requires the calculation of deviations in actual, ‘seen’ prices from a reference price, which is an estimated unsubsidised price. This is usually the ‘border price’: the cost of imports or the value of exports, as appropriate. There is a problem with border pricing when electricity is not traded internationally, as is still the case in many countries. And a second problem is trying to track the price gap backwards to its origins in specific policies.

The second approach to calculating a subsidy builds from the elements of the actual cost of production together with the cost of policies which subsidise these elements. Here there are problems in estimating the yardstick of evaluation. It ought to be the unsubsidised costs of production even if no production is actually unsubsidised. A further decision has to be made between judging subsidies using the yardstick of actual unsubsidised production, if there are data enabling it to be estimated, or using the criterion of allocatively efficient production. The lock-in factor means that existing structures of production are likely *not* to be the most efficient form of production. However, no matter which standard is selected as that by which subsidised production is judged, this method requires voluminous data. National accounts statistics do not help, even if they can be disaggregated, because costs due to revenue foregone, underpriced transfers of public assets, underpriced transfers on infrastructure, services etc will all be completely invisible.

The third method is to estimate subsidies from the costs of programmes through which the subsidies flow. However this proves to be extremely difficult because many inter-related policies are involved. They cannot be linked to the specific energy conversion technologies because their costs are never presented in a way which would make this possible, and, as with some kinds of infrastructure, such policies are not always dedicated exclusively to the energy/electricity sector.

In their review of research on the subsidy on energy from fossil fuel in the USA, Koplow and Dernbach discovered a fourfold discrepancy in estimates, which they attribute to the three meta-problems: the flawed and inadequate availability of data, varying concepts of subsidies and varying methods of computation.⁶

So, either despite the strategic importance of this question worldwide or because of it, there is a ‘black hole’ for research.⁷

A method successfully applied to India involves i) building from the ‘bottom-up’ a set of calculations from projects using specified conversion technologies – coal, gas, lignite and hydro (plus oil and nuclear) (if the data exist in the public domain⁸); ii) integrating those costs with estimates (from the ‘top-down’) of the public cost of support (with the same proviso); iii) estimating the policy time frames to give a measurement of the value of

⁶ D. Koplow and J Dernbach 2001 *Federal fossil fuel subsidies and greenhouse gas emissions: a case study of increasing transparency for fiscal policy*, Earthtrack, Massachusetts

⁷ WISE, op.cit., p29

⁸ which was not the case for nuclear energy in India

such support over the projects' lifetimes, iv) estimating the additional public costs over and above the costs of production which are due to measures of support and then v) discounting costs over the project lifetime using a sensitivity analysis with two discount rates. One would reflect the private value of the project (often represented by 10%), while the second would reflect the long term social value, or the public interest (0%).⁹

Current estimates

The scrupulous Indian study of 19 projects in the conventional power sector over the decade to 2003 may be considered an instructive outer limit to conventional (non-nuclear) power subsidies. However it is likely that only the more efficiently run plants from the 67 constructed during this period were able to provide the necessary information; so even this estimate may be low.

The cumulative lifetime subsidy varied considerably but averaged out at 150% of the original investment, not counting the costs of externalities (which is a massive unrealised research project in itself). It is therefore a significant subsidy. Since over half the population still does not have access to any electricity (notwithstanding the indirect impacts of sectoral cross subsidies), the Indian subsidy as a whole is socially regressive: it benefits the upper income brackets at the expense of poor people and those living in backward regions.¹⁰

Global and regional estimates, including the EU, are as follows:

Source	Date	Criteria	Subsidy
Kent and Myers	2001	Global environmentally damaging subsidies, of which fossil fuel subsidies	\$850 bn p.a. \$119 bn p.a.
Larsen and Shah	1992	Global fossil fuel subsidies	\$250 bn p.a.
De Moor	2001	Global energy sector, of which fossil fuel subsidies	\$240 bn p.a. \$151 bn p.a.
TERI	2000	India: energy subsidy	\$ 2.6bn p.a.
EEA	2004	EU members: energy subsidy (2001)	E 29 bn
Froggatt	2005	EC/EU grants/loans for FF-energy (1952-2004)	E 30 bn
Douthwaite and Healy	2003	Ireland: peat subsidy (11% Ireland's fuel) (2004)	E 58m

Sources: data in WISE, 2008 (see endnote ii)

Conclusions

⁹ WISE, op.cit, pp 31-58 gives details of the method as applied to India while pp58-72 presents the data, with critical comments.

¹⁰ WISE, op cit pp 73-80

Although these estimates are dated, and now dwarfed by the bail-outs to the financial sector, the most recent estimates of subsidies to fossil fuel-based energy/electricity production are very significant - as well as being environmentally 'perverse'. A detailed study of the UK subsidy, specifying each component of support (as listed in this note) to each type of energy conversion technology is long overdue and urgently needed. Indeed it is astonishing that it is not available. Such research is also needed worldwide, not only for cross-country comparisons but also for the counterfactuals needed for the implementation of the Clean Development Mechanism. It should be a high priority for a UN agency.

Only when this information becomes available can the implications of the structures of subsidies and support for CO2 lock-in in production and consumption be understood. It is in the immediate public interest in this era of apparently liberalised competition to know the degree of underestimation (and the pressures on public finance) of the cost to society of conventional fossil fuel-based and nuclear power. Levelling the playing field would either mean removing subsidies and support or providing new forms of energy (renewable energy) with comparable or greater ones, as befits socially valuable infant industries. Not to do so breaks with established historical practice.

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