

Milestones-based Funding for Department of Energy Demonstration Projects

Summary

- **Milestones-based funding of demonstration projects for new energy technologies is an effective, and in many instances preferable, alternative to conventional cost reimbursement models**
- **The Energy Act of 2020 provided encouragement and explicit authority to the Department of Energy to use milestones-based models for demonstration projects**
- **By awarding funding to a company when they achieve specific commercial milestones, this model incentivizes more rapid innovation and can provide offramps for federal funding for unsuccessful projects**
- **Funding using a milestones-based approach reduces taxpayer risk, reduces project performance risks, and can accelerate commercialization**
- **Successful pursuit of a milestones-based approach requires champions from the private sector and at the Department of Energy that recognize the potential benefits of alternative contracting approaches. Ultimately, such approaches encourage DOE to adopt an investor mindset for demonstration projects, as opposed to funding them as applied research**

What is a milestones-based approach?

Existing demonstration funding models at the Department of Energy and other technology development agencies use a cooperative agreement approach centered on funding basic research and development. In this model, a government agency competitively awards funding to a private entity for a technology development project. As the private company incurs costs for the project, they are periodically reimbursed by the federal government for those costs. Both the federal government and private sector contribute funds to the project using a cost share formula for the lifetime of the project, for example a split of 50% federal and 50% private funding.

Under cooperative agreements, the federal government is locked in to support a particular project, subject to Congressional appropriations. While this model can support successful technology development, it can present several disadvantages. The structure of the program is focused on the successful completion of the terms of the agreement, not necessarily the successful development of a commercial technology. Accordingly, technology and economic performance risks fall primarily on taxpayers. There are limited gateways or check-in points to evaluate the progress of a project until it is done, and limited circumstances under which the government agency can withdraw support. Additionally, such an approach can require significant compliance overhead by the federal agency and private entity, reducing taxpayers' return on dollar invested. These models can shape company business plans and activities as the funding structure influences business models, and funds are typically tied to federal fiscal years. Such influences may not allow innovative commercial management processes needed for technology commercialization to blossom and flourish. Finally, conventional cost share projects are prone to cost and time overruns as the model does not incentivize more rapid completion of a project (indeed, certain designs can encourage projects take longer to receive more federal funds).

A Payment-for-Milestones or milestone-based approach re-imagines government support of private-sector innovation, tying funds to the achievement specific hardware, technical, and/or financial milestones. As described in NIA's report, [In Search of a SpaceX for Nuclear Energy](#), NASA successfully used this approach to catalyze the development of aerospace technologies to provide commercial services for NASA missions. In these milestone-based projects, applicants identify and describe expected milestones. These milestones are tied to awards – when a company reaches a milestone, they receive the money. If they do not reach a milestone, they do not receive the funding. Unlike cooperative agreements, which are designed for research and development, milestone-based approaches are well suited to bridging the commercialization valley of death, balancing risks between the public and private sector.

What are the benefits of a Milestones-based approach?

Milestones funding can increase the cost-effectiveness and likelihood of success for technology demonstration projects as it requires companies to orient business activities around technology outcomes, not contract processes. Specific benefits for companies and the federal government include:

- **Incentivize rapid innovation.** The imperative of climate mitigation create urgency to develop advanced energy technologies as rapidly as possible. By tying funding to the achievement of milestones, a milestones approach incentivizes companies to deliver their project as fast as possible, accelerating innovation.
- **Reduce resources for compliance.** Cost reimbursement models can require significant government and private sector overhead for contract compliance. Milestones save dollars for taxpayers and the private sector by simplifying this process.
- **Let the industry lead in innovation.** By allowing industry to define its metric of success for its business and technology development pathways, with limited technical “requirements” or restrictions from a conventional cost share contract, industry can focus on getting innovations to market as fast as possible.
- **Increased transparency of objectives.** Defining specific project milestones that signal progress, especially for hardware, can enable the Department of Energy and the public to judge how well a project is delivering on its promises.
- **Discontinued funding for underperformance.** Taxpayer dollars are a precious resource and significant delays in projects and cost overruns could threaten overall progress towards national technology objectives. Ending unsuccessful projects can free up funding for new efforts, enabling a more nimble and adaptive approach to technology commercialization.

The fundamental goal of a milestone-based funding approach for demonstration project is complementing and accelerating a company's internal plan to develop a technology of importance to the national interest. Critically, successful milestones funding is based on company-set milestones; innovators are in the best position to identify key progress points. While conventional cost-share models can be effective, milestones approaches can adapt lessons from the venture capital industry to ensure smart, successful investments. By dividing projects into discrete phases via milestones, progress indicators can be readily identified and funding can

be matched to project success. Further, such approaches can be more attractive for venture and institutional capital, building a foundation for later rapid commercialization.

Although not all companies may opt to use a milestones-approach, ensuring it is an available option maximizes the chances of success for technology demonstration projects. Having cost reimbursement as the sole option limits business model diversity and can inhibit the pace of innovation. Not allowing a milestones option can bring significant opportunity costs in terms of greater carbon emissions.

For example, for a nuclear demonstration project, there are natural milestones that makes the model attractive: completion of the initial design, completion of a license application to the Nuclear Regulatory Commission (NRC), the NRC progressing through a review and ultimately granting a permit or license, multiple major construction activities, and start-up testing and initial operations of a facility. Tying awards of funds to completing these specific milestones incentivizes continued progress for companies while allowing them to raise private funds to meet those milestones. It also allows the Department of Energy and the public to ensure that a project is progressing on time and on budget.

DOE Implementation of a Milestones-based approach

Section 9005 of the Energy Act of 2020 grants the Department of Energy explicit authority to use milestones-based approaches to fund public-private demonstration projects. DOE should work with private companies to implement such approaches as quickly and as widely as possible. Doing so requires clearly identifying relevant hardware, technical, and financial milestones tied to a company's technology development plan.

Importantly, successful development of such a program requires champions in industry and at the Department of Energy. Overcoming industry and institutional inertia can require great effort, but the benefits of milestones are worth it. Successful development of a milestones model can speed the rate of advanced reactor development, better steward taxpayer resources, and best meet the economic, environmental, and national security goals of the United States.