DOE's Building Technologies Office: Technology-to-Market (T2M) Initiative

Karma Sawyer, BTO T2M Initiative

BTO Peer Review Meeting

April 4, 2016

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DOE Building Technologies Office (BTO) Ecosystem

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Energy Efficiency & Renewable Energy

Clean Energy Innovation Infrastructure

National Lab Impact & Innovations

BTO T2M: Imitation is the Most Sincere Form of Flattery

ARPA-E's T2M Strategy

INFORM

- Provide awardees with market knowledge to inform their technology
- Provide resources on commercialization best practices
- Assist awardees in tracking down specific information to overcome knowledge gaps

CONNECT

- Identify and connect awardees to strategic opportunities and valuable resources
- Assist in identifying and connecting awardees with specific resource needs
- Maintain and cultivate a strong network across market/industry
- Identify and make connections across programs as appropriate

ADVOCATE

- Present and highlight ARPA-E projects and new technologies to stakeholders across the ecosystem
- Identify, highlight, and work to mitigate shared commercialization obstacles for new technologies (regulatory, ecosystem, standards, etc.)

arpa·e
CHANGING WHAT'S POSSIBLE

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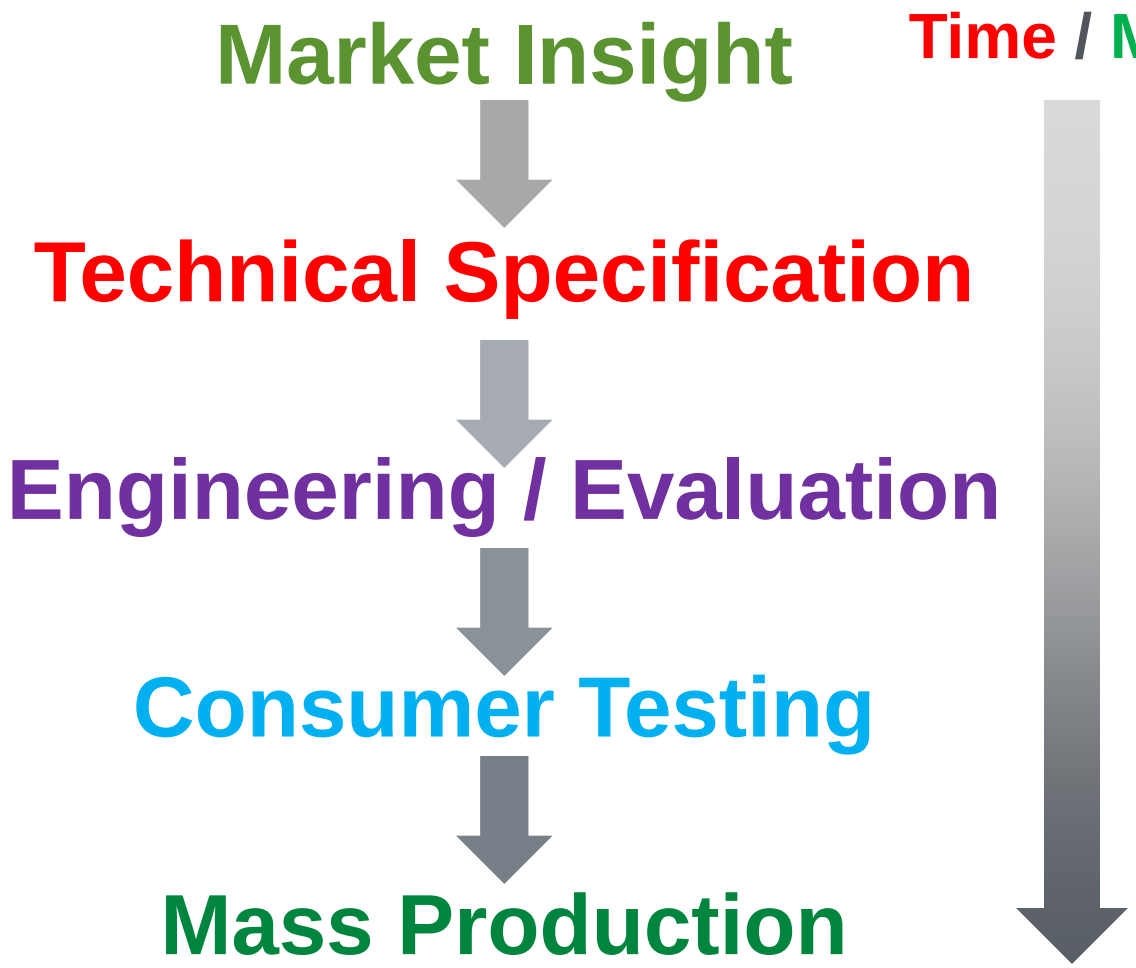
What does this model look like in BTO?

- **INFORM:**
  - Utilize the BTO ecosystem to scope R&D opportunities & projects to be market-facing.
  - Utilize BTO tools to communicate opportunity (economic & energy)
- **CONNECT:**
  - When do we need to bring in strategic partners?
  - How do we utilize the non-BTO pathways and networks (Industry, DOD, GSA, EnergyStar, AMO, States, Utilities)?
  - Maintain & cultivate networks to support BTO & awardees
- **ADVOCATE:**
  - Get more (new) people working on BTO-relevant problems
  - Utilize BTO tools to communicate opportunity (economic & energy)
  - Highlight & work to mitigate commercialization challenges for new technologies

How do new technologies get to the market today?

Traditional Innovation to Market Path



Time / Money

It can take up to five years or more for a new product to enter the market and cost tens of millions of dollars

New products have a success rate of 50%

What if the cycle and cost could be significantly reduced?

Innovation Impediments

Barrier 1:
Selection Bias Relies on a Few Decision Makers

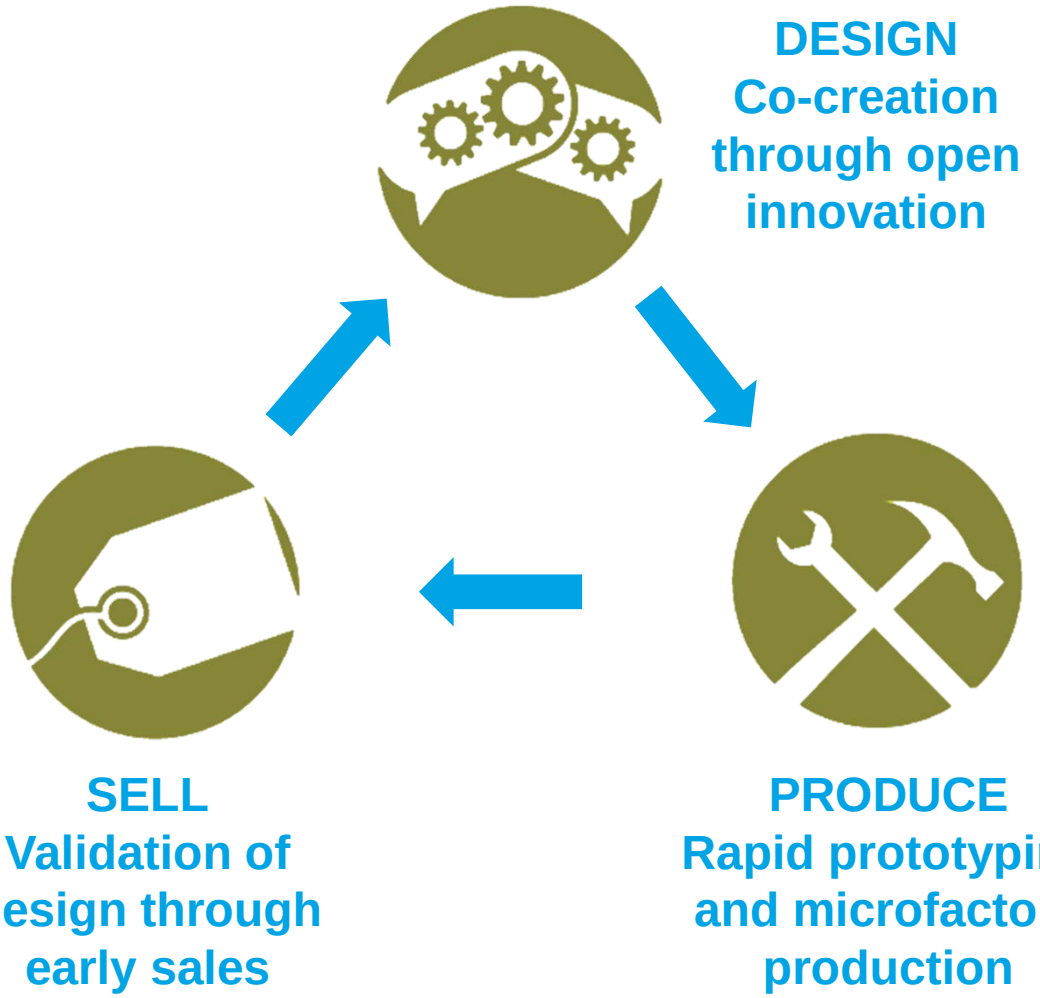
Barrier 2:
High Production Cost

Barrier 3:
Confidentiality Inhibits Feedback until Years Later

Impacts

- Selling to management is difficult due to large investment ($30 - $50 M) and risk
- New product launches are discouraged
- Bias against innovation
- Lost opportunities

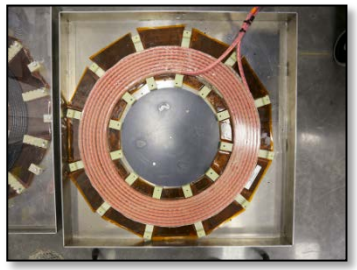
How many creative ideas never make it to market?

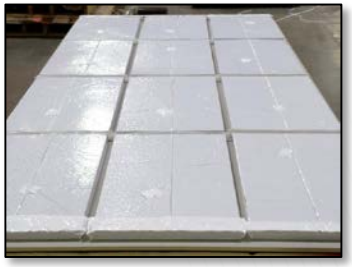


- Months to market
- Frequent and numerous product launches
- Quick consumer feedback
- Innovation is welcome
- Lower cost
- Reduced risk

Additive Manufacturing Integrated Energy (AMIE)

Big-area additive manufacturing (BAAM)	Bidirectional wireless power transfer	Building technologies	Building control and power management
3D printing of house and vehicle	Power transfer from a single engine to house or vehicle, as needed	Modified atmosphere insulation (MAI) 7x more efficient than traditional insulation	Solar panels paired with batteries to generate, store, and transfer renewable power

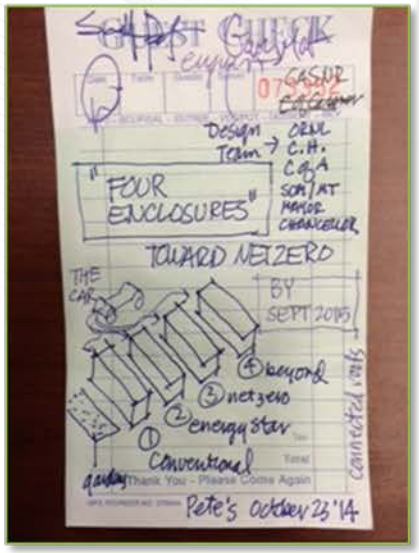




Panel: Additive Manufacturing for Building Envelope
Wednesday at 12:05 in Salon 6-8

Additive Manufacturing Integrated Energy (AMIE)

October 2014 → January 2015–September 2015



Novel 3D Printed Vehicle

All accomplished in 9 months with >20 partners.

OAK RIDGE National Laboratory

JUMP: Join in the discussion; Unveil innovation; Make connections; Promote T2M

jump • Unveil innovation • Make connections • Promote Tech2Mkt
Join the discussion

A open innovation community linking innovators to building energy efficiency challenges from industry partners

Argonne NATIONAL LABORATORY
NREL NATIONAL RENEWABLE ENERGY LABORATORY
BERKELEY LAB
OAK RIDGE National Laboratory
Pacific Northwest NATIONAL LABORATORY

Honeywell

more partners to come!

Freedom and incentives unleash the drive and entrepreneurial genius that are the core of human progress.

-Ronald Reagan

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jump
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Honeywell

Make it easy & cheap to introduce building energy efficiency challenges to a new solvers.

Third-party validation of problem-statements & solutions

Connect the solvers to partners that can (and want to) commercialize or deploy good market-acceptable ideas

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How does JUMP Work?

Labs Work with Partners

- Identify challenges
- Collaborate to craft Calls for Innovation
- Provide Prize(s)
  - Cash awards
  - In-kind tech support
  - Connection to DOE resources (SBV, CRADAs, other)

Calls for Innovation Issued

- Market the JUMP Calls for Innovation
  - Regional networks & innovation communities
  - Webinars
- Funnel idea submissions on feasibility
  - Technical, economic, market readiness, customer need
- Foster crowd action for discussion and voting

Recognition and Reward

- JUMP Advisory Board completes judging review
- Prizes offered, if appropriate
- Mentoring offered, if appropriate
- Events to unveil the premier ideas
  - Connection to seed funders
  - Hack-a-thons
  - Business plan mentorship

A.O. Smith Challenge

INCREASING THERMAL ENERGY STORAGE IN A RESIDENTIAL GAS OR ELECTRIC WATER HEATER WITHOUT INCREASING ITS SIZE

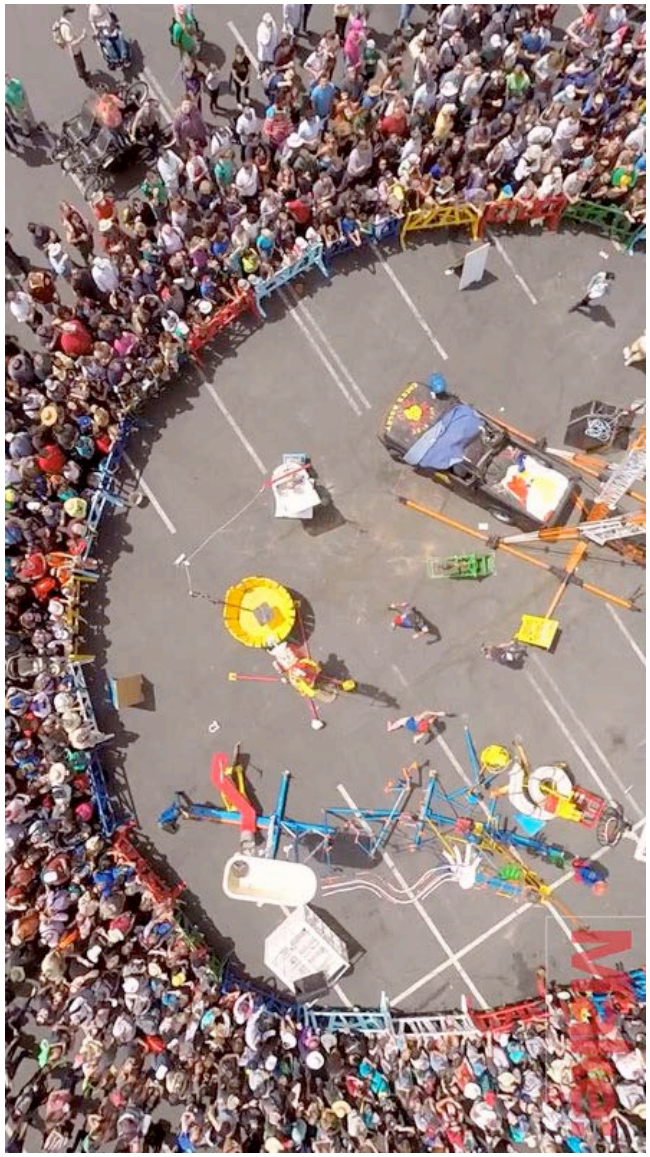
Constraints:

- must not increase the storage temperature
- must stay within the existing dimensional footprint of 50 gallon units (diameter and height)
- must not negatively impact EF (10 CFR Part 430, Subpart B, Appendix E)
- must not negatively impact the service life of the water heater
- must not negatively impact the safety aspects of the water heater
- must increase the manufacturing cost by no more than $150 at high volume

Challenge is open to ALL thermal storage types

Challenge is open to METHODS **and** MATERIALS

jump @ the Bay Area



JUMP Exposure event the Bay Area Maker Faire

- Create JUMP buzz with a 100K+ audience of innovators, makers, students, and families
- Maker Faire Innovation panel & DOE pavilion Make: Energy
  - Announce new JUMP calls
  - Showcase open innovation
  - Inspire next generation of innovators to work on building technologies
  - Invite attendees to join as JUMP platform members and voters, at the DOE pavilion

Collaboration explorations with established Bay Area cleantech organizations for events, promotion etc.

- VERGE
- Prospect Silicon Valley
- Clean Tech Open
- Google

BERKELEY LAB

JUMP Announcement at CET Challenge Next Week

clean energy trust

www.cleanenergytrust.org/challenge

The event will be webcast.

Share Ideas & Bring EE Tech 2 Market

Get involved: share ideas, comment, and discuss advancing EE technologies and services

Website Under Development Now

Future rounds open in Spring through Summer

web.ornl.gov/jump

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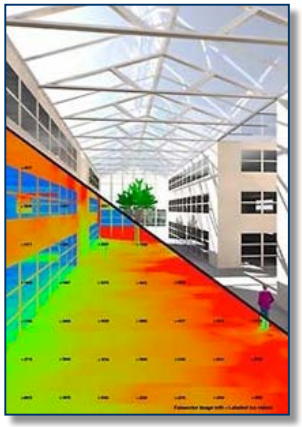
Virtual Building Triathlon

Accelerating Energy Efficiency using EnergyPlus

ASHRAE, IPBSA-USA and LBNL T2M design competition to promote benefits of building simulation based analysis of integrated whole building retrofits providing deep savings.

- 2 competitions in 2016
  - **Practitioners competition** - Launch April/May, judging at SimBuild 2016: Building Performance Modeling Conference in August
  - **Student competition** – During 2016 Fall Semester

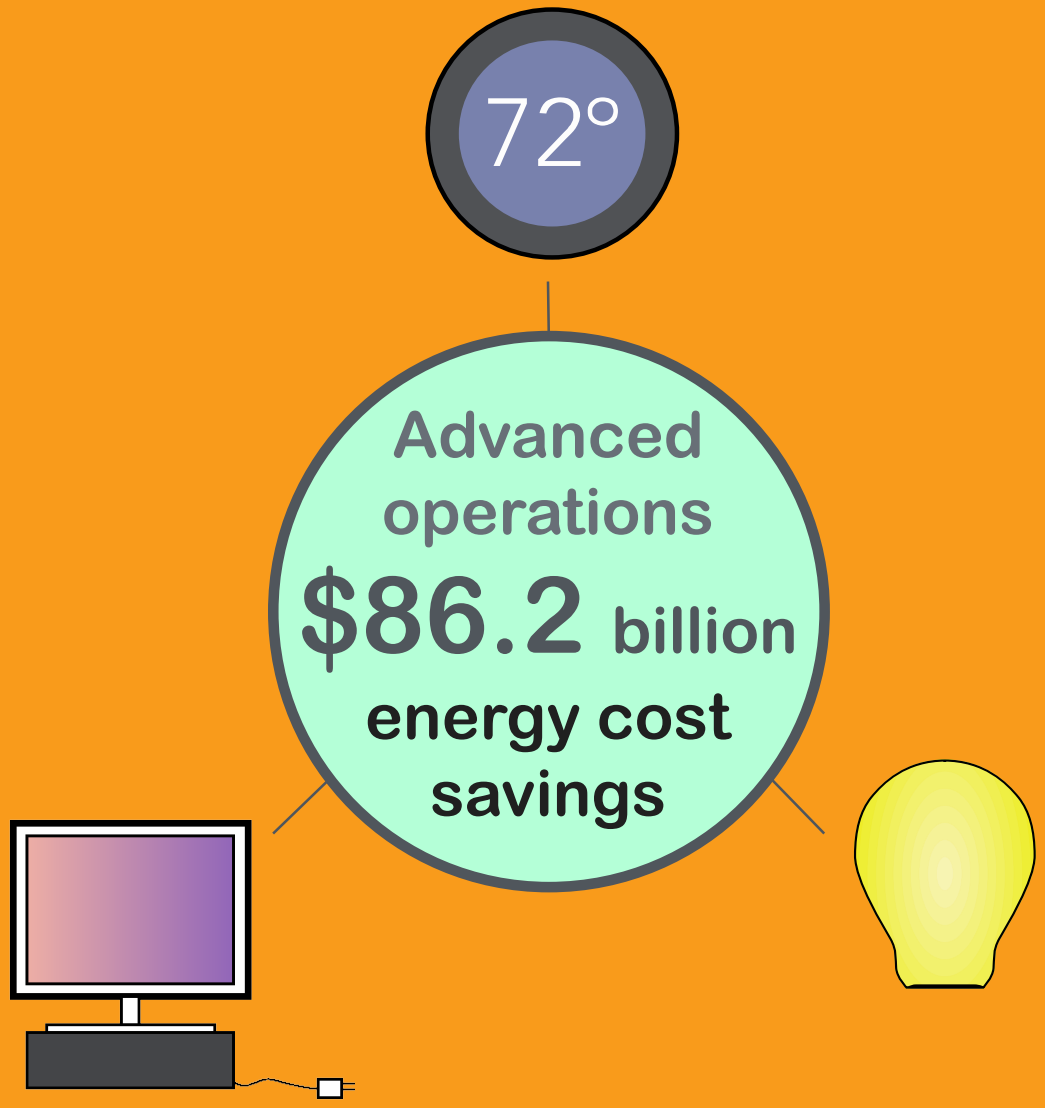
- 2 large office recruited for case studies
- Jurist Panel will include reputable building managers, engineers, architects and developers.



- Judged thru 3 stages
  - **As-Built Stage**: Base case simulation model assembly and calibration
  - **Analysis Stage**: Use of simulation for integrated retrofit measures analysis
  - **Final Measures Stage**: Quality of retrofit measures (>50% savings)
- Judge and/or Building candidate nominations forwarded to either:
  - Philip Haves, phaves@lbl.gov;Norman Bourassa, njbourassa@lbl.gov

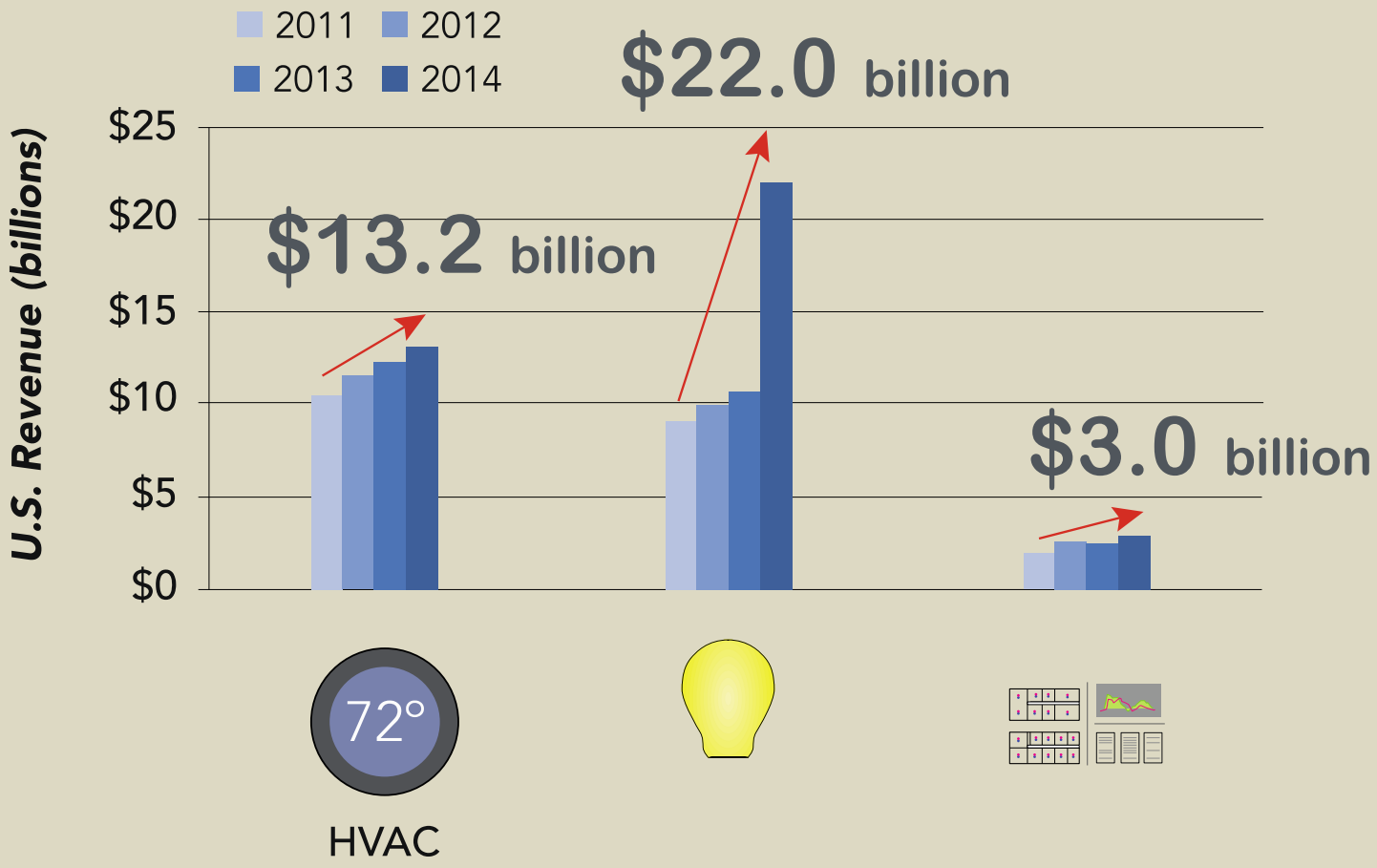
Catalyst Energy Innovation Prize Program

Software solutions for better buildings



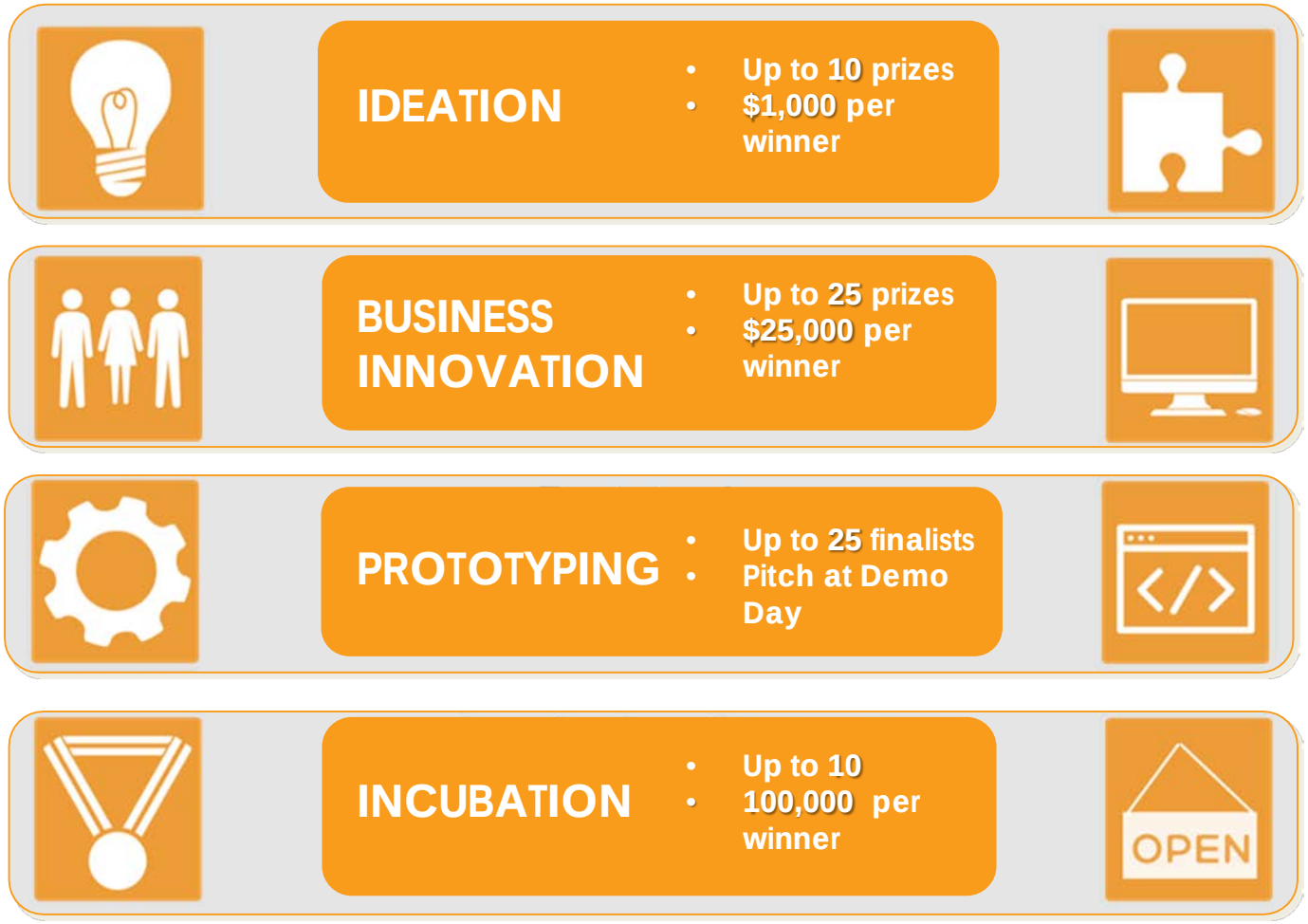
Sources: EIA AEO 2014; Song, 'Advanced, Integrated Control for Building Operations to Achieve 40% Energy Saving', 2012

Data analytics for advanced equipment



Source: 2015 Advanced Energy Now Market Report

Catalyst Unboxing



Next Round of Catalyst is in the works…Stay Tuned!

DOE Building Technologies Office (BTO) Ecosystem

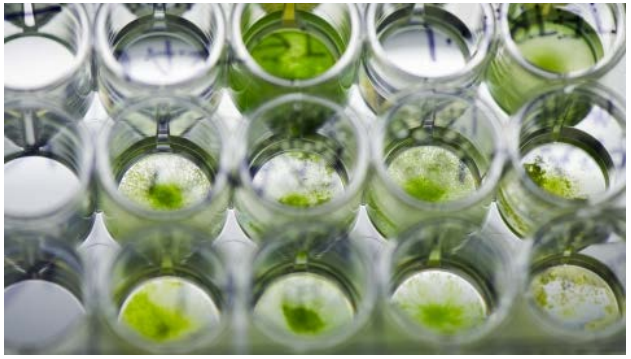
EERE Technology-to-Market

Clean Energy Innovation Infrastructure

- Clean Energy Incubator Network
- Clean Energy Manufacturing Initiative
- Cleantech University Prize
- SBIR/STTR
- Small Business Vouchers Pilot

National Lab Impacts & Innovations

- Lab-Corps
- Lab Impact Initiative
- Technologist-in-Residence Pilot



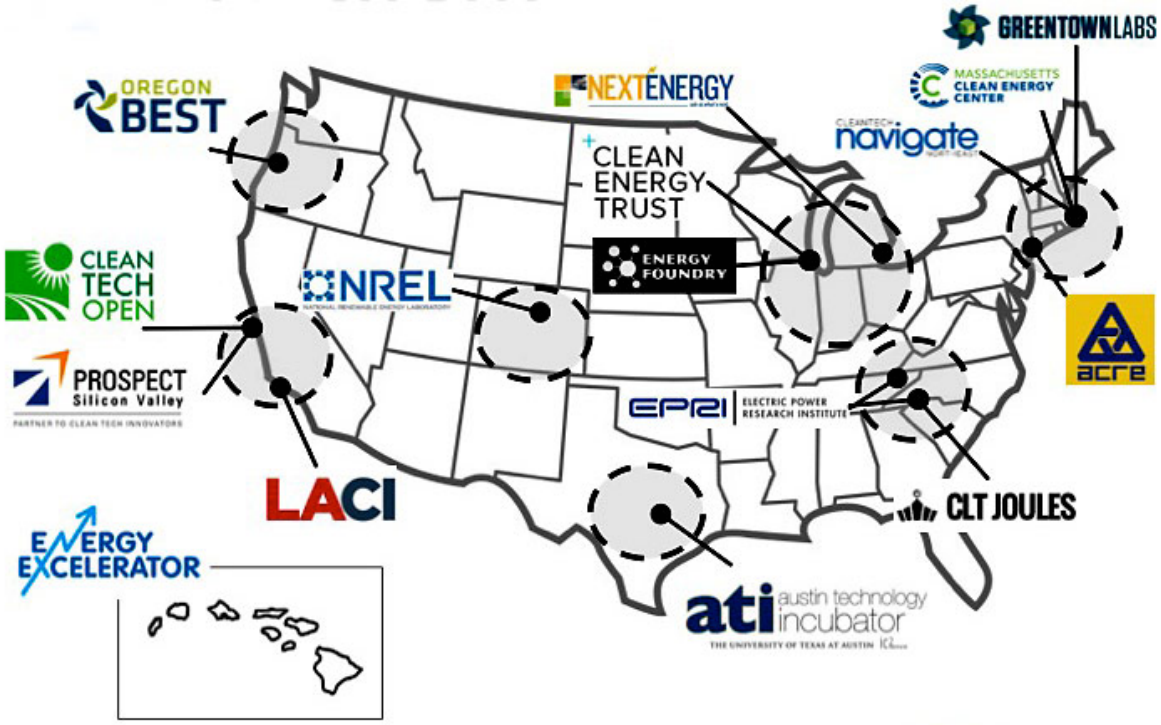
Transitioning Energy Systems

- Climate Action Champions
- Energy Transition Initiative
- Solar Decathlon

http://energy.gov/eere/technology-to-market/technology-market-program

incubateenergy network

A community of U.S. clean energy incubators supporting entrepreneurs driving innovation in the industry



- Share best practices
- Support clean energy entrepreneurs
- Annual network meetings & regular outreach

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Small Business Vouchers Pilot
U.S. DEPARTMENT OF ENERGY

Small Businesses Are Innovation Engines

- 46% of nonfarm GDP
- 64% of net new job creation
- 16 times more patents per employee

*Data from Small Business & Entrepreneurship Council
http://www.sbecouncil.org/about-us/facts-and-data

- Unique Materials
- Prototyping
- Technology Testing / Validation
- Modeling and Analyses
- Engineering Designs
- Scale-up of Samples/Processes

*State Energy Advisory Board suggestions (unpublished personal communications)

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Small Business Vouchers Pilot
U.S. DEPARTMENT OF ENERGY

Goals:

- Increase small business accessibility to lab capabilities
- Broaden lab awareness of small business needs and technologies
- Encourage labs to develop outreach strategies to showcase capabilities
- Make lab business practices more compatible with private sector timelines

***Funds*: $20M =** ~100 small businesses served at ~$175,000/entity

***BTO Lead Labs*:** ORNL & PNNL ($2M)

Program Design:

- Single one-stop shop IT platform with clear lab capabilities explained, uniform IP terms, and application process
- High Impact small businesses selected through lab announcements of voucher opportunities to fill assistance gap
- BTO made 4 selections in Round 1

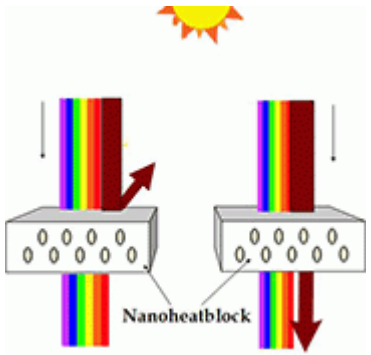
Round 2 closes April 10 2016

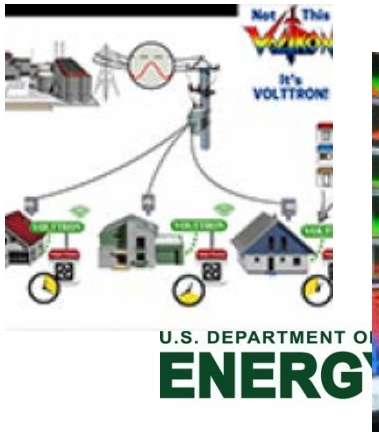
Lab Corps Teams

Training program for DOE Lab researchers aimed at accelerating the transfer of clean energy technologies from labs into the market.

BTO Lab-Corps Teams:

- Argonne National Laboratory: Sonic LQ (PI: Ralph Muehleisen)
- Oak Ridge National Laboratory: CI-ReClad (PI: Diana Hun)
- Oak Ridge National Laboratory: Tunation (PI: Joshua New)
- Pacific Northwest National Laboratory: Sub Lambda (PI: Kyle Alvine)
- Pacific Northwest National Laboratory: VOLTTRON (PI: Jeremy Haake)
- Lawrence Berkeley National Laboratory: Ring Burner (PI: Peter Therkelsen, Vi Rapp)
- National Renewable Energy Laboratory: Eco-AC (PI: Chuck Booten)
- Lawrence Livermore National Laboratory: C-BEST (PI: Yining Qin)
- Argonne National Laboratory: NanoHeatBock (PI: Jie Lie)





incubateenergy network

OPEN CATALYST

IDEATE INNOVATE PROTOTYPE INCUBATE

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Small Business Vouchers Pilot

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