



RPSEA R&D Plan

2018

**"Keeping it going for the long haul"
*The Easy Stuff is Gone***

Executive Summary

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President***



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This document is the Research Partnership to Secure Energy for America (RPSEA) R&D plan (PLAN). This will allow us and key our key stakeholders to prioritize our focus, as well as provide a roadmap for industry and policymakers to work together to address oil and gas challenges through research and technology transfer. RPSEA has been a focal point for the industry to address technical challenges over the past decade in a collaborative manner. This PLAN takes advantage is this network of the leading subject matter experts, looking at challenges best addressed through investments in R&D, providing value in terms of energy security, jobs and the economy while improving safety and environmental performance for the next decade. No one knows what the energy industry will look like in the next ten years, but we do know in order to maintain our leadership position, the United States must compete on a global basis, take full advantage of rapidly evolving technology and address the variety of challenges we will face. It is not sustainable to compete and be profitable offshore if new technologies and equipment are just bigger and more expensive; if the time from discovery to production is not reduced; and if advances are not made to better assure safety and environmental performance. We know we must improve efficiencies for onshore operations, while increasing the recovery of each well drilled, and investments are needed to assure operations are conducted in the safest and most environmentally responsible manner possible. It can be done!

The title: “Keeping it going for the long haul – the easy stuff is gone” is the reason we must prioritize our research investments on the key targets including:

- Technologies that will improve safety and environmental performance;
- Onshore emerging and developing shale plays;
- Offshore satellite fields; and
- Improved recovery for onshore and offshore reservoirs.

This PLAN is evolutionary and builds upon the foundation of the successful program described in the Final Report for the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Research and Development Program (Program) established pursuant to Title IX, Subtitle J, Section 999 (Section 999), of the Energy Policy Act of 2005 (EPAAct). The U.S. Department of Energy (DOE), through its National Energy Technology Laboratory (NETL), provided program oversight. That report covers the period from 2007, when research began, through 2016, when the “999 program” funding ended, and builds a foundation for work that can be conducted in the future.

Working with the U.S. Department of Energy NETL, RPSEA successfully managed over 170 projects utilizing \$350 million including cost share. The projects, several of which

are already commercial, have resulted in improved safety, reduced environmental risk and increased energy security. The research generated over \$150 billion in direct economic value from jobs, royalties and revenue. It yielded over \$40 billion in environmental damage mitigation. As evidence of its successful technology transfer program, over 5,000 articles were published documenting their results.

The Final Report documents the most successful public private partnership for oil and gas R&D in the U.S. and lays the foundation for future research endeavors. Section 999 funded investments in R&D from the Federal royalty trust fund, which provided certainty, stability and continuity to research efforts. RPSEA's successes are also due to its members providing hundreds of subject matter experts, contributing thousands of hours in directing the program. Future programs should follow the same processes and funding mechanisms and build upon the lessons learned described in the report. The result is increased success rates, shortened cycle time from concept to application, and maximum return on investment.

An important component of RPSEA's PLAN is to ensure that the risks associated with the development of offshore and onshore resources are fully understood, and that the means are available to fully mitigate those risks with respect to both prevention and recovery.

The model RPSEA has developed involves the active engagement of stakeholders across the entire community of energy producers, researchers, technology providers, regulators, and environmental groups. The best efforts of the research community are required to identify challenges and develop the technology necessary to safely deliver hydrocarbons from the targeted resources. However, the knowledge residing with producers and service companies is crucial in providing effective direction for the needed research. **Effective Technology Transfer is essential.** Further, the rapid transfer and application of new ideas and results will be facilitated by the continuing involvement of producers and service companies in the planning and execution of the research program.

The emphasis on safety and environmental sensitivity reflected in this PLAN will require more direct involvement and communication with the regulatory agencies and the environmental community.

The safe and environmentally sensitive delivery of secure domestic hydrocarbon resources to the citizens of the United States is not the only outcome of the research conducted under this program. While the U. S. is currently a leader in terms of the development of oil and gas (in particular, the onshore unconventional shale resources), other nations are beginning to see these resources as an important component of a plan to move toward a lower-carbon, sustainable energy mix. While development of these resources in the U.S. directly yields thousands of high-paying domestic jobs, research

efforts funded by RPSEA's program are helping to keep U.S. companies and universities in the forefront of energy technology worldwide.

This PLAN was developed through member and key stakeholder involvement, RPSEA conducted surveys, focused program advisory meetings, and meetings with industry leaders. RPSEA also asked leaders to identify the grand technical challenges, then identifying target enabling technology needs, and the R&D required to develop technologies. The PLAN also incorporates information from publications, presentations and reports from technical organizations, government, science and industry associations.

This plan has identified the need for R&D funding that in most part does not exist today. Feedback from our survey also includes the need for big challenges that will be a priority, an example is:

We have over a million wells in the US onshore and offshore, in deep and shallow water and in areas of the Arctic. In all these areas, there is significant opportunity to increase the recovery factor per well. The big challenge is how to increase production from existing wells and known discoveries in a cost-effective manner without drilling a number of new wells. This challenge requires cooperative efforts from the geoscience, reservoir engineering, mechanical and chemical engineering and production fields. A related challenge is to extend the life of a well, with aging infrastructure above and below the ground, beyond its intended life design, addressing economic, safety and environmental challenges.

RPSEA manages an onshore and offshore program. Elements of the offshore program will include addressing harsh environment challenges such as operations in the arctic, deep water and reservoirs with extreme high pressure and high temperature. Our onshore program addresses efficiencies that can be gained through new technology, that will provide a positive long-term improvement on production, environmental performance and jobs. RPSEA also strives to work with and support Federal agencies at the Department of Interior and Energy and with energy producing States. The RPSEA R&D plan focuses on all these areas and provides new technology and processes to industry and regulators, to address the big challenges the oil and gas industry faces today and will face into the future.

The U.S. has a lot to gain from reliable, safe and environmentally conscious development of our domestic natural resources. Advances in technology have allowed us to increase our production and decrease our dependence on foreign production. A public-private partnership focused on cross-cutting applied R&D has been demonstrated as an effective way to assure funding is leveraged and properly invested where advances in technology can continue.

It is also important to note that certain R&D topics are *not* listed in this PLAN because some technologies are rapidly being developed by industry and do not require government investments; but other topics and challenges included in this report are best advanced through collaborative government and industry investments.

All stakeholders benefit for this type of investment.

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