

Calculating the cost of generating electricity: Which role for nuclear?

by J.H. Keppler*

Crisis or no crisis, between replacing ageing plants having reached the end of their economic life and keeping up with fast-rising demand, the world will need to invest roughly USD 15 trillion in electricity generation in the next 20 years. That is a large number even at the scale of the world economy. Each plant will have to be decided upon on the basis of a set of economic, social and environmental criteria.

Nuclear, coal, gas, hydro, other renewables... all have various advantages and disadvantages according to different customers and countries. Independent of the specific local and national context, however, economic and financial cost will frequently be the key criterion. Having an idea of the cost of different power plant technologies is thus crucial for developing a vision of the composition of the electricity sector in the years to come.

That is why the NEA, in co-operation with its sister agency the IEA, publishes an update approximately every five years of the cost of generating electricity with different technologies in a range of OECD countries. The last of these studies was published in 2005 under the title *Projected Costs of Generating Electricity*. These studies have always constituted highly respected reference values for the costs of power generation and figure regularly among the best-sellers of both the NEA and the IEA. Since the beginning of 2009, work on a new edition of the Electricity Generating Cost (EGC) study has begun.

The methodology employed for assessing the costs of different technologies is the calculation of levelised average lifetime costs. This means calculating the properly discounted lifetime costs of a plant according to a set of common assumptions and dividing it by its output, which provides an intuitive, easy-to-grasp cost figure per MWh of electricity. While such a figure certainly does not capture all

the financially relevant aspects of a power plant, it constitutes a useful starting point for any discussion about investing in power generation. The most important assumptions used are the commissioning date (31 December 2015), the lifetime (40 years with sensitivity analyses for longer lifetimes) and the discount rate (5 and 10 per cent, again with sensitivity analyses for additional values).

While the basic methodology is relatively straightforward, its practical implementation is not. Power plants cannot be bought off a rack. Over a 40-year lifetime, many parameters, such as fuel prices, discount rates, contingency planning, refurbishment, waste handling and decommissioning, need to be assessed carefully by every participant contributing to the study. For this edition, not only the majority of NEA and IEA member countries are participating in the study, but also a number of renowned experts from industry and academia. Selected non-OECD countries will also send experts.

Traditionally, nuclear energy has been performing well in terms of levelised average lifetime costs, especially in locations with low interest rates. This cost advantage will be significantly enlarged if a) longer lifetimes are assumed, and b) carbon pricing with the help of carbon markets or a carbon tax becomes a reality. Carbon is, of course, already priced in Europe and is set to become so in the United States. In terms of financial performance, the disadvantage of nuclear energy remains its high ratio of fixed to variable costs, which implies increased investor risk in liberalised electricity markets with uncertain power prices.

In conjunction with generalised carbon pricing, however, the new generation 3+ reactors that will be commissioned now for 2015 should further improve the competitiveness of nuclear energy. The competitiveness of nuclear power plants should thus further increase to the extent that it can overcome the disadvantage of its cost profile, even in liberalised electricity markets. The 2010 edition of the Electricity Generating Costs study will show whether this is already the case. ■

* Dr. Jan Horst Keppler (jan.keppler@oecd.org) is principal administrator in the NEA Nuclear Development Division.