

Capacity Building and Nuclear Knowledge Maintenance for Sustainable Energy Development

Objective

To enhance the capacity of Member States to perform their own analyses of electricity and energy systems development, energy investment planning and energy-environment policy formulation and their economic

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implications. To sustain and effectively manage nuclear knowledge and information resources for the peaceful uses of nuclear science and technology and to support Member States interested in including nuclear energy in their national energy mixes by providing nuclear information.

Energy Modelling, Databanks and Capacity Building

Each year, the Agency prepares low and high projections of future nuclear capacity development in the world. In 2010, for the first time, the time frame for these estimates was extended to 2050. In the 2010 high projection, the global nuclear power capacity increased from 375 GW(e) in 2010 to 803 GW(e) in 2030 and 1415 GW(e) by 2050, an almost fourfold increase over 40 years. In the low projection, the capacity increased to 546 GW(e) in 2030 and 590 GW(e) in 2050. The low and high projections are not intended to identify extremes, but to cover a plausible range. They were developed by international experts assembled by the Agency and are based on a country by country ‘bottom-up’ approach reflecting both announced plans by governments and electric utilities and the judgment of the assembled experts. Figure 1 shows the regional breakdown of the

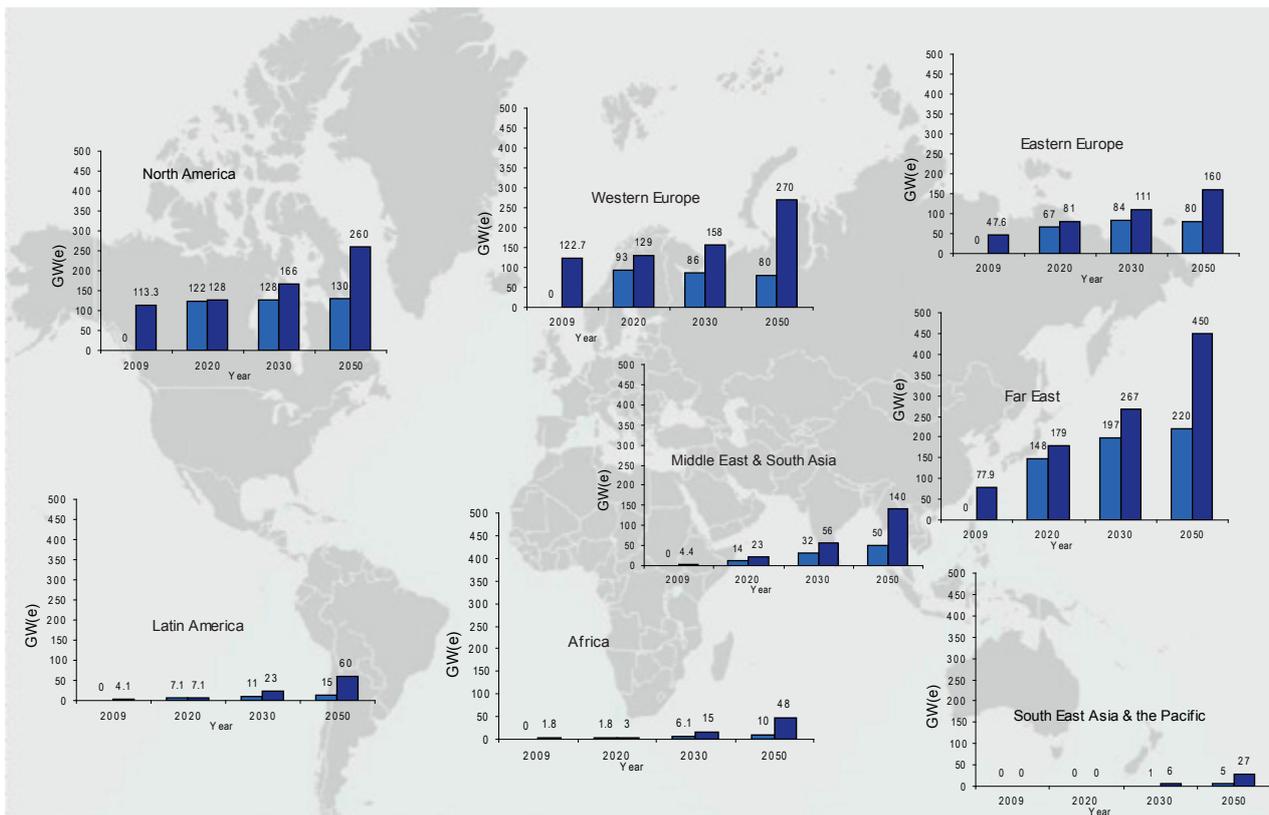


FIG. 1. The Agency's updated high and low projections from 2010, by region.

projections. The highest growth is expected in the Far East and is dominated by expansion plans in China.

Demand continued to increase for Agency assistance in capacity building for energy system analysis and planning, and for conducting national and regional studies of future energy strategies and the role for nuclear power. The Agency's analytical tools developed for this purpose are now being used in more than 120 Member States, and during 2010, over 650 energy analysts and planners from 68 countries were trained in their use. About 20% of this training was conducted through distance learning courses. A report was completed on *Assessment of the Techno-Economic Viability of Nuclear Energy in Kuwait – A Pre-Feasibility Study*, which showed that nuclear energy can be a viable electricity generating and desalination technology even in a country well endowed with hydrocarbon resources.

To ensure that Member States and the Agency have authoritative data when conducting such analyses, the Agency completed the 2010 annual update, in cooperation with the United Nations, the OECD International Energy Agency, the United States Department of Energy and other partners, of its information on energy supply and demand, energy resources, and electricity generation and consumption.

Energy–Economy–Environment (3E) Analysis

At the 16th Session of the Conference of the Parties (COP-16) to the United Nations Framework Convention on Climate Change (UNFCCC) in Cancún, Mexico, the Agency maintained an information centre, as it had at COP-14 and COP-15, which provided an opportunity to present the Agency's work on the linkages between climate change mitigation and nuclear power, to disseminate pertinent publications and to discuss the nuclear power option and its climate change mitigation benefits with government and non-government delegates.

In addition to Agency assistance for near term comparisons of nuclear power and its alternatives, as described above, a number of Member States are interested in long term comparisons between large scale carbon capture and storage and final repositories for radioactive waste. In connection with a CRP, the Agency completed a report in 2010 featuring a technical–economic comparison of the geological disposal of carbon dioxide and nuclear

waste. It is intended to serve the broader scientific and policy communities involved in carbon dioxide and radioactive waste disposal.

Nuclear Knowledge Management

In 2010, the nuclear power industry continued to face the challenge of growing demand for qualified personnel both in countries with established nuclear power programmes and in countries exploring or launching nuclear power, such as Brazil, Egypt, Italy, Jordan, Malaysia and the United Arab Emirates. In March 2010, the Agency convened an international conference in Abu Dhabi on 'Human Resource Development for Introducing and Expanding Nuclear Power Programmes'. The conference was jointly hosted by the Government of the United Arab Emirates, the Emirates Nuclear Energy Corporation (ENEC), the Federal Authority for Nuclear Regulation (FANR) and the Khalifa University of Science, Technology and Research (KUSTAR). The

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conference provided a forum for discussion and networking to advance nuclear science, engineering education and research programmes, and confirmed the importance of a balanced approach to human resource development that emphasizes building expertise in all areas of the nuclear field (Fig. 2). The need to attract a younger workforce early in their careers was underlined, ideally encouraging them to receive early experience in different areas of nuclear power and maintaining a strong safety culture.

The Agency continued to support Member States in preserving nuclear knowledge by conducting knowledge management assistance visits to Armenia, Belarus, Bulgaria, Kazakhstan, the Russian Federation, Ukraine and Vietnam. Such visits provide assistance, education and advice on best practices and strategies in knowledge management. They also reinforce existing strengths and offer recommendations on possible improvements.



FIG. 2. One focus of the Abu Dhabi conference was on demonstrations of human resource related tools and methods.

Specific enhancements were implemented in 2010 at the Kozloduy nuclear power plant in Bulgaria and at all nuclear power plants in Ukraine, including a methodology for knowledge loss risk assessment. Another knowledge management assistance team suggested that the Russian National Nuclear Research University enhance cooperation with nuclear power plants and research institutes employing graduates by inviting industry experts to give lectures, seminars

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and courses. In Vietnam, the mission recommended that three universities offering nuclear curriculums coordinate their programmes to avoid duplication in infrastructure, equipment and courses. And, with the assistance of Agency experts, the Kazakhstan Atomic Energy Committee launched a pilot version of a nuclear knowledge management portal.

Training courses on nuclear knowledge management were conducted by the Agency to reach broader audiences and support networks that disseminate information in this area. In cooperation with the Kuwait National Foundation of Science, the Agency held the 2010 School of Nuclear Knowledge

Management at the Abdus Salam ICTP, in Trieste. For the first time, the Agency also conducted the Nuclear Energy Management School at the Abdus Salam ICTP. This course provided an opportunity for young managers from developing countries to be involved in nuclear programme management and to learn from world experts and the Agency’s specialists about global nuclear energy development.

The Agency also conducted knowledge management seminars: at the Karlsruhe Research Centre, Germany, in cooperation with the European Commission; in Sevastopol, Ukraine; and in Gelendjik, the Russian Federation.

During 2010, the Fast Reactor Knowledge Base was further developed by introducing ‘topic trees’ and ‘knowledge mining’ software and creating new possibilities for performing specialized analysis. In 2010, the knowledge base was made available to Member States as a web application through the Internet (<http://www.iaea.org/inisnkm/nkm/awvs/frdb/index.html>).

International Nuclear Information System and the IAEA Library

In 2010, the International Nuclear Information System (INIS) marked its 40th anniversary. From the initial 25 members, INIS has grown into a global information system with a current membership of 148 countries and 24 international organizations. Removing barriers to access by making nuclear

information available on the web in 2009 positioned INIS as a key provider of knowledge on the peaceful uses of nuclear science and technology.

In 2010, the IAEA Library received over 1000 visitors per month. Efficiency gains were realized by merging the Reference and Loan Desks into a single

contact point. A total of 15 000 research requests were answered and 10 000 books were checked out to users. While usage statistics confirmed the continuing demand for a strong print collection, the Library intends to provide access to e-books in the future.