

THE FULL COSTS OF ELECTRICITY PROVISION

Introduction

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1. **The study** is performed under the umbrella of the WPNE (Working Party on Nuclear Economics) as a project in the Programme of Work 2015-2016 of the NEA NDC (Committee for the Technical and Economic Studies on Nuclear Energy Development and Fuel Cycle).
2. **The study should provide policy makers with consistent, quantitative and qualitative information on different elements of costs of electricity provision for informed decision-making on energy policy.**
3. It needs to cover all sources of electricity provision and related costs, therefore it is important to have interactions well beyond the “nuclear community”, and **this workshop** is aiming at facilitating such interactions and collecting information. We welcome the participation of other OECD agencies and departments, and the European Commission.
4. A second workshop is scheduled towards the end of 2016.

1. Introduction:

Objectives, Methodology, Overview of past and recent works
NEA Staff, Stefan Hirschberg, EC

2. Plant-level Costs

Geoffrey Rothwell, William D'haeseleer

3. System Costs

Marco Cometto, Alain Burtin

4. Costs of Climate Change

Jan-Horst Keppler, Olivier Durant-Lasserve

5. Costs of Air Pollution

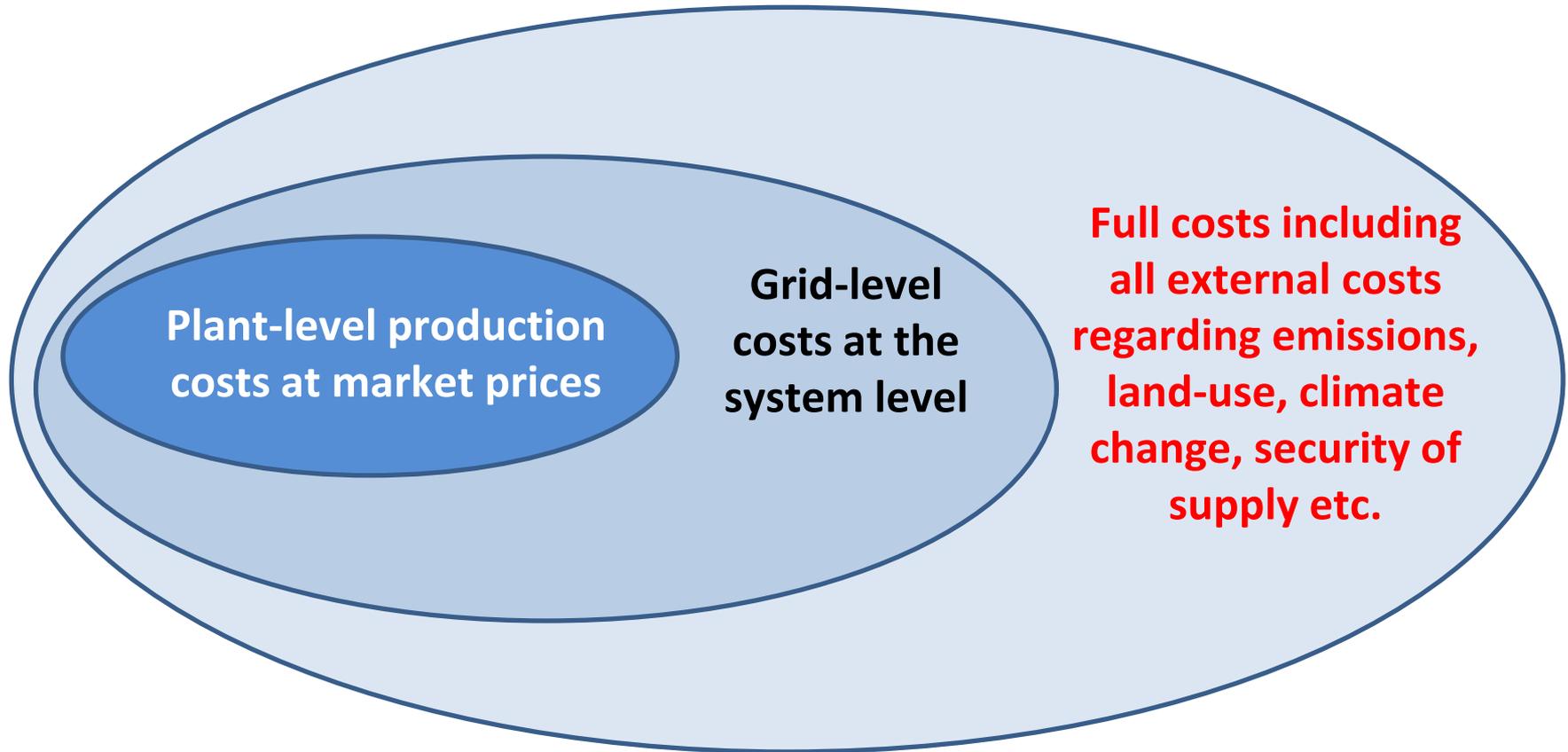
Rainer Friedrich, Nils Axel Braathen

6. Costs of major Accidents

Marco Cometto, Stefan Hirschberg

7. Concluding Discussion: Gaps and Further Steps

1. The study is on electricity PROVISION – more than GENERATION (includes transport and distribution)
 - a) Private costs will be derived from market prices or dedicated studies (EGC 2015),
 - b) Social or external costs will be based on the existing literature,
 - c) The emerging topic of grid-level system costs will be based on recent work by NEA and IEA.
2. Objective of NEA study is not to identify the « cheapest » technology
 - a) “Full costs” depend on the subjective or political weighting of different cost categories
 - b) Some categories are difficult to monetise and come with wide ranges for interpretation, where consensus is difficult (see Hirschberg et al. in NEEDS project).
3. Work is organised not by **technology**, but by **cost category** (including context, questions and issues).
4. **This NEA study is a Meta-study providing a synthesis and a policy-relevant perspective of the large body of existing work.**



Recent publications from NEA and others on different elements of the costs of electricity provision:

- Comparing Nuclear Accident Risks with Those from Other Energy Sources (2010).
- The Security of Energy Supply and the Contribution of Nuclear Energy (2010).
- Projected Costs of Generating Electricity (2015).
- Long-term Operations of Nuclear Power Plants (2012).
- Nuclear Energy and Renewables: System Effects in Low-carbon Electricity Systems (2012).
- The Back-end of the Nuclear Fuel Cycle (2013).
- Estimation of Potential Losses Due to Nuclear Accidents (forthcoming).
- Costs of Decommissioning Nuclear Power Plants (forthcoming).
- Social and Economic Impacts of Nuclear Power (forthcoming).
- **OECD ENV and IEA**
- **European Commission – ExterneE (1990-2005), NEEDS (2004-2008), recent studies in support of Energy Policy (DG ENER and JRC)**
- **USDOE, Japan Atomic Energy Society...**

1. Direct economic impacts

- a. Plant-level costs (LCOE and other parameters);
- b. Grid-level system costs.

2. Impacts on the environment and human health

- a. Climate change;
- b. Local and regional air pollution;
- c. The costs of major accidents;
- d. Land-use and other non-atmospheric ecosystem impacts;
- e. Resource depletion.

3. Social and indirect economic impacts

- a. Positive spill-overs in terms of growth, employment, social and regional cohesion;
- b. Security of energy and electricity supply;
- c. Impacts on innovation and the trade balance.

The Study will concentrate on

1. A survey of different costs categories in each of the three main categories presented above,
2. Ranges of cost estimates, based on the literature as well as on NEA research,
3. The highlighting of key uncertainties,
4. Prevalent and desirable forms of internalisation,
5. The identification of key decisions for policy-makers to be made on future research and internalisation.

Only area in which the study proposes new work on social costs is **climate change**:

1. No explicit damage cost estimation, but
2. Implicit **cost of control** estimation which at the margin is equal to damage cost under optimisation hypothesis.
3. Cost of control will be estimated by comparing the IEA 2° scenario (450 ppm) with the 4° scenario (baseline) in terms of generation mix and cumulative CO₂ emissions between the base year and the years 2035 and 2050.
4. The cost difference between the two scenarios will be assessed based on the differences in the generation mix and the cost figures of EGC 2015.
5. The ratio between the cost difference and the difference in CO₂ emissions will provide a useful indicator (in terms of order of magnitude) of what policymakers implicitly assume to be an acceptable shadow price of CO₂ emissions per ton of CO₂.

- The study on the « Full costs of electricity provision » will be directly supervised by the WPNE.
- The work will be undertaken by the NEA Secretariat. There exists the possibility to draw on outside consultants in case that voluntary contributions will be forthcoming.
- Collaboration and exchange with OECD ENV, IEA and EC, possibly others, will be actively sought.
- Two High Level Workshops in order to share information among leading experts, provide material and review.
 - First Workshop in January 2016 (post COP21) – back to back with WPNE
 - Second Workshop toward End 2016, close to the end of the project.