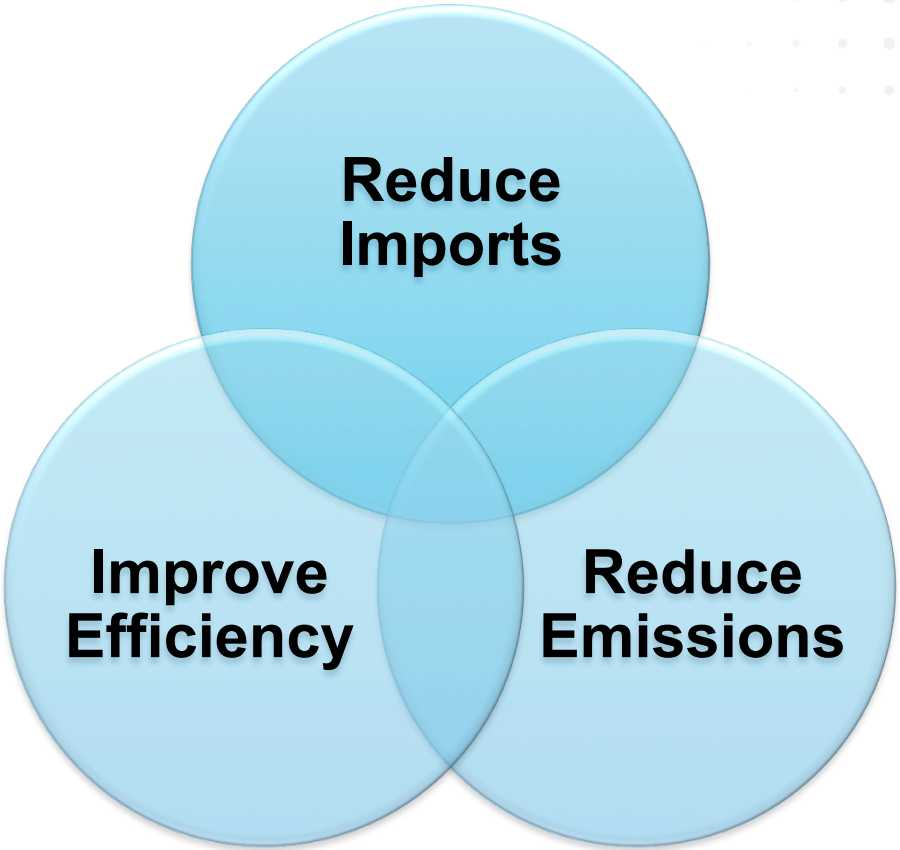
The ARPA-E Mission

Catalyze and support the development of transformational, high-impact energy technologies

Ensure America's

- National Security
- Economic Security
- Energy Security
- Technological Lead



ARPA-E Program Framing Questions

What is the problem to be **solved**?

If successful, how will the proposed program impact one or more of **ARPA-E's mission areas**?

What is the current state of R&D? How is the proposed program a **transformative and disruptive approach**?

How does the program **complement R&D efforts** in other DOE programs, federal agencies, and the private sector?

Why is now the **right time** to solve this problem?

What are the **program goals** and how will progress towards those goals be measured?

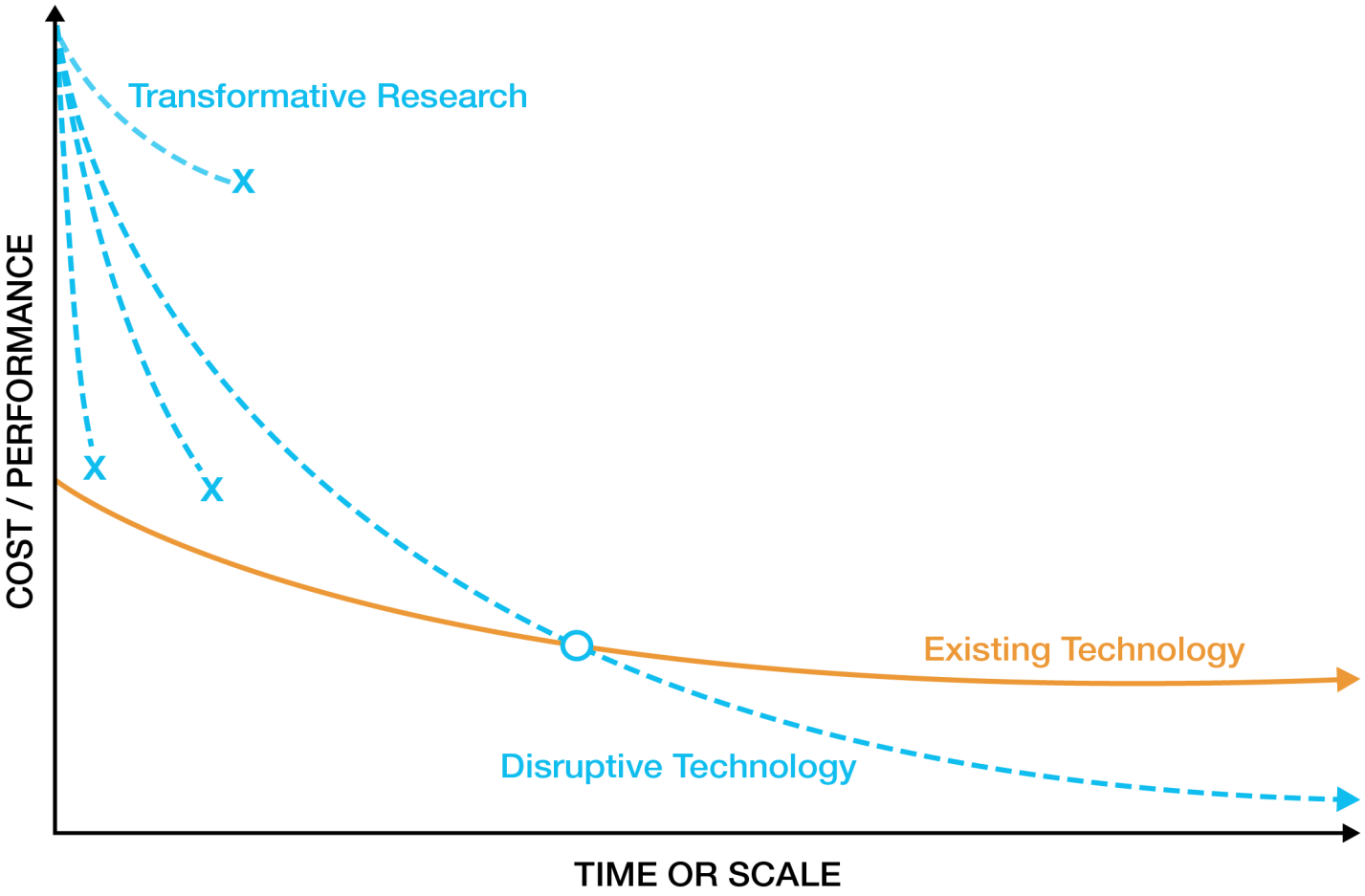
What happens at the conclusion of the program? What are the **barriers to commercialization** and how might these problems be overcome?

What **research communities** need to be brought together?

If it works…

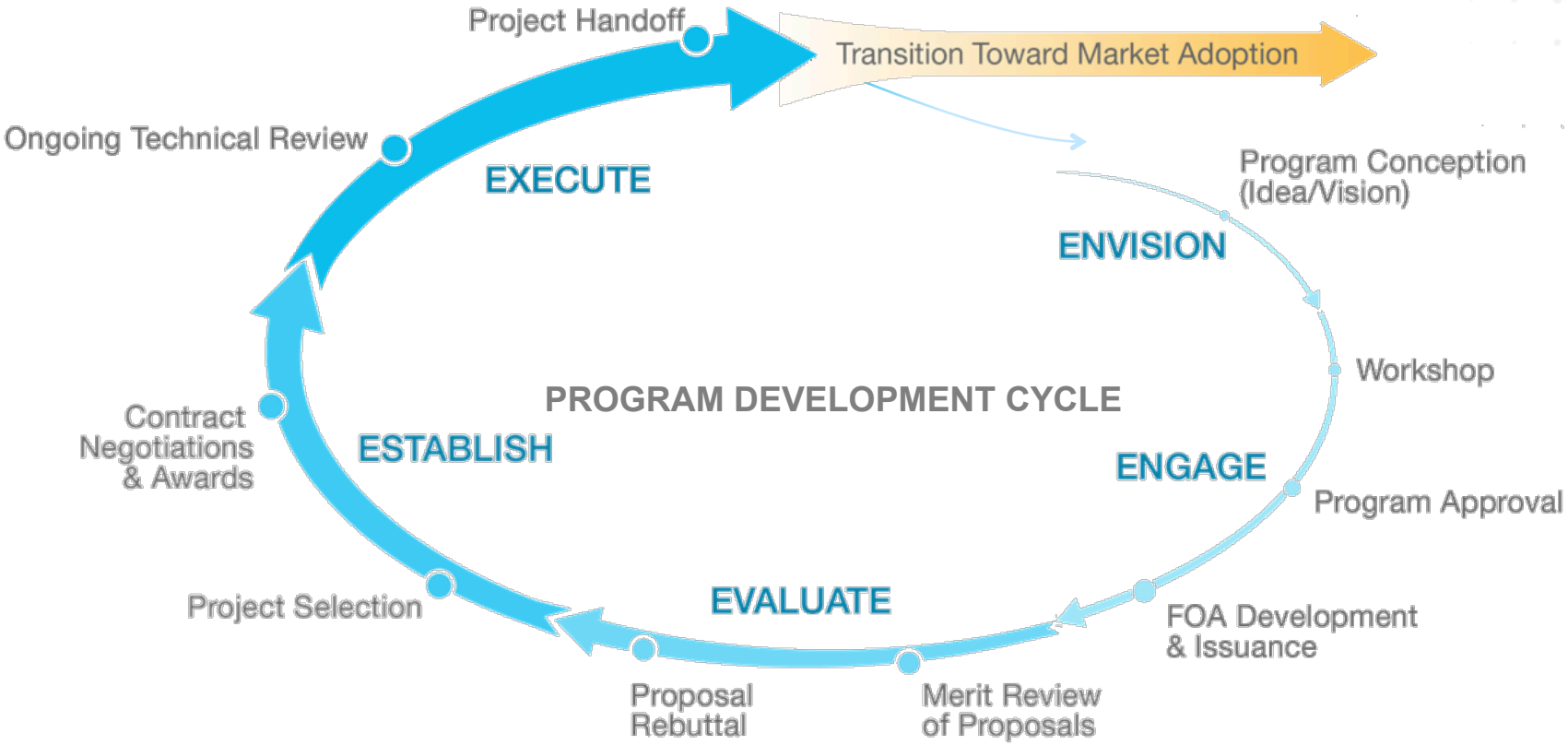
will it matter?

Creating New Learning Curves

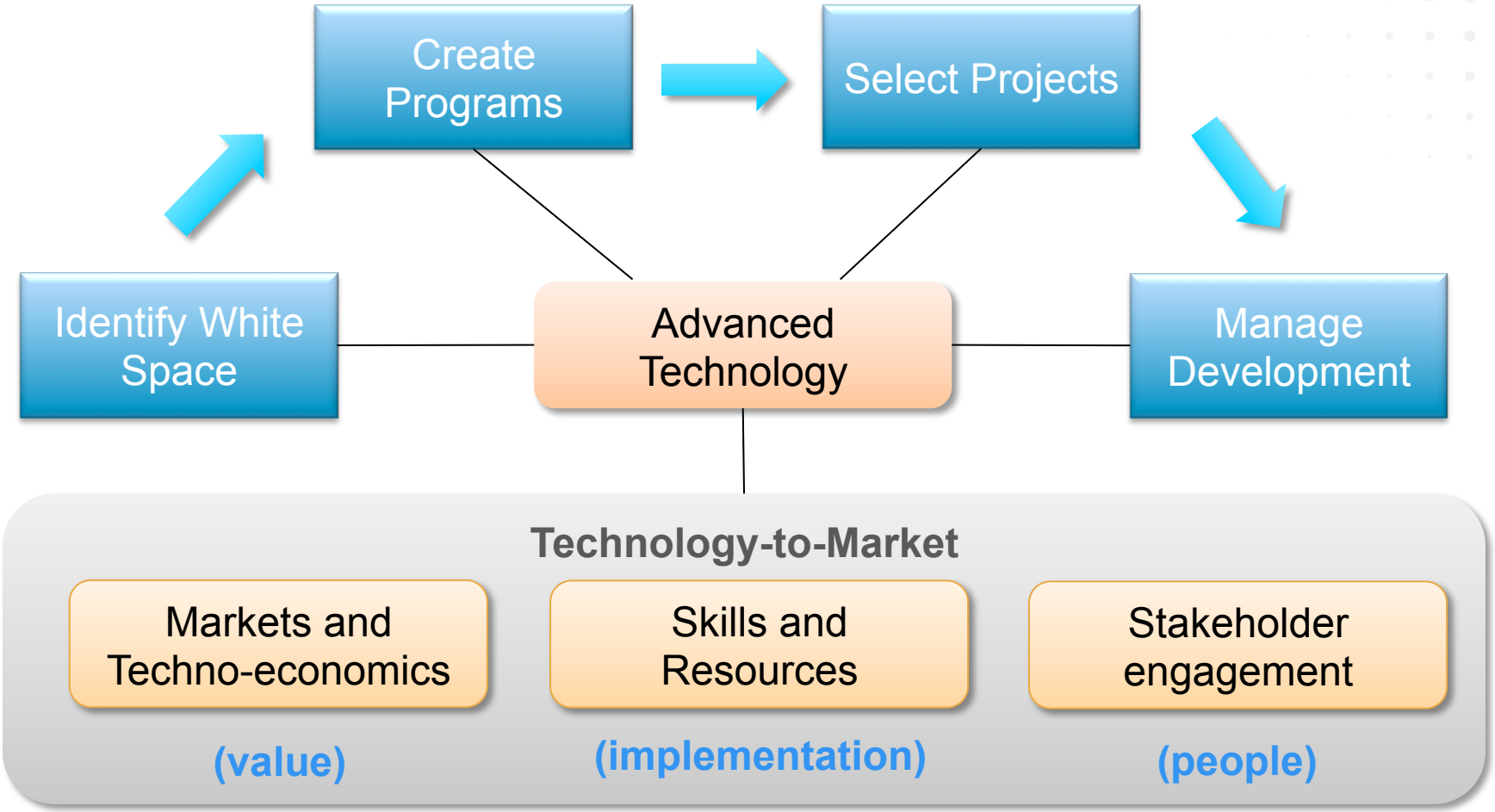


Developing ARPA-E Programs

ARPA-E Program Directors

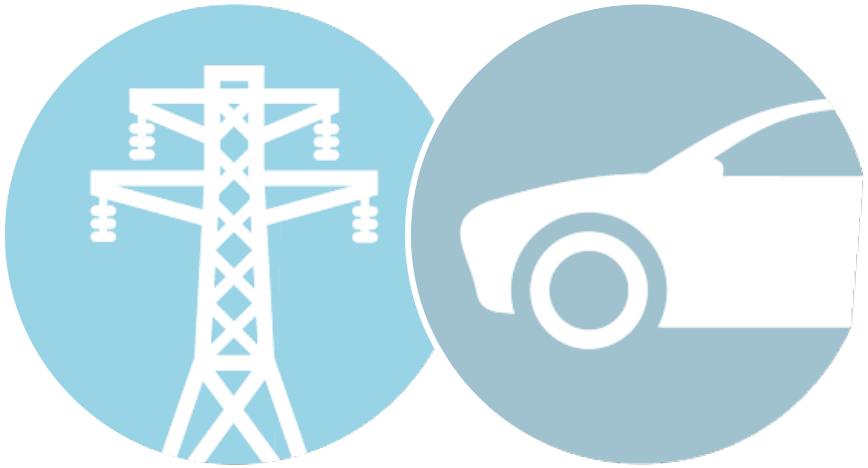


Changing the Model



The ARPA-E Portfolio

As of January 2015, ARPA-E has funded over 400 projects, investing $1.1 billion across 25 focused programs and open funding solicitations



Stationary Energy Technologies

Solar ADEPT		FOCUS
GRIDS	BEETIT	
IMPACCT	GENI	REBELS
		DELTA
		MONITOR

Transportation Energy Technologies

BEEST	PETRO	Electrofuels
		MOVE
		RANGE
		REMOTE

Stationary & Transportation Energy Technologies

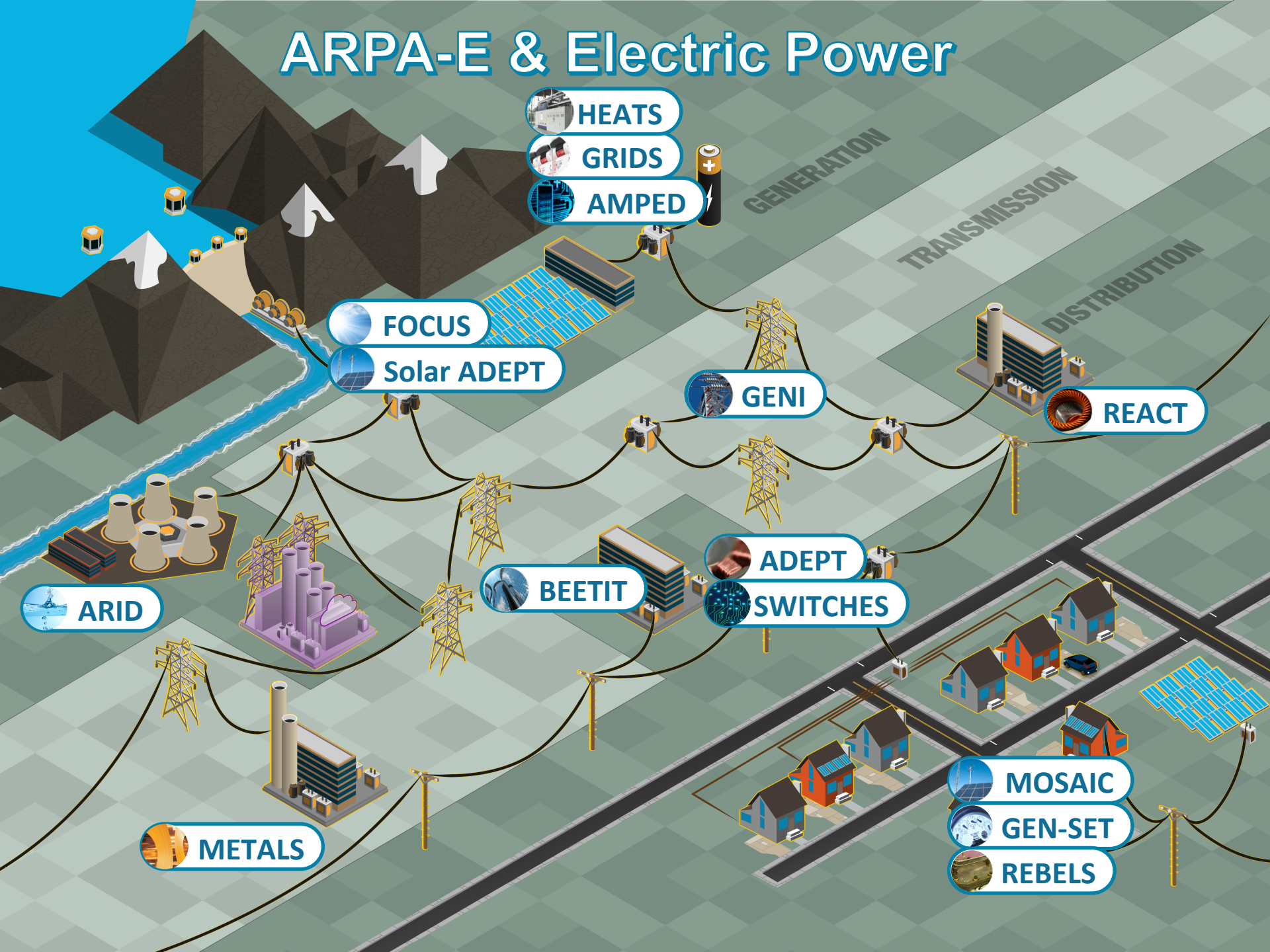
ADEPT	AMPED	SWITCHES
HEATS	REACT	
SBIR/STTR	METALS	

Open

OPEN 2009	OPEN 2012	IDEAS

Active Funding Opportunities

- OPEN 2015
- Advance Research in Dry-cooling (ARID)
- Micro-scale Optimized Solar-cell Arrays with Integrated Concentration (MOSAIC)
- Transportation Energy Resources from Renewable Agriculture (TERRA)
- Accelerating Low-Cost Plasma Heating and Assembly (ALPHA)
- Traveler Response Architecture using Novel Signaling for Network Efficiency in Transportation (TRANSNET)
- GENerators for Small Electrical and Thermal Systems (GENSETS)
- Network Optimized Distributed Energy Systems (NODES)


ARPA-E & Electric Power
HEATS
GRIDS
AMPED
GENERATION
TRANSMISSION
DISTRIBUTION
FOCUS
Solar ADEPT
GENI
REACT
ADEPT
SWITCHES
BEETIT
ARID
METALS
MOSAIC
GEN-SET
REBELS

FOCUS

Advanced Technologies Solar Energy

Mission

Develop technologies to advance solar energy beyond current photovoltaic (PV) and concentrated solar power (CSP) technologies to ensure solar power remains a consistent, cost-effective renewable energy option.

Program Director	Dr. Howard Branz
Year	2013
Projects	12
Investment	$30 Million

Goals

Develop two distinct technology options to deliver low-cost, high-efficiency solar energy on demand:

- (1) **New hybrid solar energy converters** to turn sunlight into electricity for immediate use, while also producing heat that can be stored at low cost for later use (using the entire solar spectrum more efficiently than PV or CSP technologies)
- (2) **New hybrid energy storage systems** that accept heat and electricity from variable solar sources to deliver electricity when needed

Highlights

- Coming soon!

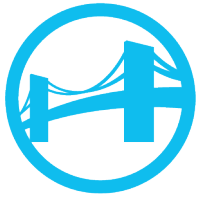
What Makes an ARPA-E Project?

IMPACT

- High impact on ARPA-E mission areas
- Credible path to market
- Large commercial application

TRANSFORM

- Challenges what is possible
- Disrupts existing learning curves
- Leaps beyond today's technologies



BRIDGE

- Translates science into breakthrough technology
- Not researched or funded elsewhere
- Catalyzes new interest and investment

TEAM

- Comprised of best-in-class people
- Cross-disciplinary skill sets
- Translation oriented

MOVE

NATURAL GAS FOR CARS

Mission

Develop (1) cost-effective ways to power passenger cars and other light duty vehicles and (2) quick-filling at-home refueling stations.

Program Director	Dr. Dane Boysen
Year	2012
Projects	13
Total Investment	$30 Million

Goals

- 5-yr payback for light duty natural gas vehicles (NG is $1.50/gallon of gas equivalent, gasoline $3.50/gallon)
- Conformable tanks with energy density = CNG
- Convenient, low-cost at-home refueling

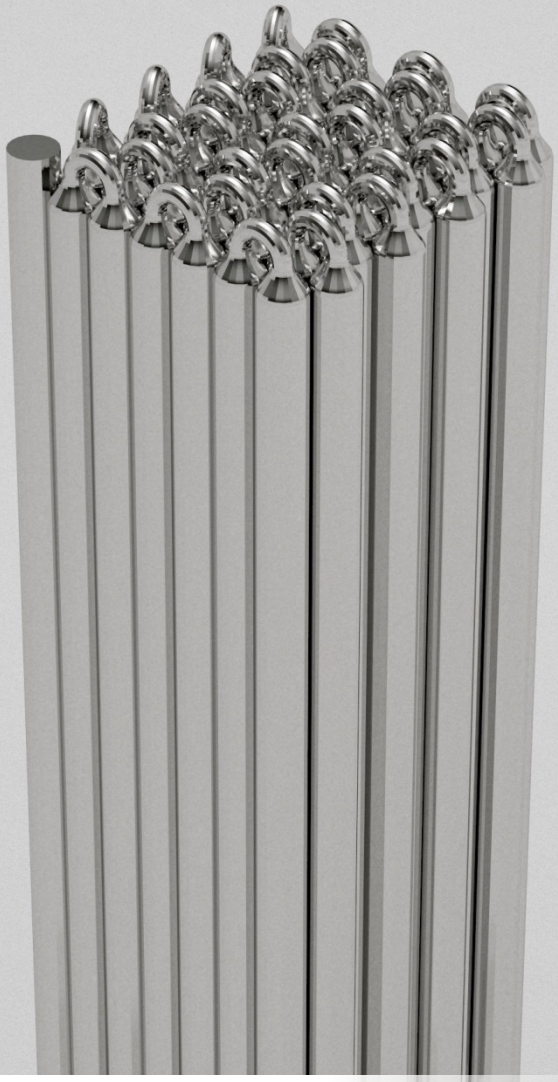
Approaches

Approach 1: Low pressure storage (< 500 psi)

- Sorbent materials with energy density equal to CNG

Approach 2: High pressure storage (3,600 psi)

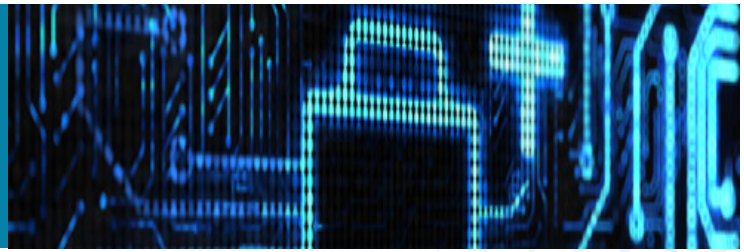
- High strength, conformable tanks with low cost compression



Otherlab

AMPED

ENERGY STORAGE SYSTEMS



Mission

Develop advanced sensing, control, and power management technologies that redefine the way we think about battery management.

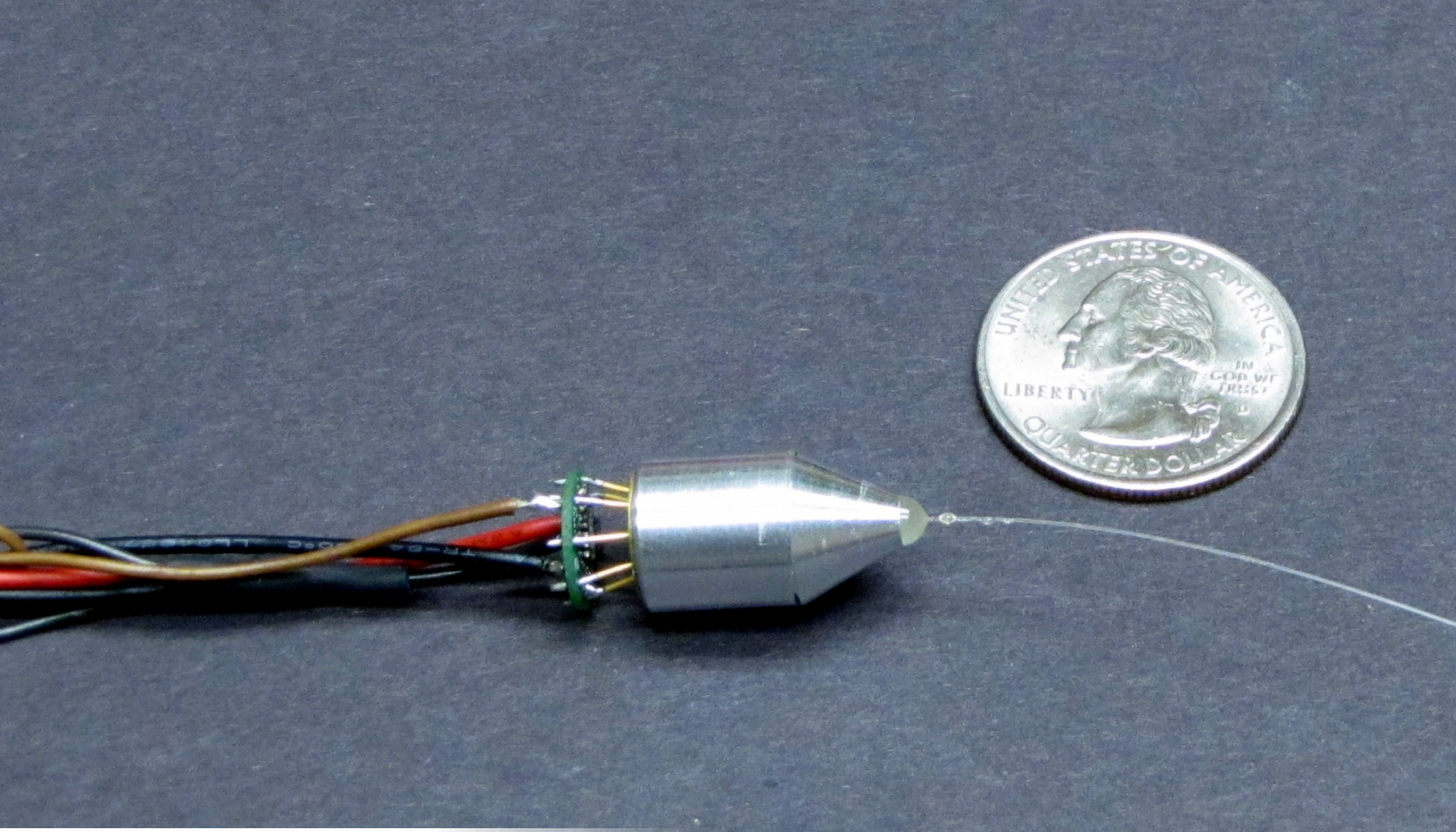
Program Director	Dr. Ilan Gur
Year	2012
Projects	14
Total Investment	$30.2 Million

Goals

- Improve lifetime and valuation of battery
- Safe, rapid charging batteries
- Enable hybrid and secondary use applications
- Increase battery utilization without changes to the battery itself through adaptive management, sensing, modeling and power electronics

Highlights

- Radical sensor integration to allow real-time measurement
- Novel diagnostic and state determination through non-electronic signals
- Adaptive model and power electronic architecture approaches



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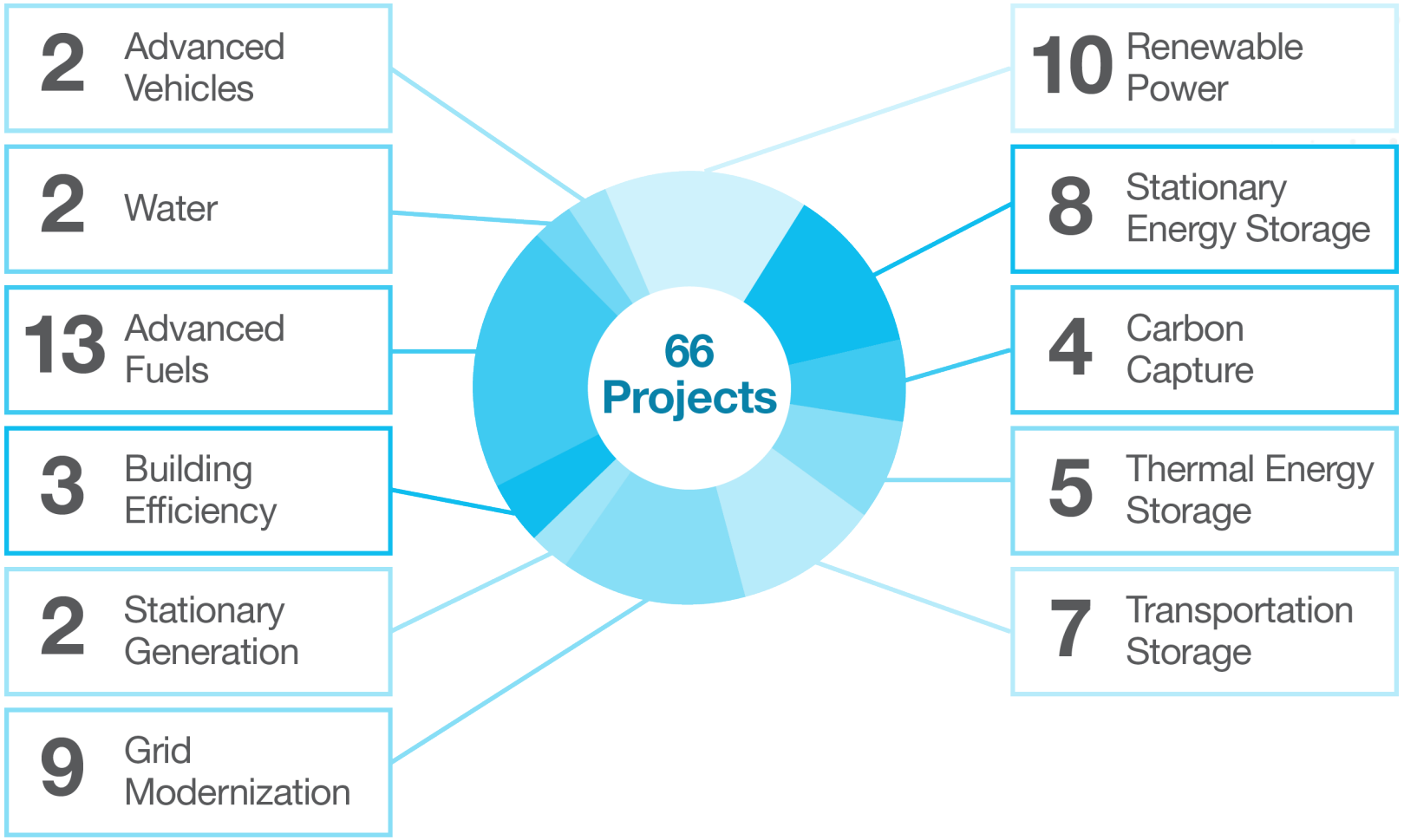
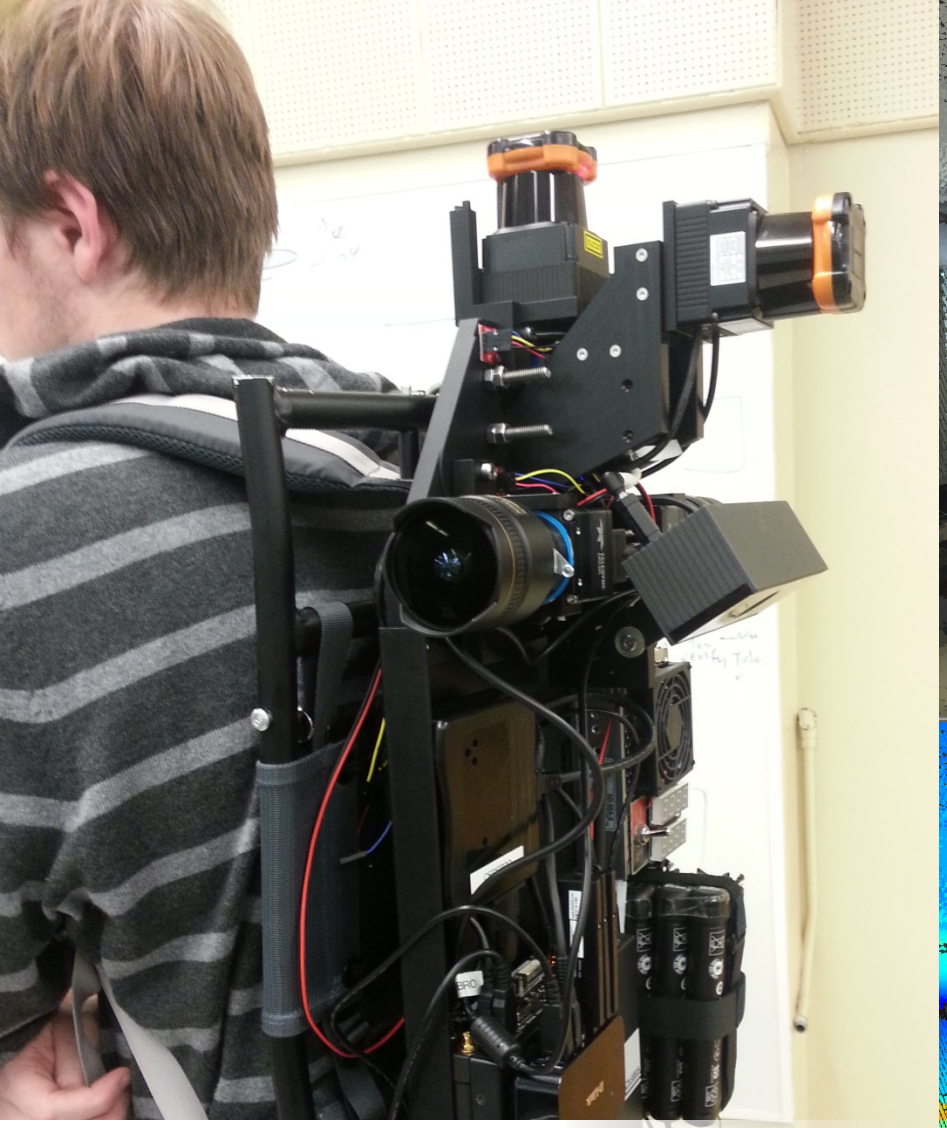
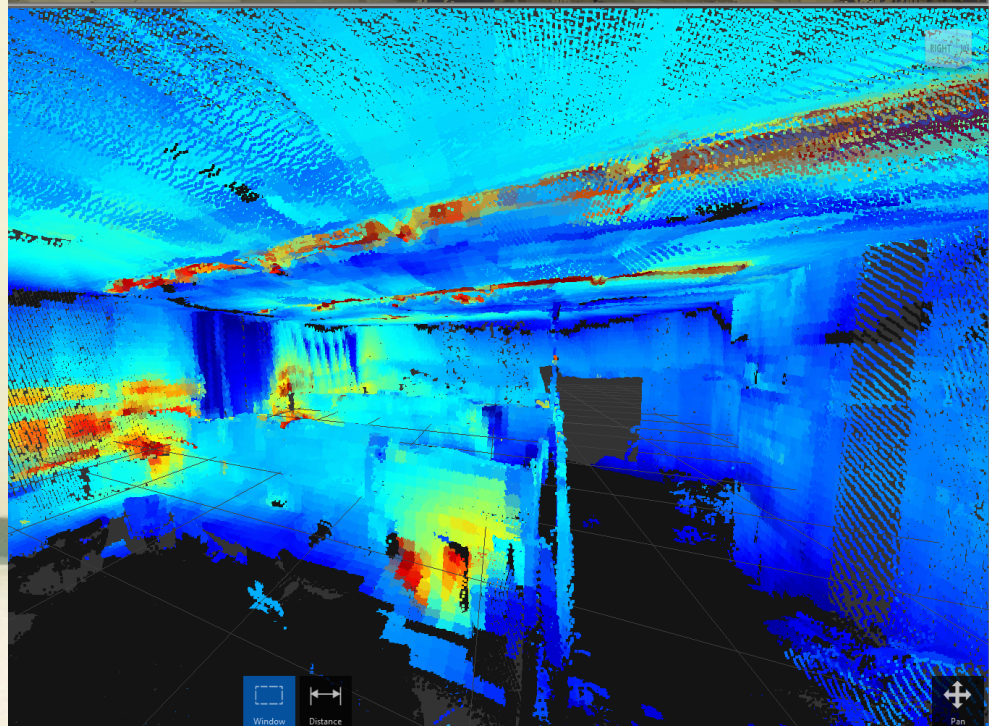
OPEN 2012: 66 Projects, 24 States, 11 Areas







BERKELEY LAB

Measuring ARPA-E's Success

MOVING TECHNOLOGY TOWARD MARKET

- More than 37 partnerships with other government agencies
- More than 30 new companies formed
- 34 Projects have attracted more than $850 million in private-sector follow-on funding after ARPA-E's investment of $135 million
- Established company relationships and developed new communities
- Several technologies now in products in the marketplace

BREAKTHROUGH ACHIEVEMENTS

- Technology breakthroughs
- Patents
- Publications

OPERATIONAL EXCELLENCE

- Expedited program development and project selection
- Aggressive performance metrics

Help change the world by winning an ARPA-E award

Top 5 Tips for Writing a Competitive Proposal

1. Read the Funding Opportunity Announcement (FOA)
2. Demonstrate impact
3. Describe the technology
4. Compare to state of art
5. Identify challenges and solutions

Top 5 Tips for Writing a Competitive Proposal

1. **Read the Funding Opportunity Announcement (FOA)**
2. Demonstrate impact
3. Describe technology
4. Compare to state of art
5. Identify challenges and solutions

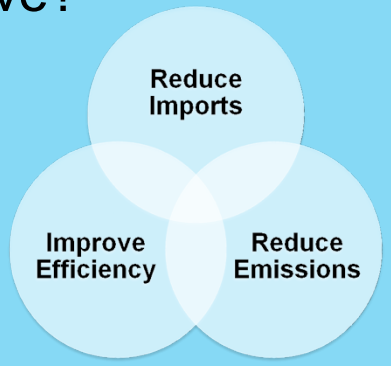
- Motivation for the program
- Program objectives
- Technical categories of interest
- Technical performance targets

Read the FOA!
Then read it <u>again</u>, *carefully*.

Top 5 Tips for Writing a Competitive Proposal

1. Read the Funding Opportunity Announcement (FOA)
2. **Demonstrate impact**
3. Describe technology
4. Compare to state of art
5. Identify challenges and solutions

- How does it impact ARPA-E mission areas?
- What problem are you trying to solve?



Your first question should not be "will it work?"

"If it works, **will it matter**?"

Top 5 Tips for Writing a Competitive Proposal

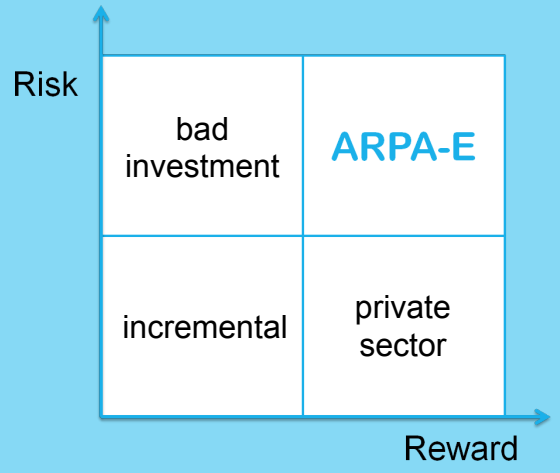
1. Read the Funding Opportunity Announcement (FOA)
2. Demonstrate impact
3. **Describe technology**
4. Compare to state of art
5. Identify challenges and solutions

- How does it work? Describe with minimal jargon.
- What's new in your approach?
- Why do you think it will be successful?

Top 5 Tips for Writing a Competitive Proposal

1. Read the Funding Opportunity Announcement (FOA)
2. Demonstrate impact
3. Describe technology
4. **Compare to state of art**
5. Identify challenges and solutions

- How is it done today?
- Why are today's solutions insufficient?
- How does your solution represent a dramatic improvement?



Top 5 Tips for Writing a Competitive Proposal

1. Read the Funding Opportunity Announcement (FOA)
2. Demonstrate impact
3. Describe technology
4. Compare to state of art
5. **Identify challenges and solutions**

- What is the challenge to developing your specific technology? Why is it hard?
- What approaches will you take to overcoming these challenges?

Why should we fund you?

Provide **key insight/unique approach** to solve a problem where others failed

U.S. DEPARTMENT OF
ENERGY

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