The 1970s French experience with nuclear power

Supplementary Submission to Standing Committee on Environment and Energy of the Australian Parliament inquiry into the prerequisites for nuclear energy in Australia.

Submission from
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The success of the French government in undertaking a substantial expansion of nuclear power in the 1970s stands in stark contrast to the pattern of delays and cost overruns experienced in many other countries, notably including the US, Canada and the UK. It is, therefore, important to consider the conditions under which this success was achieved, and whether these conditions can be replicated in Australia.

The French nuclear expansion began with the Messmer Plan, announced in response to the oil crisis of 1973. The plan, set out by then Prime Minister Pierre Messmer, was for France to go 'all nuclear, all electric'. That is, electricity would replace oil and coal in all uses, including transport, and all new generating capacity would be nuclear.

Messmer announced the plan in early 1974, and construction of the first three plants started in December of that year. There was no parliamentary debate, no meaningful opportunity for public discussion and no requirement for an environmental impact statement. Since the electricity supply system was publicly owned, and subject to direct political control, implementation of the plan was a simple matter of executive fiat. Thanks to this top-down process, the first plants took only six years to build.

The Plan was not delivered in full.The original plan envisaged the construction of around 80 nuclear plants by 1985 and a total of 170 plants by 2000. The actual number built was only 56, and the hoped for transition to an all-electric economy did not take place. Large-scale construction ceased in the 1980s.

Nevertheless, in broad terms, the plan worked. France went from a standing start to a predominantly nuclear electricity-generating system, based on a small set of standard models, mostly designed by US firm Westinghouse. Unlike most other countries with large-scale programs, there were neither major disasters nor obvious cost blowouts. French electricity costs remain broadly competitive with those elsewhere in Europe.

The costs of the French program were analyzed by Arnulf Grubler of the International Institute of Applied Systems Analysis in Vienna, using data published by the Jospin

government in 2000. Grubler's conclusion is that from the beginning of the program to the end, the construction cost per kilowatt for French nuclear plants tripled in real terms.

Given the trends identified by Grubler, the more recent failures of the French nuclear program, such as that of the EDF reactor under construction at Flamanville (seven years behind schedule and several times its initial cost estimate) are merely the continuation of a longterm trend. The factors that enabled so many plants to be constructed at low costs during the 1970s were eroding steadily, even at the time.

What did France do right under the Messmer Plan, and when did it go wrong?

Grubler quotes Dominique Finon and Carine Staropoli, who summarize the unique institutional framework as consisting of four elements:

*strong political support,

*a state-owned electricity monopoly endowed with [substantial] engineering resources, *

high regulatory stability...and

*efficient coordination resulting from long-term organizational arrangements.

Not only was the policy elite unified in support of the program, but the public were almost totally excluded, allowing local concerns to be overridden. In addition, at the beginning of the period, real interest rates were effectively negative and low-cost capital could be directed to favored sectors, such as nuclear power.
These conditions could not be sustained indefinitely. The inflationary conditions of the late 1970s saw blowouts in the costs of megaprojects of all kinds. As a result, the nuclear industry experienced increasing costs everywhere. France did a better job in containing costs than others, but couldn't beat the trend.

By the time interest rates returned to lower levels in the 1990s, the other conditions for French success had disappeared. The centralised dirigiste state of the postwar era was gone, and with it the possibility of anything like the Messmer Plan.

Looking at the implications for the future prospects of nuclear power, the conditions of France in the 1970s can no longer be replicated anywhere in the developed world. Australia is particularly poorly placed to copy France. At present we lack all of the conditions identified by Finon and Starapoli. Australian energy policy is characterized by

* Continuous and bitter disagreement over a wide range of issues

* A fragmented and decentralized market with a mix of private firms, corporatized GBEs and an 'alphabet soup' of regulatory bodies

* Continuous changes in regulation

* No coordination

The aim of my submission was to suggest a path by which at least some of these deficiencies might be addressed.

References

Finon, D., and Staropoli, C. (2001), 'Institutional and technological co-evolution in the French electronuclear industry', *Industry & Innovation*, 8(2), 179–199.

Grubler, A. (2010), 'The costs of the French nuclear scale-up: A case of negative learning by doing', *Energy Policy Special Section on Carbon Emissions*, 38(9), 5174-5188.

Nuclear power and a Clean Energy Target

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I think the Committee for the chance to present my submission. I found the Committee's questions very helpful in clarifying my own thoughts on the issue. As a result, I wish to change my primary recommendation

from

Recommendation 1 (old): *A carbon price of $25/tonne should be introduced immediately, and increased at a real rate of 5 per cent a year, reaching $50/tonne by 2035*

to

Recommendation 1 (new): *A Clean Energy Target requiring at least 80 per cent carbon-free electricity by 2035*

Nuclear power and a Clean Energy Target

In my initial submission to the inquiry, I recommended the removal of the existing legislative ban on nuclear energy accompanied by the immediate imposition of an explicit carbon price, rising from $25/tonne to $50/tonne over time. The rationale was that this cost difference would be needed in order for nuclear power to compete with coal.

In my evidence to the Committee, I noted that a carbon price could take many forms, including the price implicit in quantity based measures such as renewable energy targets

In the course of the discussion, it became clear to me that a package based on a Clean Energy Target, similar to that proposed by the Finkel inquiry would be more comprehensible and more broadly acceptable than one based on an explicit carbon price. As suggested by Finkel, carbon-based generators would be required to purchase offsetting certificates in proportion to their emissions (not, as under the current Renewable Energy Target, in proportion to electricity generated). Certificates would be purchased from carbon-free generators, including nuclear..

To match the effects of the carbon price proposed in my original submission, the proportion of carbon-free generation would need to increase to around 80 per cent of total generation by 2035.