

# More and Better: Building and Managing a Federal Energy Demonstration Project Portfolio

Robert Rozansky  
David Hart

May 20, 2020

Questions? Submit via [www.sli.do](http://www.sli.do) using code:  
#ITIFenergy

@rob\_rozansky @ProfDavidHart

# More and Better: Building and Managing a Federal Energy Demonstration Project Portfolio

David M. Hart, Senior Fellow, ITIF

Robert Rozansky, Senior Policy Analyst, ITIF

Sydney Bopp, Associate Director for Technology Policy, Bipartisan Policy Center

John Deutch, Institute Professor, emeritus, Massachusetts Institute of Technology

# About ITIF

---

- Independent, nonpartisan research and education institute focusing on intersection of technological innovation and public policy, including:
  - Innovation and competitiveness
  - IT and data
  - Telecommunications
  - Trade and globalization
  - Life sciences and agricultural biotech
  - Clean energy innovation
- Formulates and promotes policy solutions that accelerate innovation and boost productivity to spur growth, opportunity, and progress
- World's top think tank for science and technology policy, according to the University of Pennsylvania's authoritative *Global Go To Think Tank* Index

## More and Better: Building and Managing a Federal Energy Demonstration Project Portfolio

ROBERT ROZANSKY AND DAVID M. HART | MAY 2020

Demonstrating the commercial viability of new technologies for deep decarbonization requires federal funding. But the government's past record is decidedly mixed. So Congress should increase funding for demonstration projects while reforming how they are administered.

### KEY TAKEAWAYS

- Promising clean energy technologies—especially complex, capital-intensive, large-scale technologies—too often remain on the cusp of commercial deployment because they have not been effectively demonstrated.
- The federal government should substantially increase its investment in clean energy demonstration projects, and Congress should establish an Office of Major Demonstrations at DOE with dedicated funding to manage this expanded portfolio.
- The focus should be on large-scale technologies that can achieve deep decarbonization, including advanced nuclear power, long-duration grid storage, carbon-neutral fuels, carbon capture and storage, and carbon removal.
- Federal funding is critical for energy demonstration projects, because the risks are often too high for private investors. Yet the government's past record is marred by drawn-out support for failed megaprojects and periods of stagnant investment.
- Given the historical record, policymakers may be reluctant to fund energy demonstration projects until there are substantial reforms to how they are administered. Academic literature, including prior ITIF research, offers an actionable framework.

# Contents

---

- 1 The Case for Public Support for Demonstration
- 2 More: Increasing Federal Investment in Demonstration
- 3 Better: Reforming Management of the Federal Portfolio
- 4 Conclusion

# Motivation: Clean Energy Innovation is Needed, Quickly

- Mitigating climate change requires new clean energy technologies
- International Energy Agency (IEA): 32 of 39 key technologies not being deployed fast enough
- Large-scale, complex technologies face unique barriers to deployment

**IEA technology progress (compared to Sustainable Development Scenario):**

- on track
- more effort needed
- not on track

<b>Energy Storage</b>	<b>Hydrogen</b>
<b>Nuclear Power</b>	<b>Carbon capture in power</b>
<b>Geothermal</b>	<b>Carbon capture in industry</b>
<b>Concentrating solar power</b>	<b>Ocean Power</b>

# Insufficient Demonstration Slows Clean Energy Innovation

---

- Complex, large-scale technologies often need demonstration
- Demonstration: prototype at full/near-full scale in real world conditions
  - De-risks technology by generating knowledge (technical, economic, environmental, etc.) to reduce costs and boost stakeholder confidence
  - Currently, a weakness in the innovation process, halting adoption



Source: National Academies of Science, Engineering, and Medicine, *The Power of Change*

# Demonstration is an Innovation “Valley of Death”

---

- Energy demonstration is unattractive to investors
  - Expensive – projects can cost \$100s of millions to billions
  - Risky – some first-of-a-kind projects will fail
  - Modest payoffs – knowledge spillover limits first-mover advantage
- Who will fund demonstration?
  - Private sector typically won’t invest alone
  - Fed govt. has cost-shared with private sector, with mixed success



# History of Federal Demonstration: A Mixed Record

---

- The good: public demonstration has spawned new industries
- The bad: infrequent funding for demonstration
- The ugly: failed megaprojects

*Nuclear Power*



*FutureGen Power Plant  
(never built)*



Source: U.S. Department of Energy

# Contents

---

- 1 The Case for Public Support for Demonstration
- 2 More: Increasing Federal Investment in Demonstration
- 3 Better: Reforming Management of the Federal Portfolio
- 4 Conclusion

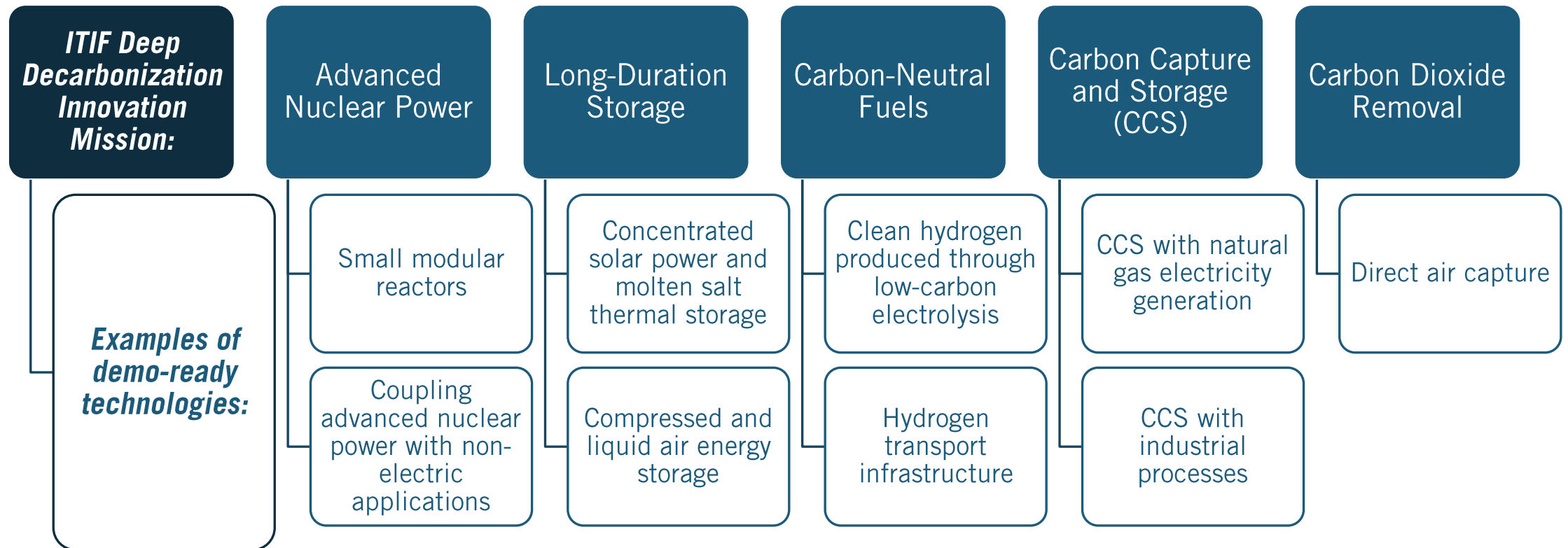
## Recommendation #1: Increase Investment in Demonstration

---

- Few large-scale clean energy demonstration projects funded today
- Demonstration projects are expensive
  - Millions to billions of dollars
  - Multiple projects needed to identify and de-risk pathways for a single technology
- \$5 billion per year (or more) would support cost-share of a few large projects and many smaller ones

# Which Technologies Should Be Demonstrated Today?

Technologies that (a) support deep decarbonization, (b) are large/complex, (c) are demo-ready



# Example: Why Use Public Funds to Demonstrate Direct Air Capture (DAC)?

---

- National Academies: we must remove 10 gigatons CO<sub>2</sub> / year by mid-century
- First DAC demonstration by Climeworks (\$600 / ton CO<sub>2</sub>)
- Public support for DAC demonstration can
  - Incentivize private firms to share cost/performance data
  - Speed up deployment to meet emissions reduction goals

# Contents

---

- 1 The Case for Public Support for Demonstration
- 2 More: Increasing Federal Investment in Demonstration
- 3 Better: Reforming Management of the Federal Portfolio
- 4 Conclusion

# Eight Precepts To Guide Demonstration Project Administration

---

1. Strategic portfolio
2. Expert management
3. Minimal political influence
4. Tailored cost-share agreements
5. Knowledge sharing
6. Cross-sector linkages
7. Coordination among partners (federal, state, and intl.)
8. Steady, sufficient funding

## Recommendation #2: Establish a DOE Office of Major Demonstrations

---

- Demo project management decentralized among DOE Applied Offices
- Opportunities for improvement:
  - Steady, sufficient funding
  - Portfolio coordination
  - Insulation from political influence
  - Project management expertise
- Numerous reform proposals; we recommend DOE Office of Major Demonstrations



# Five Options for Demonstration Project Administration

---

The Default Option:  
The **DOE Applied Offices** continue to fund and manage individual projects.

Option #2:  
A **DOE Office of Major Demonstrations**, staffed with project management expertise, oversees a demonstration portfolio across multiple technology areas.

Option #3:  
A **Quasi-governmental Demonstration Corporation** independently finances and oversees a portfolio of large-scale energy demonstration projects.

Option #4:  
A non-profit national **Green Bank** facilitates private investment into low-carbon infrastructure, including demonstration projects.

Option #5:  
**Regional Demonstration Funds** across the country representing local utilities support and manage electricity sector demonstration projects.

# Full Analysis

	DOE Applied Offices	DOE Office of Major Demonstrations	Quasi-governmental Demonstration Corporation	Green Bank	Regional Demonstration Funds
<i>Would this administration...</i>					
develop and maintain a strategic portfolio?	No	Yes	Yes	No	No
apply expert management practices?	Maybe	Yes	Yes	Maybe	Maybe
avoid political influence?	No	No	Yes	Yes	Maybe
tailor cost-share agreements?	Maybe	Yes	Yes	Maybe	Maybe
facilitate knowledge sharing?	Maybe	Yes	Yes	Maybe	Maybe
ensure strong upstream linkages?	Yes	Maybe	No	No	Yes
ensure strong downstream linkages?	Yes	Yes	Yes	Yes	Yes
enhance coordination among federal, state, and international partners?	Yes	Yes	Maybe	Maybe	No
ensure steady and sufficient funding?	No	Maybe	Yes	No	Yes
... And is this reform politically feasible?	Yes	Yes	Maybe	Maybe	Maybe

# Option 3: Quasi-governmental Demonstration Corporation

---

- Independent, well-funded, and with close commercial ties
- But political barriers are high

Quasi-governmental Demonstration Corporation	
<i>Would this administration...</i>	
develop and maintain a strategic portfolio?	Yes
avoid political influence?	Yes
ensure strong downstream linkages?	Yes
ensure steady and <u>sufficient</u> funding?	Yes
... And is this reform politically feasible?	Maybe

# Option 4: Green Bank

---

- Like corporation, independent, well-funded, and with close commercial ties
- But deployment focus could lead to overly conservative portfolio

Green Bank	
<i>Would this administration...</i>	
develop and maintain a strategic portfolio?	No
ensure strong downstream linkages?	Yes
ensure steady and <u>sufficient</u> funding?	No
... And is this reform politically feasible?	Maybe

# Option 5: Regional Demonstration Funds

---

- Strong regional linkages and possibility for reliable, local funding stream
- But lack of national coordination is not ideal, and system complexity makes implementation unlikely

Regional Demonstration Funds	
<i>Would this administration...</i>	
develop and maintain a strategic portfolio?	No
ensure strong upstream linkages?	Yes
ensure strong downstream linkages?	Yes
ensure steady and <u>sufficient</u> funding?	Yes
... And is this reform politically feasible?	Maybe

# Option 2: DOE Office of Major Demonstrations

---

- Strategic portfolio; project management expertise; well-positioned to coordinate with stakeholders, experts, and programs within and beyond DOE
- And, relatively politically feasible
- Our recommendation

DOE Office of Major Demonstrations	
<i>Would this administration...</i>	
develop and maintain a strategic portfolio?	Yes
apply expert management practices?	Yes
avoid political influence?	No
enhance coordination among federal, state, and international partners?	Yes
ensure steady and <u>sufficient</u> funding?	Maybe
... And is this reform politically feasible?	Yes

# Contents

---

- 1 The Case for Public Support for Demonstration
- 2 More: Increasing Federal Investment in Demonstration
- 3 Better: Reforming Management of the Federal Portfolio
- 4 Conclusion

# Conclusion: More and Better

---

- Critically important to support demonstration, now
  - More: Fund demo-ready tech for deep decarbonization (>\$5 B)
  - Better: DOE Office of Major Demonstrations
- Prospects for reform
  - American Energy Innovation Act (proposed) authorizes 17 demo projects in geothermal energy, carbon capture, advanced nuclear, and storage
  - Stimulus offers opportunity for clean energy demonstration



# Thank You!

Robert Rozansky | [rrozansky@itif.org](mailto:rrozansky@itif.org) | [@rob\\_rozansky](https://twitter.com/rob_rozansky)

David Hart | [dhart@itif.org](mailto:dhart@itif.org) | [@ProfDavidHart](https://twitter.com/ProfDavidHart)