

Nuclear Development and the Fuel Cycle

Nuclear Development Committee (NDC)

The NDC continues to support member countries in the field of nuclear energy policy, addressing issues of relevance for governments and the industry at a time of nuclear technology renaissance and sustained government interest in ensuring long-term security of energy supply, reducing the risk of global climate change and pursuing sustainable development.

Highlights

- A study on *Risks and Benefits of Nuclear Energy* was completed and published. Based on a comprehensive survey of authoritative published literature and research results, the study provides insights into the advantages and drawbacks of the nuclear option as compared with alternatives.
- Co-operation with the International Energy Agency (IEA) continued with the NEA providing significant contributions to the IEA publication *Energy Technology Perspectives 2008*, as well as expertise for the in-depth reviews of energy policy of several IEA member countries.

Nuclear policy issues

Nuclear energy is attracting increasing interest from decision makers in the context of policies aiming at security of energy supply, reduction of fossil fuel dependency and mitigation of global climate change. The study on *Risks and Benefits of Nuclear Energy* provides a wealth of information and data that policy makers may use to assess the potential role of nuclear energy in their national energy policies. The study

was completed in 2007 and was widely presented in international conferences and scientific journals. Based upon a broad survey of literature and results from research on life cycle analysis of electricity generation chains, it offers illustrative examples of quantitative and qualitative indicators concerning economic, environmental and social aspects of electricity generation. It also provides insights into methodologies and decision-aiding tools of interest to policy makers responsible for assessing alternative options for energy supply mixes.

Security of supply is a cornerstone of energy policy and has become more prominent on the agenda of policy makers following increasing tensions in oil and gas markets and rising prices of hydrocarbons. The role of nuclear energy in enhancing national security of supply has been recognised by several OECD countries. There is, however, little analytical work providing quantitative assessments of nuclear energy's contribution to ensure secure access to electricity. The objective of the NDC study on this topic is to identify relevant quantitative approaches for measuring the contribution of nuclear energy to security of supply and to provide decision makers with robust, authoritative information to support technology choices for electricity generation aiming at enhancing security of supply.

Shares of uranium resources and production

	Resources (%)*	Production (%)**	Production (tU)**
Australia	24.0	21	8 575
Canada	9.4	23	9 465
United States	7.2	4	1 700
Namibia	2.1	7	2 875
Niger	4.8	8	3 154
South Africa	7.2	1	535
Kazakhstan	17.2	16	6 655
Russian Federation	3.6	8	3 415
Uzbekistan	1.6	6	2 305
Ukraine	1.9	2	845
Others	21.0	4	1 676
Total	100.0	100	41 200

* Identified resources recoverable at less than USD 130/kgU (2005 data).

** 2007 estimates.

In order to ensure that nuclear energy issues are addressed on a level playing field with alternatives, the NEA strengthened its collaboration with other parts of the OECD and in particular with the IEA. In this connection, the NEA contributed a nuclear energy chapter to the IEA publication on *Energy Technology Perspectives 2008*, drawing primarily from the outcomes of past and ongoing studies carried out under the auspices of the NDC.

NEA staff members participated in the IEA in-depth energy policy reviews of Finland, Japan, Sweden, Switzerland and the United States. NEA involvement brings nuclear energy expertise to the teams in charge of the reviews, thereby contributing to a comprehensive approach to the overall analysis.

Economics

Recognising the growing importance of competitiveness in liberalised electricity markets, the NDC decided to create a Working Party on Nuclear Energy Economics. The working party will provide guidance to the NDC on key economic issues that could be investigated from an international perspective for the benefit of member countries. At its first meeting in November, the working party developed proposals for activities on economic databases and models, and selected high priority topics for consideration by the NDC within its 2009–2010 programme of work. It is expected that the working party will play an essential role in reinforcing the relevance and quality of the economic analyses issued by the NEA.

The study on market competition in the nuclear industry has been completed and its outcomes will be published early in 2008. The report covers the state of competition in each of the major nuclear industry sectors, including the supply of new nuclear power plants and each stage of the front and back ends of the fuel cycle, as well as the industry's outlook for the coming years. One of the findings of the study is that competition, while present in all sectors of the nuclear industry, is limited in some sectors and in some geographic regions. The study concludes that efforts should be made by governments to maintain, and where possible increase, the level of competition in all nuclear market sectors as the industry expands to meet growing demand over the next decade and beyond.

Technology

The report on *Management of Recyclable Fissile and Fertile Materials* published early in 2007 provides an overview of inventories of recyclable materials and the options available for managing those materials. It highlights the relevance of exploiting the energy content of recyclable materials in the context of renewed interest in nuclear energy in many countries. The report also includes a comprehensive review of the advantages and drawbacks of alternative options for the back end of the fuel cycle, ranging from direct disposal of spent fuel to recycling of plutonium, partitioning and transmutation and full recycling of minor actinides. The main findings of the study were presented at various international conferences, including Global 2007.

The renewed interest in recycling, triggered in part by the perspective of a nuclear energy renaissance and also by increasing uranium prices, has led the NDC to launch a study on transition scenarios from thermal to fast neutron reactors. The study, initiated in mid-2007, will focus on strategic and policy issues associated with the deployment of fast neutron reactors and analyse the role of governments in ensuring an adequate framework for the implementation of synergetic strategies to optimise the use of fissile materials and minimise the environmental and social impacts of nuclear energy programmes.

The project on the timing of high-level waste (HLW) disposal was completed by the end of 2007 and the report summarising the main findings and conclusions will be published early in 2008. The study identifies key factors influencing the timing of HLW disposal and examines how social, technical, environmental and economic aspects impact national strategies in the field. It confirms the importance of informing all stakeholders and involving them in the decision-making process in order to achieve a successful implementation of those strategies. The study underlines the need for support and a clear, long-term commitment on behalf of government regarding the design and implementation of a national policy for the management and timely disposal of radioactive waste.

In the context of strong, anticipated growth in nuclear energy, policy makers, industrial stakeholders and civil society are enquiring into the adequacy of natural resources to support a broad revival of nuclear programmes. A new project has been initiated by the NDC to define any raw material limitations that could arise from a hypothetical tenfold expansion of global nuclear generating capacity. Such growth would increase the demand not only for nuclear fuel, but also for a number of natural resources required to support nuclear power plant construction, operation, decommissioning and the disposal (or reprocessing) of used nuclear fuel. The study is also investigating ways and means of overcoming the limits identified through policy measures and/or technical progress. The scope of the study includes all natural resources necessary to support nuclear energy development, including uranium and other mineral resources (e.g. zirconium and gadolinium), as well as land requirements for siting all nuclear facilities.

Data and resource assessment

The annual edition of *Nuclear Energy Data* (or the "Brown Book") provides statistical data on nuclear electricity capacity and generation, as well as nuclear material and fuel cycle service production and demand in member countries. The 2007 edition offers projections to 2025 and country reports highlighting key events in the nuclear energy field.

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