



American Energy
Innovation Council

ENERGY INNOVATION: SUPPORTING THE FULL INNOVATION LIFECYCLE

Executive Summary

February 2020

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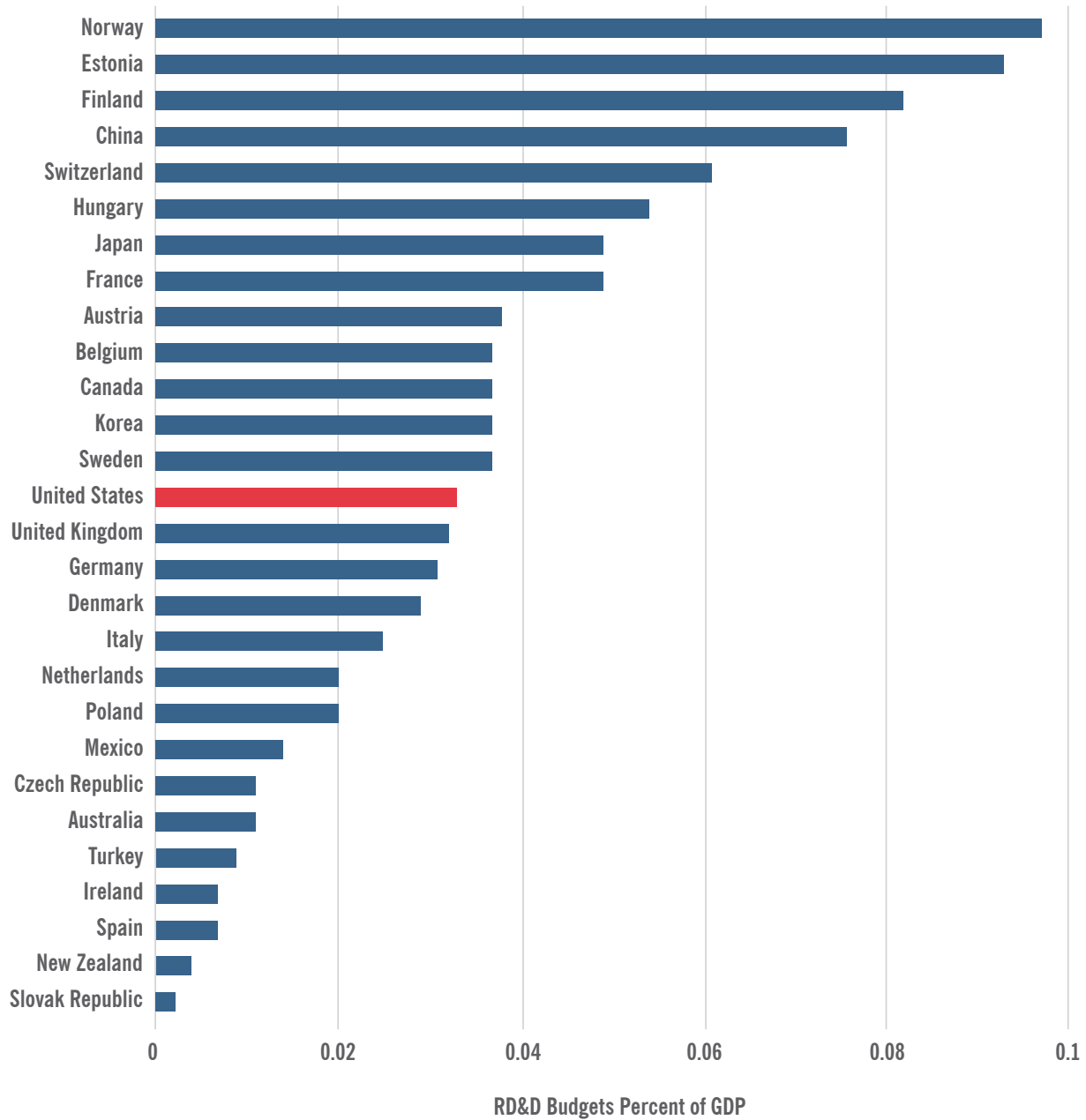
There is a growing urgency for the United States to address the critical challenges of climate change and global economic competitiveness. A robust energy innovation agenda must be at the heart of this strategy because all the technologies we need to address climate change simply do not yet exist. Bipartisan momentum is gathering around a technology-forward innovation agenda. For the United States to effectively nurture climate-saving technologies and maintain our position of global economic leadership, **we must triple our investment** in the full energy innovation lifecycle. This will require increasing federal support for basic science research to creating effective federal institutional and financial structures to support the scale-up and demonstration of low-and zero-emission energy technologies for deployment here and export abroad.

GLOBAL ENERGY R&D INVESTMENT TRENDS

Both public and private spending on energy R&D increased globally in 2017 and 2018. This increase followed four years of decline with investment concentrated primarily in low-carbon energy technologies. Corporations remain the largest source of energy innovation funding in terms of total dollars, but government spending also plays a major role in this sector worldwide. From 2017 to 2018, global spending on energy innovation by corporations and governments increased, in both cases by approximately 4%. The global increase in public funding for energy research was driven by China and the United States; however, it did not keep pace with growth in global GDP.

The United States **fell from 13th to 14th** place in terms of public energy R&D spending relative to national GDP between 2015 and 2017 (See Figure 1). Relative to most other developed economies, the U.S. government dedicates a smaller share of its research budget to energy and other industrial technologies, including technologies for making heavy-industry manufacturing processes cleaner and more efficient. In contrast, China was fourth globally, and has continued to expand its relative lead in public energy research, development and deployment spending as a share of GDP. Substantial public spending, along with government subsidies and supportive policies, explain why China was the world's largest market for energy investment in 2018, even as Chinese companies were expanding their share of new markets for clean energy technologies such as electric vehicles.

FIGURE 1. GOVERNMENT ENERGY RD&D INVESTMENT AS A PERCENTAGE OF GDP, 2017



Source: International Energy Agency. "Energy Technology RD&D Budgets: Overview." May 2019.

Available at: <http://wds.iea.org/WDS/tableviewer/document.aspx?FileId=1649>

Note: Chinese public energy R&D investment includes spending by the government and by state-owned enterprises.

RECOMMENDATIONS TO SUPPORT THE FULL INNOVATION LIFECYCLE

The United States is in a global clean energy technology race and needs a galvanizing clean energy innovation agenda with a strong long-term signal. Encouraging only early-stage R&D will not be enough, serving only to support the invention of technologies that will die an early death in the lab, or be fully developed abroad and sold back to us. Rather, well-targeted public investments and well-designed public policies for the full innovation lifecycle are needed to scale the next generation of advanced energy technologies.

FOR RESEARCH AND DEVELOPMENT

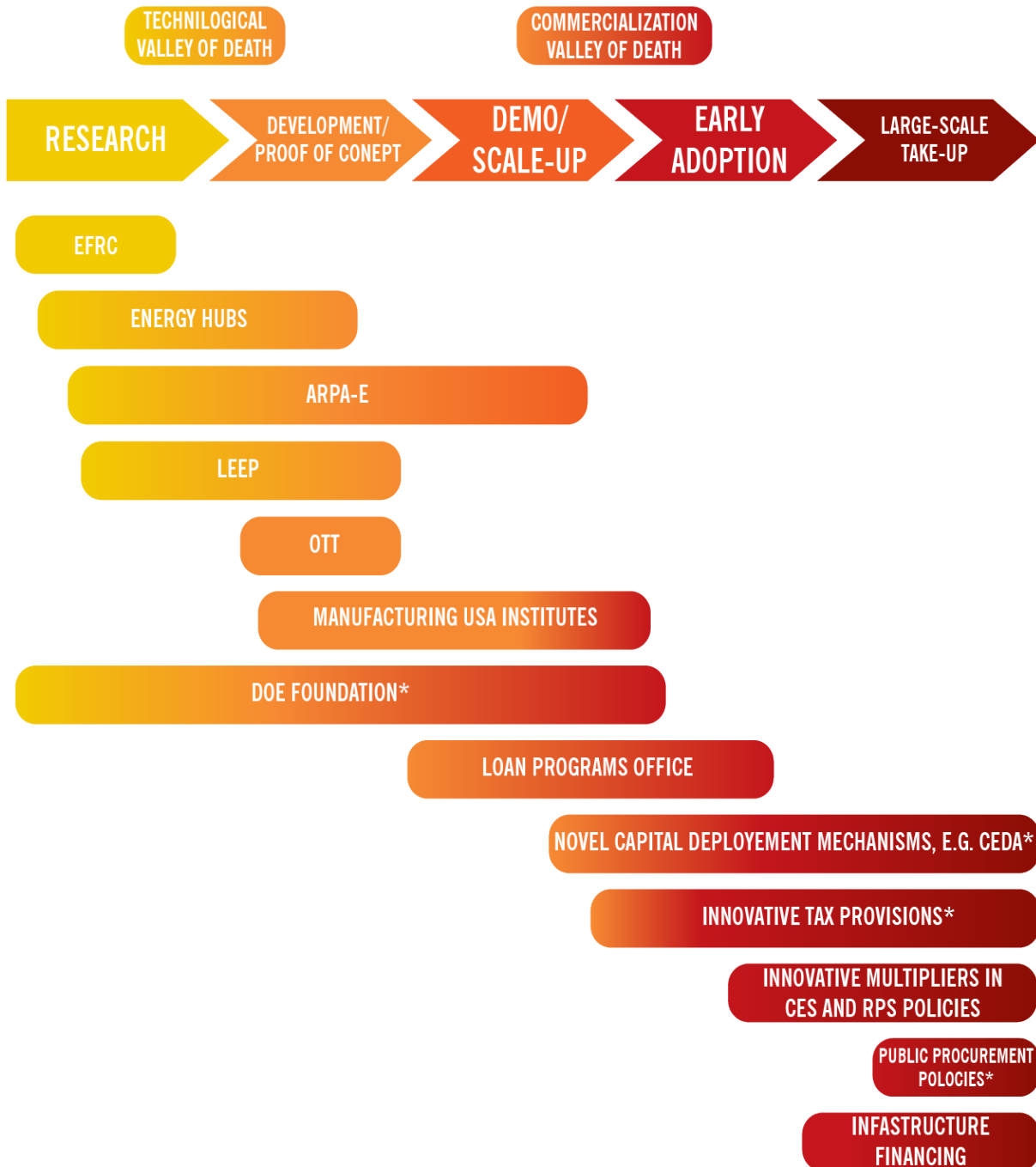
- 1.** Congress should expand federal appropriations for DOE's Advanced Research Projects Agency-Energy to \$1 billion per year.
- 2.** Congress should authorize and appropriate \$20 million per year for DOE's Lab-Embedded Entrepreneurship Program.
- 3.** Congress should authorize and appropriate \$16 million per year for DOE's Office of Technology Transitions (OTT). In addition, OTT should be given its own authorization, and the head of OTT should report to the Secretary of Energy.

FOR DEMONSTRATION AND DEPLOYMENT

- 4.** Congress should consider strengthening and enhancing DOE's Loan Programs Office.
- 5.** Congress should consider additional institutional mechanisms to support early-stage commercial projects like the Clean Energy Deployment Administration.
- 6.** Congress should consider energy tax provisions focused on supporting the early commercial deployment of new technologies.
- 7.** Innovation multipliers should be considered as a potentially powerful tool to incentivize innovation within energy standards.
- 8.** Public procurement programs should be used to establish early market demand for innovative technologies.
- 9.** Infrastructure financing should be designed to support and incorporate innovative technologies.

FIGURE 2. POLICIES TO SUPPORT THE WHOLE ENERGY INNOVATION LIFECYCLE

(Items with a * are proposals and currently don't exist or are currently limited in scope like procurement policies)



Source: AEIC Generated

NOTES

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Bipartisan Policy Center

This American Energy Innovation Council report is a product of the Bipartisan Policy Center. The findings and recommendations expressed herein are solely those of the Council and do not necessarily represent the views or opinions of the Bipartisan Policy Center, its founders, or its Board of Directors.

WHO WE ARE

The American Energy Innovation Council, originally formed in 2010, is a group of 11 corporate leaders who share a common interest in increasing U.S. commitment to energy innovation. We speak as executives with broad-based success in innovation. In the course of our careers we have been called upon to overcome obstacles, seize opportunities, and make difficult decisions, all in the pursuit of building great American companies.

OUR MISSION

The mission of the American Energy Innovation Council is to foster strong economic growth, create jobs in new industries, and reestablish America's energy technology leadership through robust public and private investments in the development of world-changing energy technologies. The AEIC is a project of the Bipartisan Policy Center.

THE AMERICAN ENERGY INNOVATION COUNCIL PRINCIPALS

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