
SENATE APPROPRIATIONS SUBCOMMITTEE ON
ENERGY AND WATER DEVELOPMENT

Testimony of John Deutch, November 16, 2016

Report of the Secretary of Energy Advisory Board, SEAB, Task Force on
The Future of Nuclear Power

Mr. Chairman and Members of the Committee. My name is John Deutch and I am here to present the results of the SEAB Task Force study on The Future of Nuclear Power, which I chaired. I served as Director of Energy Research and Undersecretary of the Department of Energy in the Carter Administration and, for many years I was a director of CMS Energy, a Michigan utility that operated two nuclear power plants.

Secretary Moniz charged the Task Force to describe an initiative that, if successful, would result in a revitalized U.S. nuclear industry of a scale able to deploy 5,000 to 10,000 MWe of nuclear power annually, during the time period 2030 to 2050. The Task Force report and a summary set of charts are available on the web and these materials have been provided to Subcommittee staff. In order to allow the greatest opportunity for discussion, I wish to confine my remarks to the basic thrust of the Task Force report and then to summarize very briefly its major findings and recommendations.

- If the nation wants to have a nuclear option in 2030 it must undertake now an initiative of the scale and scope such as that described by the Task Force.
- Such an initiative will take time, significant public resources, redesign of electricity markets, and sustained and skilled management.
- There is no shortcut to reestablishing a vigorous U.S. nuclear power industry that could be a major source of carbon-free electricity generation for this country and the rest of the world.

I draw your attention to following findings and recommendations of the Task Force:

1. The U.S. nuclear fleet is aging and there have been a number of early retirements. The early retirements are due to the many aspects of the rules governing electricity rates and dispatch that differ in different parts of the country, which make it challenging to value base load nuclear generation appropriately.

Examples include the rate structure in wholesale capacity markets, preferential dispatch rules for renewable generation, exclusion of nuclear power from renewable portfolio standards, and rates that are inadequate to assure recovery of investment. The Task Force report discusses a variety of market design measures that could overcome these obstacles. For existing plants the market obstacles need to be addressed at a state level such as has occurred in New York. However, absent market reform, additional early retirements are likely to occur and in most regions of the country there will be no real prospect for new base load generation. [The Task Force believes that significant market restructuring is a prerequisite for the success of any nuclear power Initiative.](#)

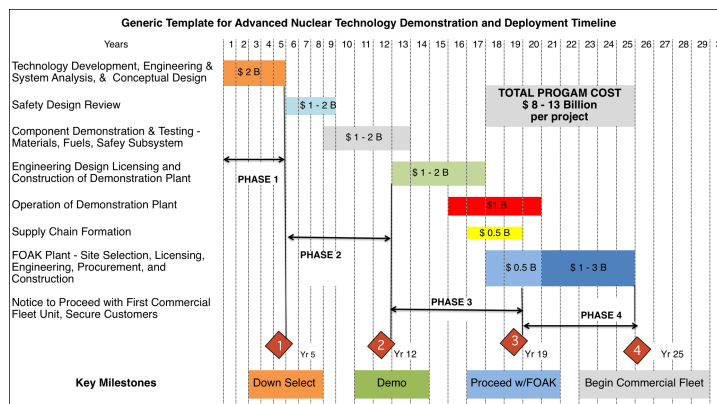
2. The outlook for construction of new nuclear plants in the United States and other OECD countries is bleak primarily because of the high overnight capital cost of nuclear (\$5,000 per kWe) compared to natural gas (\$1,000 per kWe), which makes the levelized cost of electricity of nuclear generation significantly higher than the cost of natural gas generation. The cost disparity would be greatly diminished if the carbon free nature of nuclear power were recognized either by direct production payment proportional to the social cost of carbon avoided or by imposition of a carbon charge on natural gas generation emissions. [Absent an economy-wide carbon emission charge the Task Force recommends a 2.7 ¢/kWe-hr production payment for new nuclear plants.](#)
3. The Task Force has reviewed analyses of the technical readiness of many advanced nuclear reactor systems that have experienced or are experiencing R&D either under the sponsorship of DOE or private firms. [The Task Force recommends a two-part program:](#)

New plants based on proven Light Water Reactor, LWR, technology do not need additional federal financial support beyond the 2.7 ¢/kWe-hr production payment mentioned above. DOE assistance with NRC licensing and possibly placing early reactors on DOE or DOD sites would be appropriate and helpful.

[For advanced nuclear reactors based on new technology, the Task Force recommends a four-part program to bring an advanced reactor from early concept to construction of first-of-a-kind, FOAK, commercial scale plant. The](#)

Task Force estimates this program will take up to 25 years and cost approximately \$11.5 billion. However, this estimate is highly uncertain. There is a realistic prospect of achieving a new reactor system that has significant advantages in such attributes as safety, lower cost, and water usage over present day pressurized water LWRs, but this is by no means certain. The Task Force envisions the cost to be split approximately 50 – 50 between the government and the private sector entity undertaking the project, with the government contribution coming in the earlier phase of the program.

4. A program plan template developed by the Task Force supports the Task Force estimate of the duration and cost of an advanced nuclear reactor development:



Some observers may believe the Task Force estimate is excessively high. Note, however, the recommended program includes a \$2 billion, five year, Part I initial R&D period, leading to down selection of one or more advanced technologies for further development, and the Part IV five year period for construction of the \$3 billion FOAK commercial plant. These two stages are often not explicitly considered. An estimate that does not include these two stages would have an estimated cost and project length in the range of \$6.5 billion and roughly 15 years.

5. Fuel cycle and waste management. Advanced nuclear reactors will raise different issues from LWRs for the front and back end of nuclear electricity generation. The issues depends on the advanced nuclear technology and the Task Force underscores the importance of addressing fuel cycle and waste management as part of the proposed initiative.

6. [The Task Force recommends the creation of an independent quasi public corporation to manage the proposed advanced reactor initiative.](#) The corporation should be funded by a one-time Congressional appropriation and should be exempt from federal personnel and acquisition regulations. The independent board of directors of the corporation would be subject to Senate confirmation and an annual financial and operational report would be submitted to Congress. Such a structure is appropriate for a highly technical program that takes place over several years and requires stable funding and expert management.

The 2012 Blue Ribbon Commission on America's Nuclear Future, co-chaired by Lee Hamilton and Brent Scowcroft, recommended the creation of a similar organization to manage their recommended program for nuclear waste. Committee staff has made the interesting suggestion of considering the creation of a single entity to manage both the advanced nuclear initiative proposed here and implementation of the Blue Ribbon Commission nuclear waste plan.

7. Nuclear Licensing and Safety. The United States Nuclear Regulatory Commission, NRC, license is the gold standard for safety. However, the NRC recent experience is only with licensing LWRs. Since the time and cost needed to obtain a construction and operating license is large, it is important for the NRC to develop a staged approach for the licensing of advanced reactors. [The Task Force believes the NRC has the authority to proceed and should do so now although more some budgetary support will be needed.](#) Some developers may choose to construct and license new advanced reactors abroad, e.g., in China, but U.S. deployment will require full NRC review.
8. International Linkages. For the next one to two decades, the majority of new nuclear deployments will be in Asia, especially in China and India, but also with new entrants such as United Arab Emirates, Jordan, Vietnam, and Turkey. South Korean, Russian, and Chinese firms will do most of the construction. As U.S. and OECD Europe nuclear deployments and exports decline, influence inevitably shifts to China, India, South Korea and Russia. This has important national security consequences for U.S. counter proliferation policies that could be partially reversed by the advanced nuclear initiative proposed by the Task Force. [Since a nuclear accident anywhere in the world is an accident](#)

everywhere, the United States must continue to encourage safety and security in all countries.

9. Concluding Remark. The Task Force report is unanimous. All members agree that if the nation wants to have a nuclear option in 2030 it must undertake now an initiative of the scale and scope such as that described in the report. The Task Force recognizes that there will be different views on whether the proposed initiative is “practical” (i.e., whether it could gain Congressional support given alternative demands) or “necessary” (i.e., whether the future electricity system will depend on distributed generation and there will no longer be a need for base load generation).