



Blue Ribbon Commission on America's Nuclear Future
Hearing of Pierre-Franck CHEVET, general director for energy and climate change
Washington DC, 2010, November the 15th
French considerations on the "future of the nuclear fuel cycle"

There is today a surge of interest in nuclear power around the world. The global population is growing in size and wealth and we will need more and more energy in the near future. We have also to fight climate change by limiting greenhouse gases emissions.

Nuclear energy is now widely considered as a major option among low-carbon energy sources to give an answer to the needs of an energy policy that are security of supply and competitiveness of our economies.

Since the beginning of the peaceful use of nuclear energy, options for the nuclear fuel cycle have been an issue of debate, in particular given their sensitive nature in relation to non proliferation issues.

Options for the nuclear fuel cycle remain diverse and subject to debates. Given the accumulation of spent fuel, some countries rely on long-term storage of untreated waste. Other countries choose to reprocess and recycle their spent fuel.

At a national level, nuclear materials and waste have to be dealt with in a sustainable development approach : this explains the French policy

France considers a spent fuel policy has to be defined taking into account five aspects. The French choice of reprocessing and recycling is hereafter assessed from these five aspects.

1. Security of supply

Reprocessing and recycling participates in security of supply, as part of diversification of supplies, which is particularly relevant for countries that are poor in energy resources. Full recycling enables us to save up to 20% of natural uranium consumption.

France recognizes that uranium resources should not be a real constraint for several decades even with the perspective of world wide nuclear reactor fleet development. But on the mid term, stresses on uranium supply will not be avoided and justify the GEN IV development for a better use of natural uranium.

Reprocessing and recycling is then relevant with a long term use of nuclear : it already participates to the security of supply (in France, the equivalent of 11 reactors within a fleet of 58 reactors does not need to bring uranium from abroad) and it provides a stock of recyclable uranium and provides materials for the launch of Gen IV.

2. Managing radioactive wastes

Reprocessing also has significant advantages for the disposal of radioactive waste, in terms of conditioning, of volume and heat load of waste to be disposed, and on an environmental point of view. Thanks to recycling, the volume of High Level Waste to be stored is far less considerable than in the case of direct storage. Technically, the exposure to uncertainties for the final disposal is then reduced .

Of course, efforts at developing suitable geological repositories and R&D in disposal options should be intensified, considering that such a repository is required whatever the long term decisions of the fuel cycle will be.

3. Economic features

More than 20 years of industrial experience of spent fuel reprocessing and recycling have shown that even with spent fuel reprocessing, the share of the nuclear fuel cycle in the generating cost remains modest. Nuclear energy is then competitive, with or without reprocessing.

Moreover, if open and closed cycle economics are comparable, reprocessing and recycling reduces the exposure to uncertainties (disposal), which is the main issue of the back end.

4. Non proliferation

Reprocessing and recycling facilities such as La Hague and Melox have a perfect track record with respect to fissile materials safeguards. Such facilities could also be operated in the US under appropriate conditions of safety, security and non-proliferation.

Moreover, recycling strengthens non-proliferation since it permits to consume roughly one third of the plutonium and significantly degrades the isotopic composition of the remaining plutonium and thus the potential attractiveness for non-peaceful usages. The reprocessing being driven by the recycling needs (in terms of MOX fuels), the stock of plutonium can be minimized.

Taking into account these two elements, as it is restricted to a few regional centers under international safeguards, reprocessing and recycling may strengthen non-proliferation:

- it may avoid the accumulation of used fuel in multiple storage sites worldwide.
- it may contribute to international non-proliferation initiatives : weapon-grade plutonium disposition (MFFF project) ; Securing « gap material » (DOE).

5. Political issues

France's experience shows that reliable and economically sound technologies are already available to address the management of the spent fuel in a sustainable way. No better technology can be expected for the short/medium term. A strategy based on a long-term interim storage of untreated spent fuel would leave the future generations with all the burden of managing the spent fuel used by their predecessors.

Reprocessing-recycling policy contributes to public acceptance of nuclear energy and its waste disposal, because it avoids a *wait and see* policy, it gains advantage from best available technologies that leave future options open.

Otherwise, in case of a waiting strategy, most of the high financial risks will be transferred to future generations (including on taxpayers if there is a transfer of property to the government), whereas reprocessing-recycling is operational and its cost can be borne today by utilities.

The international policy related to fuel cycle management

Another question is the fuel policy that countries such as the US or France adopt concerning newcomers to nuclear energy. The successful deployment of nuclear energy worldwide requires that nuclear countries are fully conscious of their responsibilities (safety, security, safeguards, sustainability) and ready to bear them. At international level, France considers that any country embarking to nuclear energy should be ready to bear a long term responsibility in the management of its waste, as part of the responsible use of nuclear energy. Otherwise, the commitment of such a country in embarking in a responsible use of nuclear energy should be questioned.

International cooperation and providing services should be promoted to facilitate the definition of fuel back end strategies and their implementation with due regard to safety, security and non-proliferation. As an example, providing reprocessing services with the return of ultimate waste (with no IAEA's safeguards and a more robust safety and security for the interim storage) to the country of origin is a good way to implement a responsible spent fuel management in this country.

And, from an internal point of view, importing foreign radioactive waste for disposal can hamper public acceptance, and can interfere with national procedures for the opening of disposal centers.

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France is ready to share its experience to enable a better understanding of what would help developing a global vision of varied paths to make nuclear energy sustainable worldwide. Concerning the back end of the nuclear cycle, France believes that cooperation between the US and France should be pursued.

1. The US and France could work on having common objectives:
 - We have to demonstrate our capacity to find a final solution for the waste, and to avoid leaving the burdens on future generations.
 - Nuclear materials and waste have to be dealt with in a sustainable development approach.
 - Spent fuel & waste: a common vision on the liabilities of a country willing to embark on nuclear energy.
2. Both countries could go into detail on back-end issues, including findings of the new MIT report on the future of the nuclear fuel cycle. France would be happy to organize in a few months a workshop with the US.
3. France would be happy to provide any further information on its policy, on reprocessing-recycling, on waste management, to organize technical visits in France, etc.