

Communiqué on Nuclear Power in France

On January 10, 2012, the Academy assessed the nuclear challenges facing France 10 months after the major accident at Fukushima. What lessons are to be drawn with respect to the future of French nuclear power? What is the solution for nuclear waste disposal? What is the impact on health? What are the economic effects of the various strategic options? These are the topical questions to which the studies undertaken by the Academy since March, 2011 - in the framework of its "Japan Solidarity Program" - have contributed¹.

Nuclear power is currently one of the main components among France's energy procurement resources and it will continue in this role for some time to come, given nuclear power's recognised inherent advantages. Nuclear power plants today represent the only way to produce concentrated, uninterrupted electricity supplies with zero emission of greenhouse gases (GHGs). Absence of any serious accident in France for the past 30 years of nuclear power generation, with its 58 nuclear reactors, *i.e.*, a total of 1700 reactor.years experience, underscores the attractiveness of this energy source. Four decades of experience have served to demonstrate that the sanitary impact of nuclear power is far less than that of other main energy sources, coal in particular. French nuclear power production has benefited from certain rules: coherence of the reactor models in service, well identified operators, competent operational and maintenance staff and regular, mandatory inspections of the site equipment by an independent authority (the ASN), together with integrated research into safety issues (IRSN).

The experience drawn from several major nuclear accidents, including Fukushima, has led to reconsider the risk factors that must be taken into account in order to be better prepared in the event of a future crisis.

1. From a technical and operational point of view, the Academy:

- **reiterates** the importance of enforcing appropriate parasismic standards and rules to protect against any extreme events, whether natural or terrorist, to be used during design, construction or upgrading of any nuclear power plant equipment;
- **recommends** that public authorities implement the measures advocated January 3, 2012, by the French Nuclear Safety Agency (ASN);
- **stresses** the advantages that would accrue from a proposal by the national operator EDF, to position complementary, resilient, backup emergency equipment and the implementation of a mobile, rapid intervention force;
- **recommends** that new impetus be given to projects to regroup treatment of spent fuel, fabrication of plutonium fuel to reduce to a maximum extent transport of radioactive matter;
- **underlines** the fact that the nuclear power generation industry has been a succession of evolving phases and technological breakthroughs. Throughout the world, decades of plant operation have demonstrated that progress is constant in terms of efficiency and safety. Thus, the third-generation reactors under construction have improved characteristics of

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resistance to accidents and to various aggressive acts. Reinforced support should also be given to academic and industrial research into small-sized reactors or more generally, for any new contributions to the field, such as thorium-fuelled models for example.

- **stresses** that management for radioactive wastes which has already benefited from research efforts, engaged at ANDRA and the CEA, be reinforced and extended in respect to confinement, short-term storage and repositories for wastes, but also handling of plutonium isotopes, transmutation of elements, minimal transuranium element production, short-term storage of spent fuels and future decommissioning and dismantling of complete nuclear power plants;
- **demands** that the important question of soil rehabilitation following contamination be subjected to coordinated research, drawing lessons from studies undertaken and actions implemented following the accident at Fukushima-Dai-ichi.

2. With regard to research deemed necessary, the Academy:

- **recommends** that research into future reactor designs be accelerated, bearing in mind 3 essential criteria: safety of nuclear plants, natural reserves of uranium and minimum production of long life nuclear wastes;
- **underlines**, in this regards, the importance of research into fourth generation reactors which could enable guaranteed fissile resources for thousands of years, using uranium 238 as the prime energy source;
- **insists** that the research structures and functions specific to nuclear issues, currently concentrated and engaged in the major public research establishments (CEA, IN2P3, IRSN) and in the main associated industries (Areva, EDF), be opened up to Universities and Grandes Ecoles [top graduate schools in France], so that these institutions become more involved in this area of high social and economic interest;
- **recommends** that a very strong focus be placed on research and innovation into alternate forms of energy that may prove economically viable and competitive; this research and study shall naturally include the impact on the environment of alternate energy policy choices;
- **recommends** that measures be advocated to encourage better energy resource management, whether on a personal, household or community basis.

3. On a human level, the Academy notes that there is a growing demand for information from the public at large and a parallel need to prioritise and rationalise risk factors with the objective to manage them in a more satisfactory manner. The Academy consequently issues the following recommendations:

- **improve preventively** the way we inform the public and communicate on accidents and incidents, whether they be natural or man-made (industrial origins);
- **develop epidemiological methods** for serious accidents, that could be mobilised in the case of an environmental, natural or man-made disaster and provide a technical platform to enable real-time observation and long-term, exhaustive monitoring of the populations concerned;
- **simulate and model response scenarios** for accidents at various levels on the [INES] scale, for health care systems, in order to assess their efficiency;
- **increase university teaching and research activities** in nuclear thematics, in epidemiology and accident management practices;

- **develop research in risk perception factors** and on their impacts on individual and population behavioural reactions.

With its history, its scientific and technical contribution to nuclear energy, its high concern about safety measures, France is a recognised international reference and will continue to play an important role in associate research work.

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