

The Full Costs of Electricity

WHY CALCULATING THE FULL COSTS OF ELECTRICITY MATTERS FOR POLICY

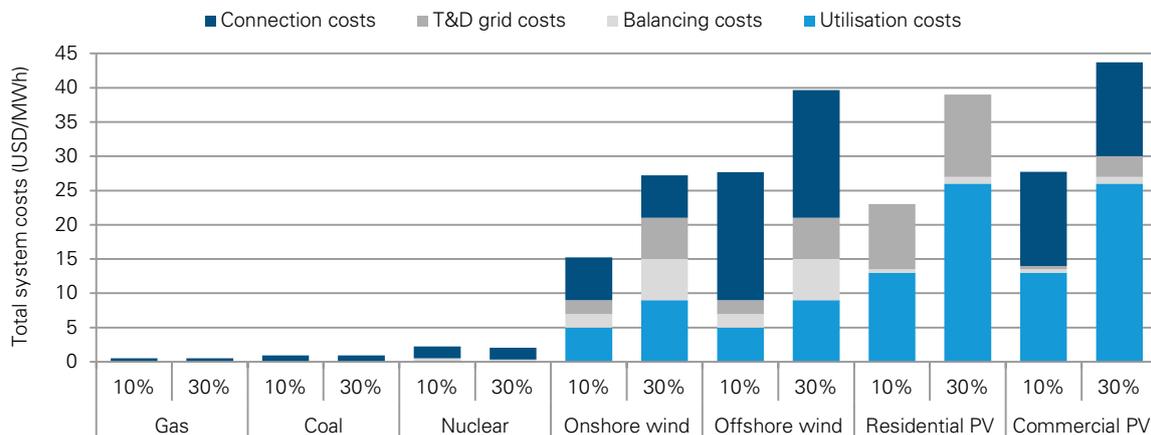
- The social and environmental impacts of electricity provision affect individuals, economies and societies in ways that are not captured in overall market prices for electricity.
- Electricity costs fall into three categories that together constitute the full costs of electricity provision: plant-level costs; grid-level costs, and social or external costs.
- The full costs of the normal operations of electricity generation exceed the economic costs of all other phases of electricity generation and include the costs of air pollution, climate change, accidents, land use and resource depletion.
- Air pollution from fossil fuels is the biggest uninternalised cost of electricity generation and the world's largest single environmental health risk, responsible for 3 million deaths per year, according to the World Health Organization.
- The importance of external costs needs to be recognised and policy instruments to internalise them must be put in place.

What's the issue?

Market prices and production costs are important measures of the economics of electricity, but they are not the whole story. The full costs of electricity provision include plant-level costs of generation (i.e. the concrete and steel used to build the plant, and the fuel and human resources to run it); grid-level system costs (i.e. the costs that plants impose on the system to extend, reinforce or connect to the grid, as well as the costs for maintaining spinning reserves or additional dispatchable capacity when the output of some technologies is variable) and external, social and environmental costs. External or social costs are the

impacts of different power technology choices on the well-being of individuals and communities in terms of air pollution, climate change, the costs of accidents, land use or resource depletion, as well as the impacts on security of energy and electricity supply, employment and regional cohesion or on innovation and economic development. It is important to emphasise that technologies differ significantly in terms of their full costs. The uninternalised social costs of coal and biomass are larger than the social costs of oil and gas, which are larger than the social costs of nuclear, hydroelectricity and renewables.

Grid-level system costs of selected generation technologies for shares of 10% and 30% of VRE generation



NEA Policy Brief: The Full Costs of Electricity

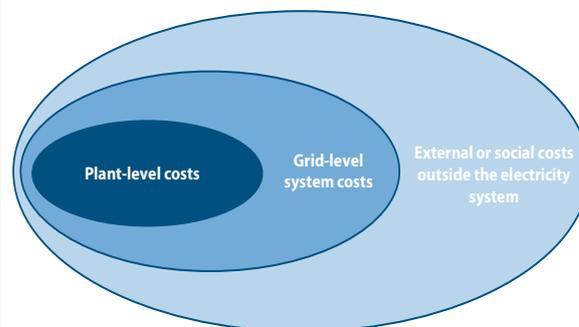
Why is this important?

The public, the media and policy makers are prone to attention bias. Public attention does not focus extensively on an issue such as air pollution, where a steady stress builds up over years to combine with genetic and other factors to cause respiratory illness and heart failure. The complexity and duration of the process makes covering, reporting, disseminating and absorbing the relevant information much more difficult. "Full cost accounting" has therefore become even more relevant in the multifaceted context of the energy transitions underway in many countries today. When the lives of millions of people are at stake, governments have an obligation to address key issues such as air pollution and climate change, which constitute the largest uninternalised cost of electricity generation. Full cost accounting provides order-of-magnitude estimates that allow public discussion and policy making to integrate the most pressing issues in a meaningful way. Both in the case of grid-level system costs and external costs, the actors who are at the origin of the costs are not always those who are primarily affected by them, which is why it is important for an outside actor, the government, the regulator or the system operator to step in so as to ensure that such costs are not overproduced and are correctly internalised. It is in fact urgent that all technologies be exposed to the market price and bear the full cost of connecting a plant to the transmission and distribution infrastructure.

How can the NEA help?

For a number of years, the NEA has been analysing different aspects of the full costs of electricity. The results of this work focus on nuclear energy but also on other sources of power generation, examining the plant-level costs, system costs and security of supply. These studies should help to generate new and more comprehensive research in the area of the full costs of electricity, the kind of which has not been undertaken in recent years. They should also allow policy makers and the public to take better informed decisions along the path towards fully sustainable electricity systems. The NEA works closely with the International Energy Agency (IEA) on in-depth reviews of member countries' energy policies. NEA participation in these reviews is critical in providing expertise on nuclear power. The NEA also offers its know-how in relation to investments in nuclear capacity for the IEA's World Energy Investment publication series. The NEA report *The Full Costs of Electricity Provision* is a small but focused effort to address some of the barriers that stand in the way of better policy making in the electricity sector.

Different cost categories that make up the full costs of electricity provision



What should policy makers do?

Recreate the momentum for systematic, credible and policy-relevant research on the full costs of electricity provision.

Act effectively where the benefits of internalisation are indisputably larger than the cost. The three most important internalised external costs are constituted by air pollution, climate change and the system costs of variable production.

Well-understood instruments for internalisation already exist. In terms of the economics behind practical policy decisions, these can be divided into two major categories:

- Price- and market-based measures, such as pollution taxes, subsidies, and new carbon emissions trading markets.
- Norms, standards and technical regulations have the added advantage of leaving the pollution rent to the polluter. In the area of air pollution and greenhouse gas emissions in particular, a review and eventual tightening of emission standards is warranted.

In all cases, information-based measures, including systematic surveying of environmental and public health impacts, public consultations and support for research and development, are at the heart of modern internalisation of the external costs of electricity generation.

Further reading

NEA (2018), *The Full Costs of Electricity Provision*, OECD, Paris.

NEA (forthcoming), *Climate Change: Assessment of the Vulnerability of Nuclear Power Plants and Adaptation Costs*, OECD, Paris.

NEA (forthcoming), *System Costs in Deep Decarbonisation Scenarios: The Contributions of Nuclear Energy and Renewables*, OECD, Paris.