

Editorial



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Nuclear energy, like other energy sources and industrial activities, must be considered within a context of sustainable development. It offers many advantages: it is competitive, safe, helps to guarantee a secure supply, avoids exhausting precious fossil-fuel reserves, and involves no carbon-dioxide emissions. The main challenge in this area now is to implement management methods at the end of the fuel cycle that are acceptable to the public, cost-effective, and environmentally friendly.

In the nuclear field, waste management is at the center of public concerns. It is the main argument voiced by opponents to nuclear energy. The mere mention of a "problem" might lead people to think that no solution can be found. The truth of the matter is that if leading nuclear nations, and in particular France, have so far failed to opt for one particular method concerning the long-term management of what is potentially the most troublesome nuclear waste, it is primarily because the situation is not urgent, and there is time to choose the most scientifically advanced solution, or solutions.

In the face of stiff local resistance to disposing of waste in deep geological formations, the French authorities more or less called for a moratorium in February 1990. The Act of December 30, 1991, stipulated the conditions. Research guidelines have been laid down and results are to be examined in 2006. Researchers are using this period to conceive, refine, confirm, or reject principles for putting forward a range of solutions that are both acceptable in terms of environmental impact, and liable to be implemented on an industrial scale.

This issue of *Clefs CEA* presents the results obtained so far by research teams at the CEA and by their partners from other French and overseas organizations and universities.

This special report is built around the four key stages operators will have to go through, whatever the process they choose, and whatever the role of nuclear energy in the future. These four stages are: sorting, transforming, conditioning, and storage/disposal. Research teams are already able to provide the technological "building blocks" from which nuclear waste management solutions can be democratically selected within an appropriate time frame, then implemented. In its final report issued in June 2001, the members of a top-level international group (known as the Visiting Committee), including five Nobel Prizewinners, set up to appraise CEA activities, were unanimous in declaring that *"by 2006, the CEA program will certainly lead to several acceptable solutions to the back-end problem of the fuel cycle"*.

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Sorting: iso-butyl-bis-triazinyl-pyridine molecule developed for the Sanex partitioning process.

Transforming: hybrid-system demonstrator concept for transmuting nuclear waste.

Conditioning: sample of "nuclear-grade" glass for conditioning high-level radioactive waste.

Storage/Disposal: concept for a spent-fuel subsurface storage facility.