Department of Energy Quadrennial Technology Review Framing Document

Comments from The Babcock & Wilcox Company

B&W supports the general concept of the Quadrennial Technology Review (QTR) Framing Document process, which should bolster the sustenance of funding for multi-year programs in accordance with plans. Dependence upon annual appropriations is fraught with uncertainties that result in project delays and inefficiencies. Authorizing legislation needs to be enacted to assure that DOE's Quadrennial Technology Review becomes an ongoing process.

The responses below correspond to the questions posed by DOE in Sections 5 and 6 of the QTR.

4) What are the optimal roles for the private sector, government laboratories, citizens and academia in accelerating technology innovation?

The Department of Energy must carefully balance long-term research and development efforts and near-term commercialization programs to accelerate technology innovation. Each is important, and each requires different forms of support in terms of funding and public or private sector involvement. While the national labs and academia play a critical role in carrying out advanced research and development efforts, first-of-a-kind deployment of new energy technologies should require significant involvement by the private sector and end-user community. This is important to ensure available funds are used to support technologies which are likely to be deployed by the U.S. industry and which can compete in the marketplace. The best way to do so is through competitive public-private partnerships or cost-sharing programs.

The desire to wait for the "next best thing" may result in a tendency to steer funding into long-term R&D and away from public-private partnerships which lead to near-term commercialization. However, public-private partnerships play a vital role by sharing with the private sector both costs and risks associated with the commercial development of any new energy technology. Public-private partnerships are particularly critical to support the development of new commercial nuclear technologies, such as near-term light-water small, modular reactors (SMRs). The Department of Energy's Nuclear Energy R&D Roadmap strikes a good balance between short-term cost-sharing for near-term technologies and longer-term R&D efforts.

The Light Water Reactor (LWR) Small Modular Reactor (SMR) Technical Support Program proposed in the President's FY 2012 budget request requires that technology vendors and utility consortia compete for cost-sharing funds and provide at minimum 50% private sector funding. This program is complemented by R&D efforts in advanced concept SMRs at our national labs. This is a strong example of the appropriate roles for government and the private sector in accelerating technology innovation.

Selection of technologies for public-private partnerships should be based on a selection process with emphasis on near-term deployment, domestic customer commitment to own and operate the technology, domestic supply chain and manufacturing, and potential for U.S. job creation. Viable partnerships require that domestic customers be committed to deployment, that market needs drive

technology selection, that aggressive, near-term schedules be set, that industry have a real financial stake in the success of the program, and that program costs be controlled and, if necessary, capped.

5) What are the principles and best practices in performing large-scale demonstration projects?

Most technology demonstrations promoted by DOE are in response to new, as-yet developed markets, driven by new energy or environmental policy directions. This is in contrast to technology development cost-share programs such as the DOE's LWR SMR Program, which aims to support innovative deployment of proven LWR technology in concert with committed utility customers. Clean coal technologies to address climate change typify this situation. Thus, in addition to technology unknowns, there is also uncertainty in the timing and robustness of market returns upon success. Technology developers, and sometimes customers, provide private sector cost share, planning to earn a return in a future market. Since the demonstration projects may take place before the market manifests, technology providers and project owners must reach equitable risk/reward solutions within the specific project, knowing the future market is not guaranteed. The combination of new technology risk with this financial risk profile often makes it difficult to secure commitments at a 50% cost share level, particularly when the total project cost is in the $10M's to $100M's.

Therefore, public sector funding levels for demonstration of new technologies needs to reflect both the technology and financial risk. They are often hard to separate on a specific project, and both determine success or failure. Prior to commitment of significant expenses, contracting parties develop and evolve their commercial positions to fully understand financial risks (i.e., revenues, guarantees, cost of fixes, expected capacity factor, etc.). Where markets have not been legislated and are uncertain, external funding at levels significantly greater than 50% are likely needed to cover financial risks and move large scale projects forward. It is recognized that higher DOE cost share beyond 50% is not realistic based on budget constraints and past practices. To reach higher funding levels by the private sector for technologies for which the market is uncertain, there needs to be explicit national climate policies that reward progress and commercialization of technologies, such as those in Waxman-Markey, as incentives. To sufficiently fund demonstrations in the absence of such drivers as W-M, other funding mechanisms that augment DOE monies but do not depend on federal appropriations, such as the wires charge concept, will be required.

Technology providers take risk if they can protect their intellectual property. As they have with carbon capture demonstrations, the best approach DOE can take to ensure government investments in demonstrations bring competitive technology to the marketplace is to fund multiple providers and technologies. Also, even though some of the IP could be trapped in a project, successful new technology demonstrations have historically reduced overall risk and brought new competitors to the market with work-arounds or their own developments.

To be most cost efficient, a demonstration project size should be that size which the technology developer deems to be adequate to address scale-up -- such that, at the end of the project (presuming success), the technology developer will be prepared to offer the technology to the marketplace with commercial guarantees. It should not be DOE's responsibility to define a demonstration in terms of MW size.

8) Comments and suggestions to technologies and sources

Section 6.2.2.3 appropriately recognizes the need for energy storage with the new mix of clean electricity technologies that may be needed in the future. There is a growing concern about the destabilizing effect of intermittent renewables such as wind power and solar photovoltaic power on the U.S. grid, especially in local regions where the concentration is relatively high. We believe DOE should follow this development, develop roadmaps and set guidance on combining intermittent renewable supply with back-up power or storage to address grid impact issues. Wind and solar PV technology providers continue to improve reliability and lower costs, but currently have no incentive to develop solutions to the intermittency problem.

A potential source for information on this issue is the 2011 MITEI Symposium on Managing Large-Scale Penetration of Intermittent Renewables. Also, EPRI is always a good source for the power industry for roadmaps and should be consulted or even put in the lead, as the problem is system-wide and may require integration of technologies.