

Enhancing the Flow of Private Capital to Early Stage Energy Technologies

John R Tuttle, Ph.D.

Senior Commercialization Advisor

Michael deSa, D.M.

ARPA-E

Kristen Brown, Ph.D.

ARPA-E

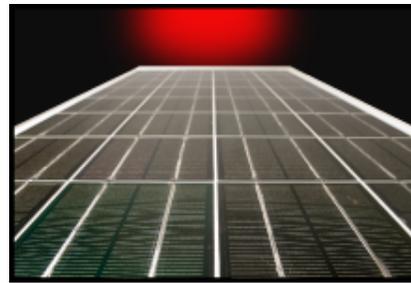
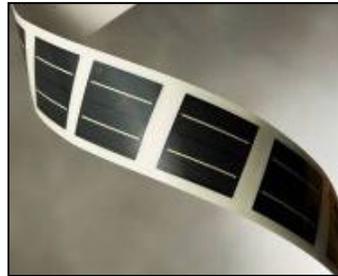
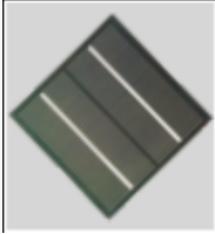
Michele Coates

BAH

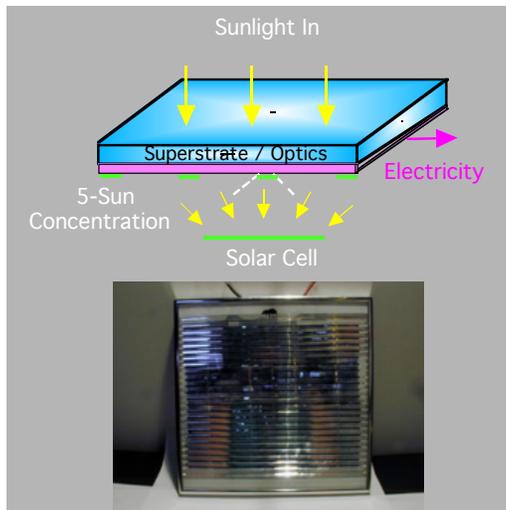
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DayStar – A Solar PV Startup

- ▶ Innovation: Flexible thin-film solar cell to substitute for / replace x-tal Si



- ▶ Secondary Innovation: Concentrating PV and space solar cells



Capital Soup

▶ 1995-2008 – DayStar Technologies, Inc.

- Received (and rejected) first **\$3M** Term-Sheet pre-company formation by **Venture Capital** firm (1995)
- First capitalization - **\$200k** **Friends & Family** funds (1996)
- Raised **\$218k** from **Corporate Strategic Partner** (Interface Corp) (1997)
- Received **\$5.9M** tender offer (**M&A**) from Amoco Enron Solar (AES) Power Development. Deal was shelved (1998)
- Initially utilized NREL lab & office space as company HQ. Utilized NREL and University of Hawaii lab space for R&D efforts. (1999).
- Awarded **\$300K** DOE/NREL **contract** & **\$1.27M** DoD/NASA **SBIR** (1999-2000)
- Received **\$85K** **sales contract** to deliver space cells to non-domestic partner (2000)
- Relocated and expanded HQ / lab space to CA. Received **in-kind** **\$150K** investment from strategic partner in the form of manufacturing tools (2002)
- Executed LOI for Firm Underwritten Public Offering, leading to **\$750k** **bridge loan** to the public offering. Reconstituted Board of Directors, revised capital structure, and assembled initial Management Team (2003)
- Successfully executed **\$10.5 million** **IPO** with an additional \$65M in associated warrants. Listed on Nasdaq National Market as DSTI. @ peak, 9.5X ROI to Seed investors after 9 years
- Raised additional **\$115 million** with **public equity** (2004-2008)
- **Acquisition** offer @ 2X market-cap (2008) – Board voted against

Outline

ARPA-E

Framing the Workshop

The Workshop

About the Speaker

▶ Senior Commercialization Advisor (“T2M”) – ARPA-E (2013-present)

- Program development and market-facing execution
- Enhancing capital acumen

▶ Technologist

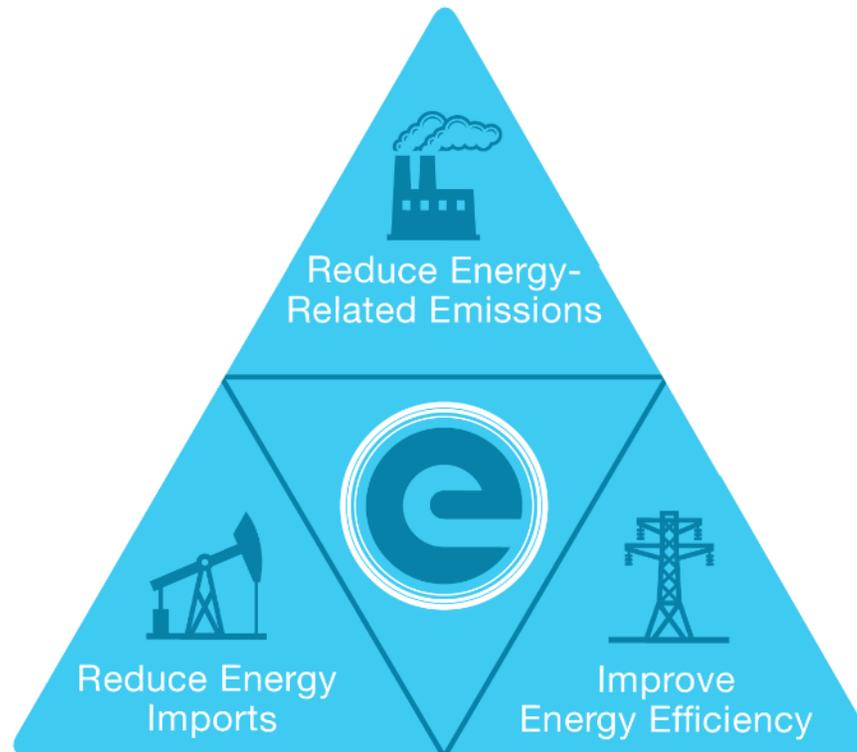
- ~30 yrs in semiconductors (including μ -electronics)
- ~30 yrs in solar-PV (11 yrs @ NREL, 10 yrs as CTO) – CIGS Technology
- ~7 yrs consulting to companies large and small
- ~3 yrs focusing on Storage, (other) Distributed Gen, Efficiency

▶ Serial Entrepreneur / Executive (~20 yrs)

- Founded DayStar Technologies, Inc – (1996)
 - Built R&D, pilot-production and equipment development facilities (NY, CA 2004-2007)
 - 3rd pure-play solar company to go public (Nasdaq: DSTI)
 - Company raised ~\$125 million → fell short of 1st production facility
- Founded Skypoint Solar, Inc. - (2008)
 - \$500M factory construction project / LOI’s for factories in China
- Consulted for several early-stage startups
- Worked with public & private sectors in Senegal, Ghana, Brasil & China

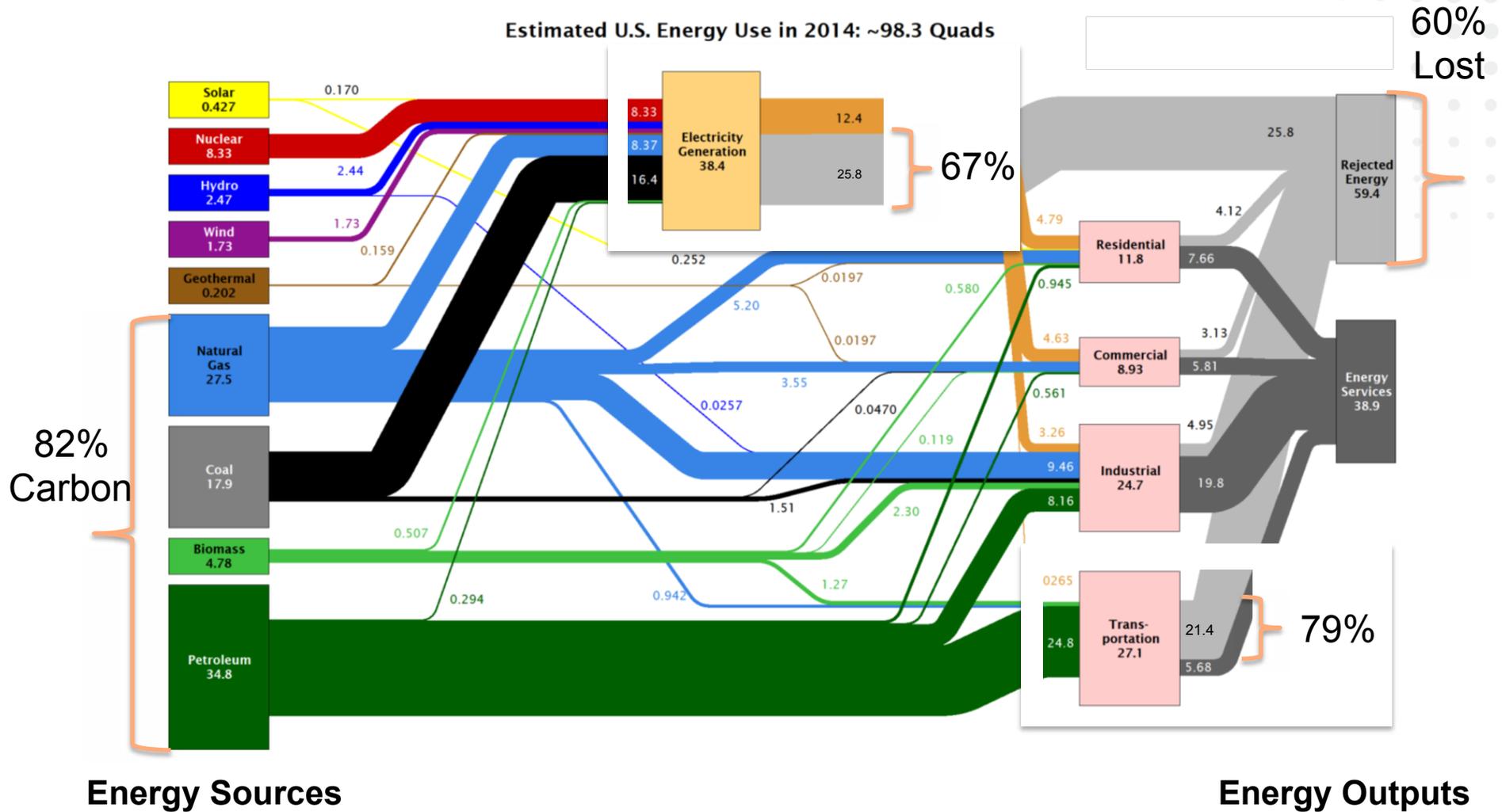
ARPA-E Mission

Catalyze the development of transformational, high-impact energy technologies

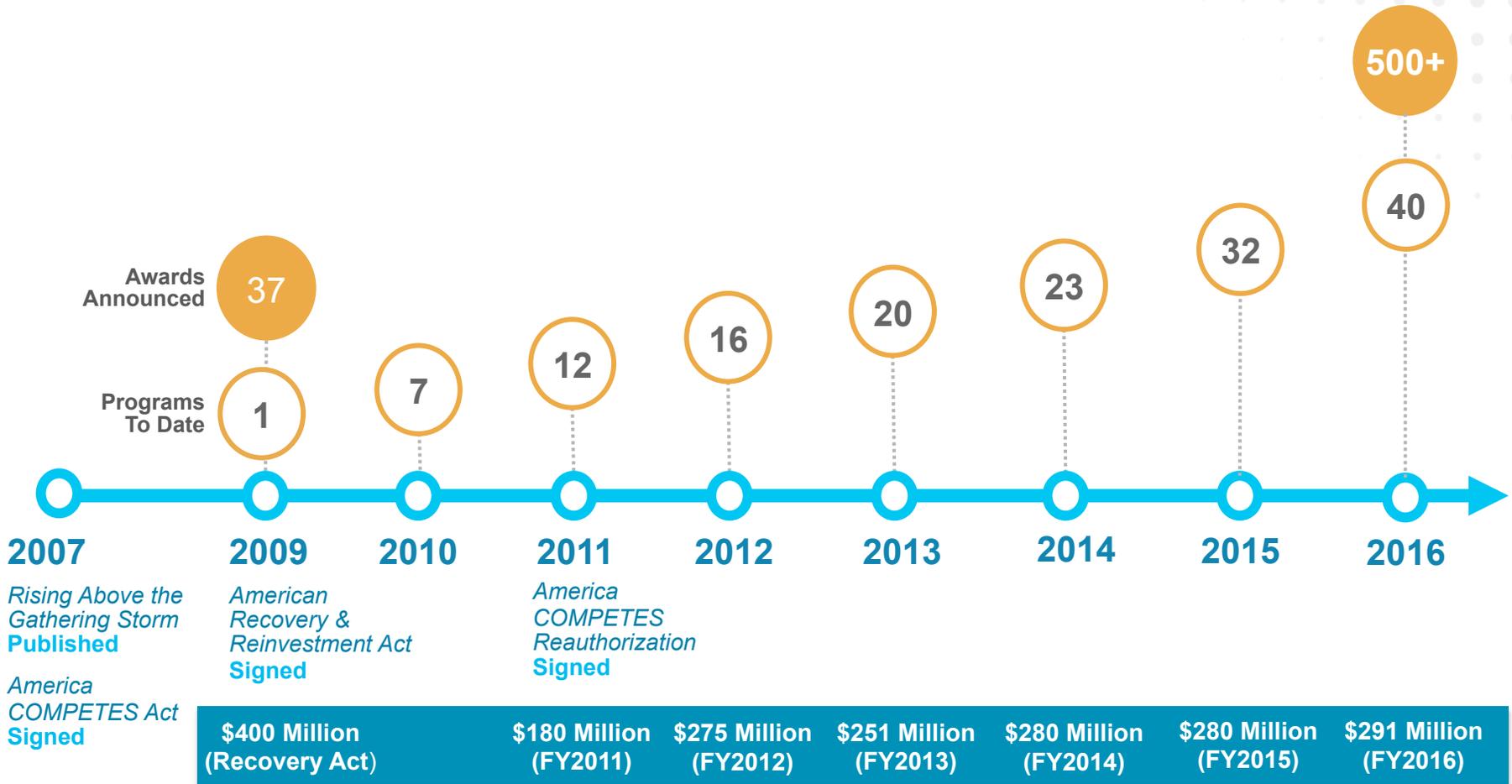


Ensure the U.S. maintains a lead in the development and deployment of advanced technologies

Energy Sources, Uses & Losses



Evolution of ARPA-E



“Investment” Modalities

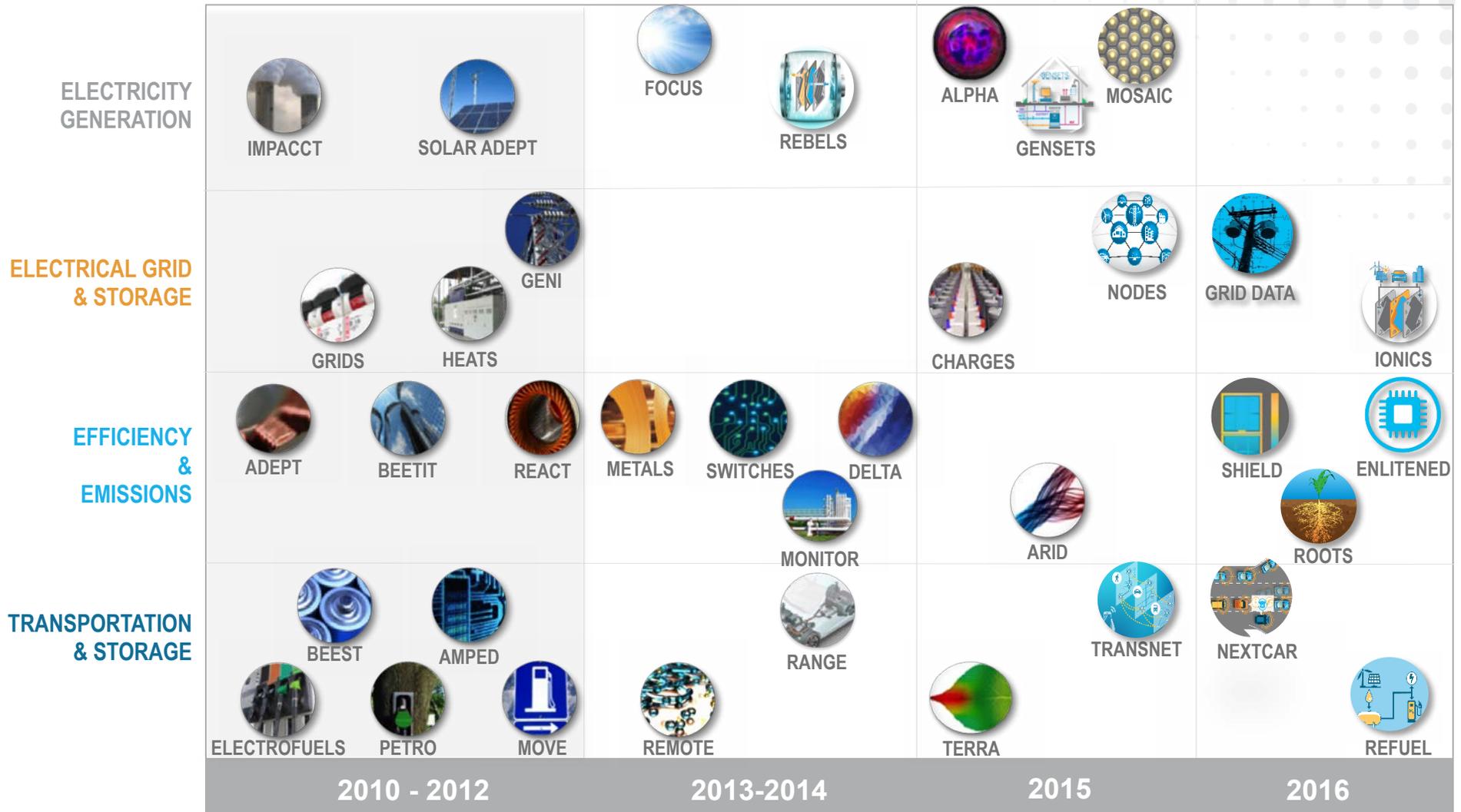
Focused Program (Portfolio Approach)

- ~\$20-30M/prog., 6-8 new progs/yr
- Thematic – such as Fuel cells, Natural gas monitoring, or new battery chemistries
- Carve out “whitespace” – a research focus that is high-risk, high-reward
- Subdivide challenges into 2-3 complimentary focus areas
- Fund ~10-15% of applicants
- “Tune” awardee statement-of-work to compliment other Program awardees
- Down-select to successes
- Prepare for follow-on funding

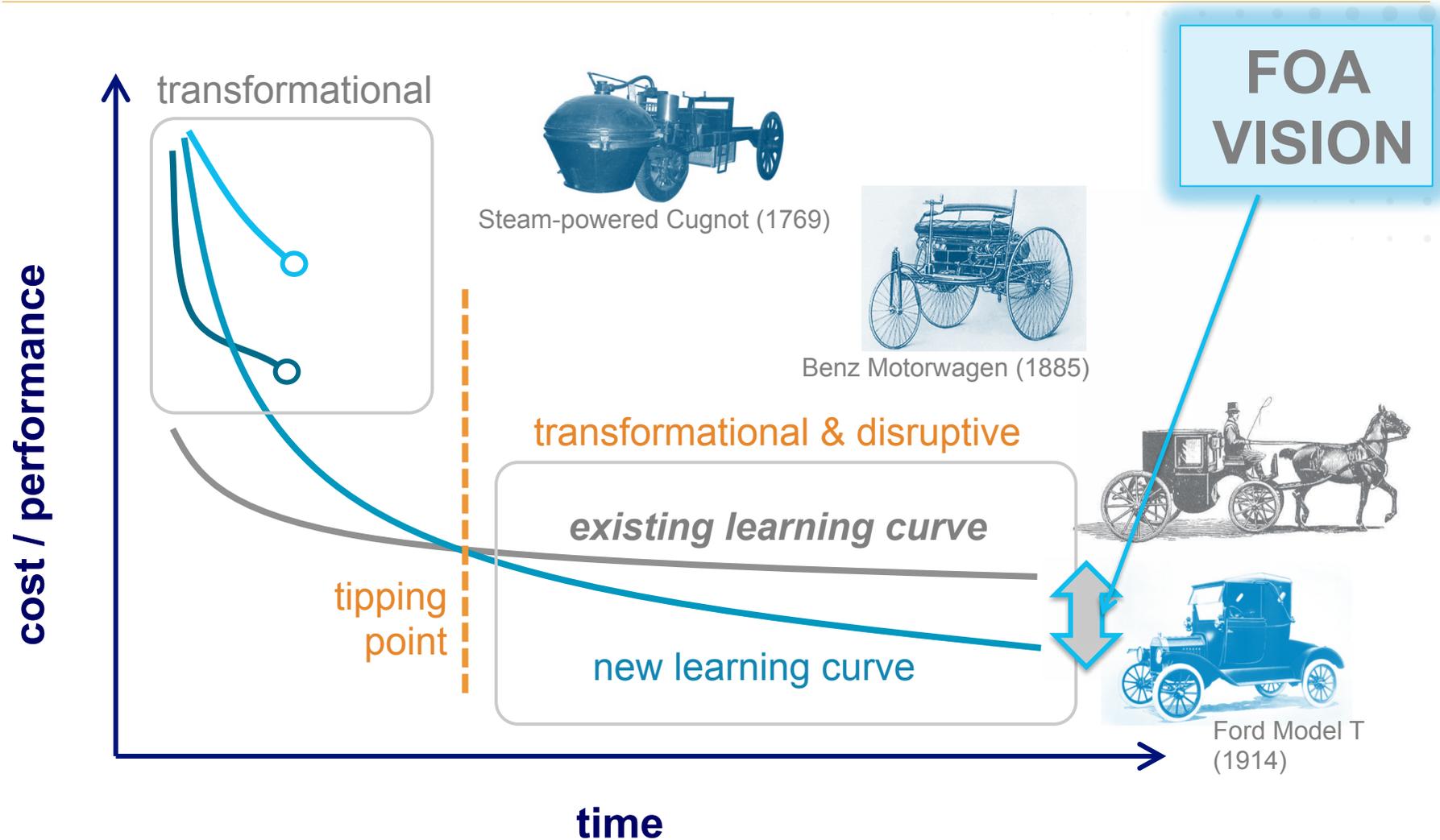
“OPEN” Program (Shotgun Approach)

- \$100-125M every 3rd yr (‘09, ‘12, ‘15)
- Non-thematic – anything goes
- Fund ~1-2% of applicants
- 1, 2, & 3-yr projects
- Down-select to successes
- Prepare for follow-on funding

Focused Program Portfolio



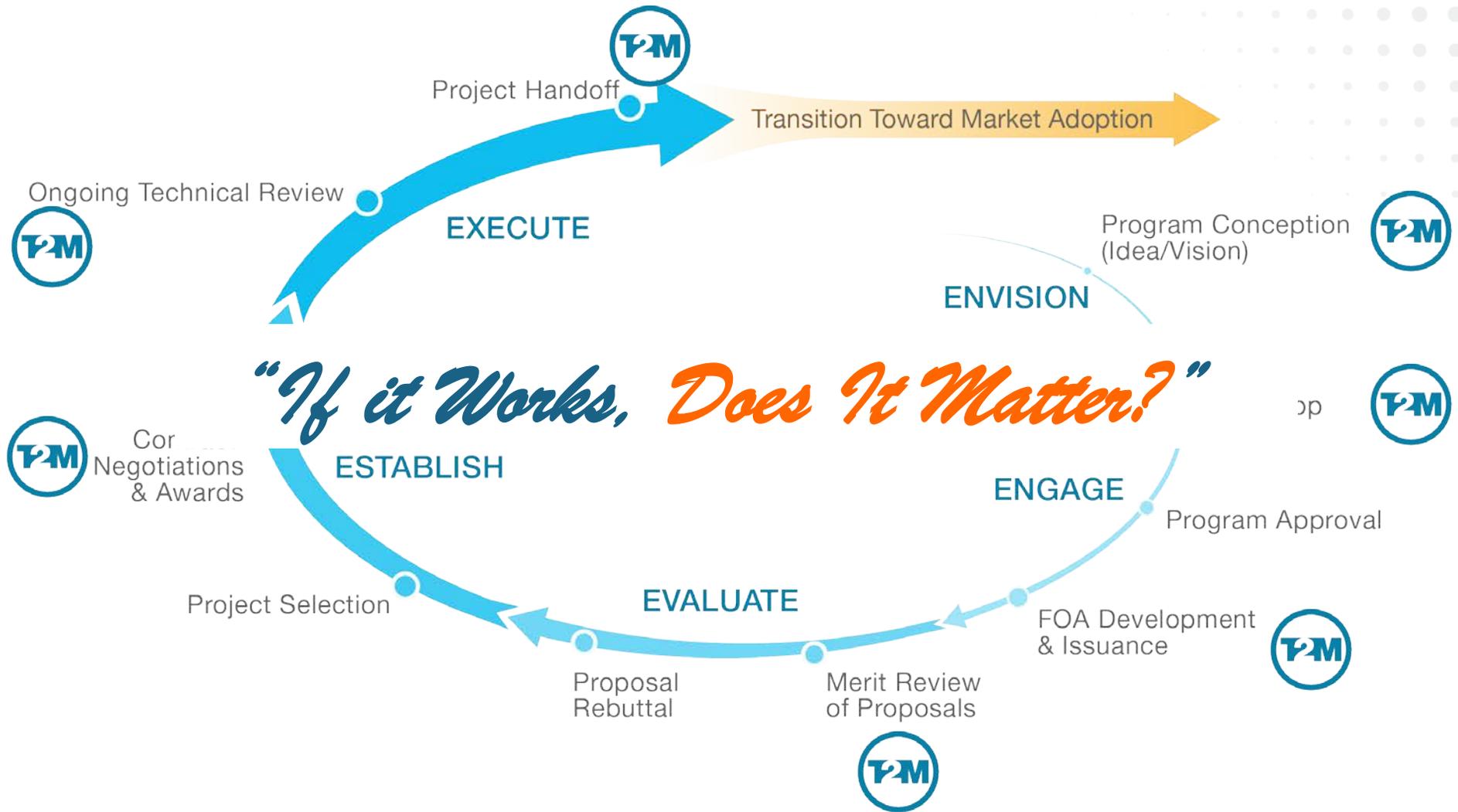
Transformative & Disruptive Technologies



Innovative & Disruptive?



At what points does T2M engage?



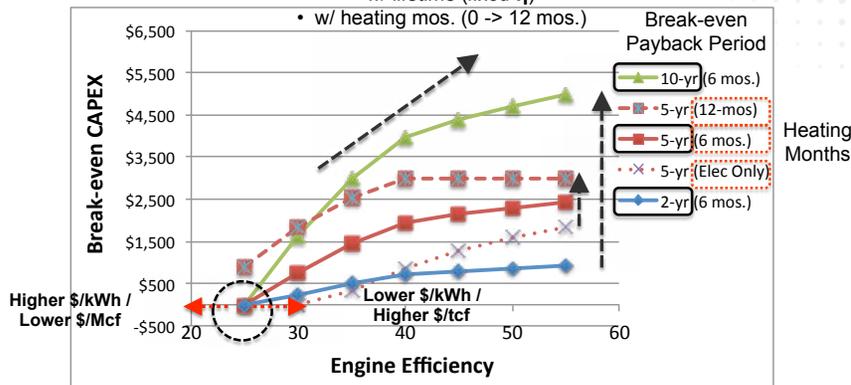
Technology to Market

"If it Works, Does It Matter?"

Capital Cost vs Device Efficiency (η)

Gas: \$10/Mcf
Elec: \$0.11/kWh

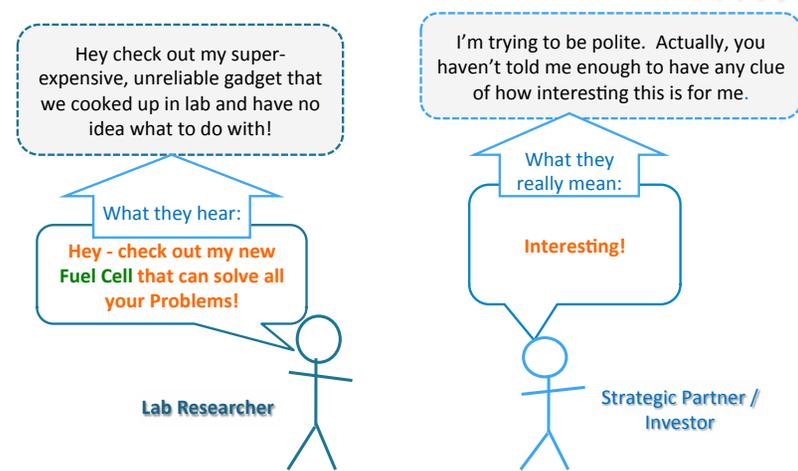
Break-even CAPEX increases
 • w/ η (fixed lifetime)
 • w/ lifetime (fixed η)
 • w/ heating mos. (0 -> 12 mos.)



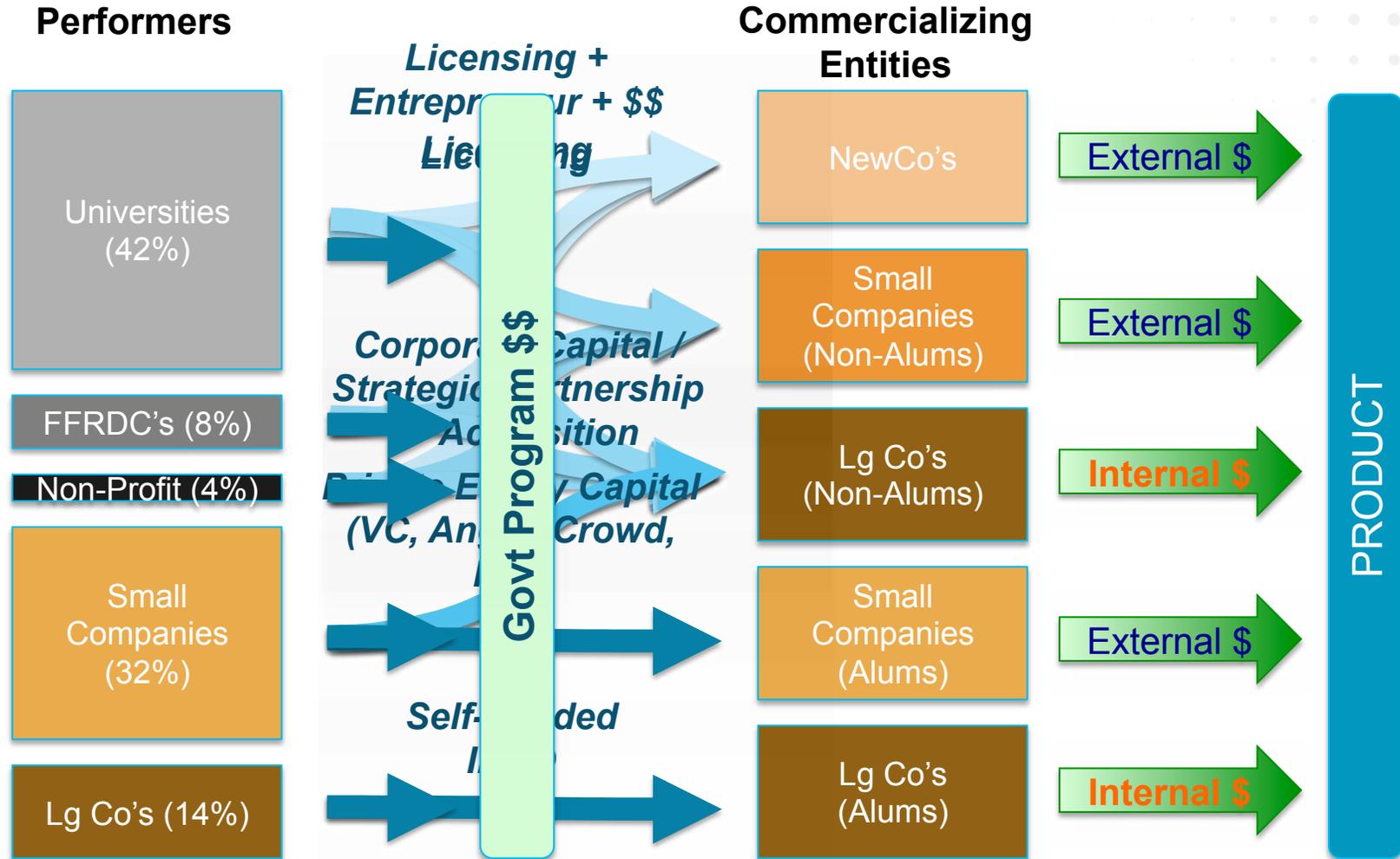
A (gas:elec) cost combo establishes an η below which it costs more to have engine than grid, even if engine is free.

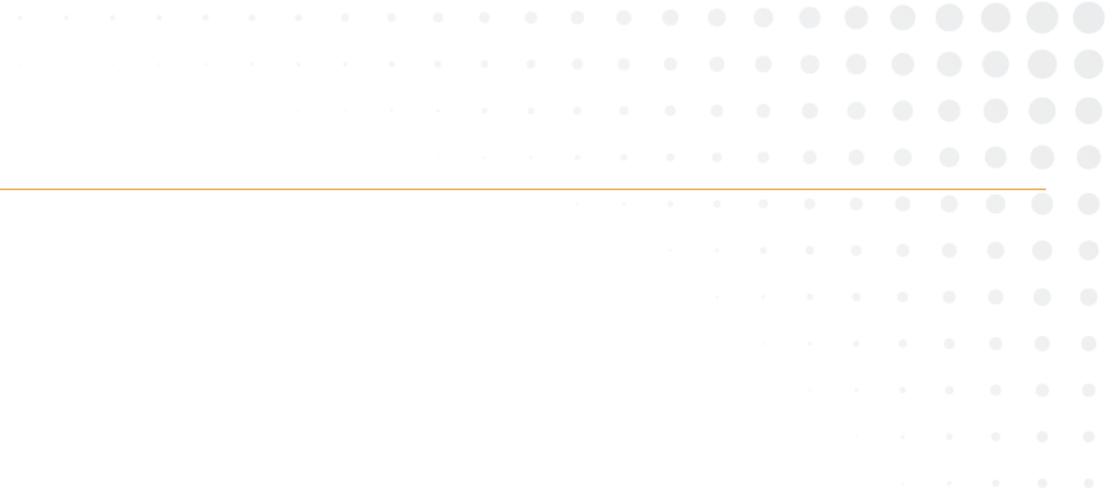
Messaging: Market Engagement

Getting past the Standard Interaction



Various Pathways to Follow-On Funding

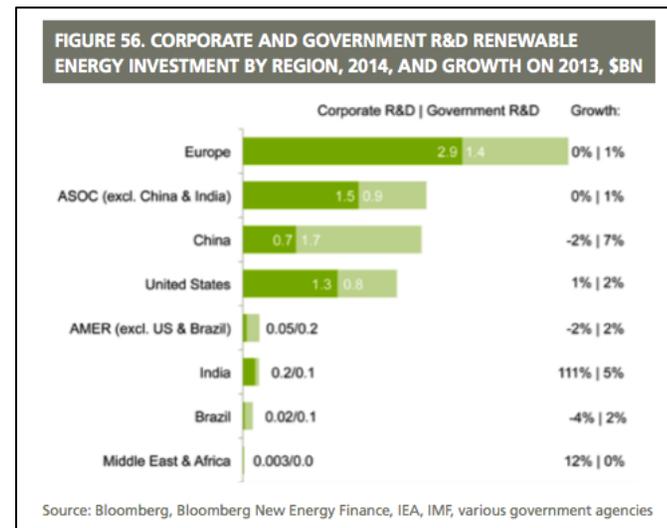
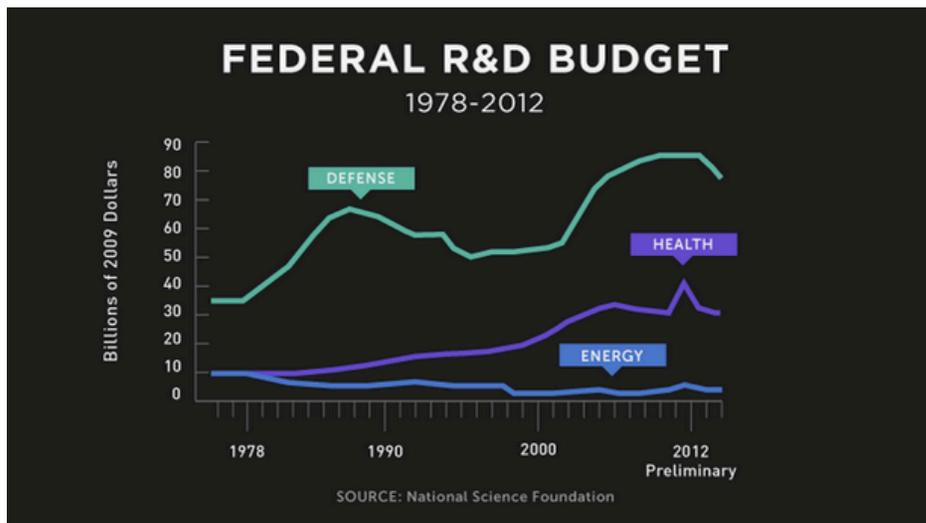




FRAMING THE WORKSHOP

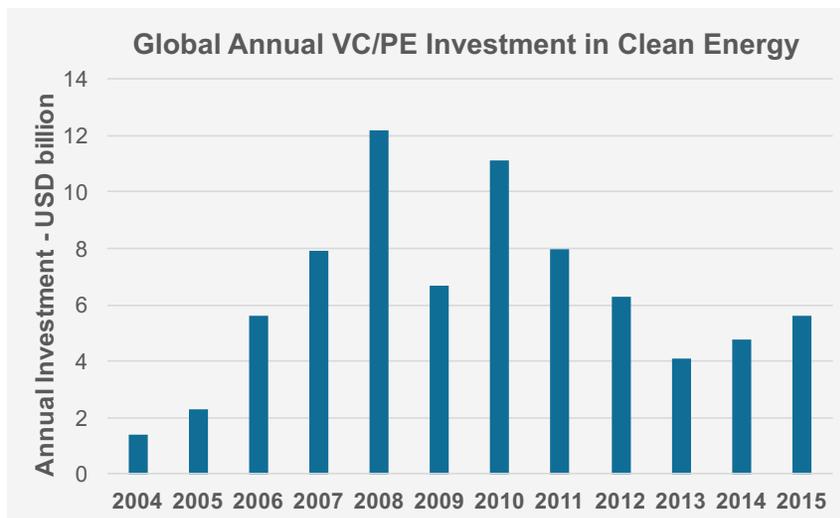
The Backstory

- ▶ Creating a sustainable energy future is a Trillion \$\$ opportunity
 - Innovation and/or
 - Deployment
- ▶ Public sector \$\$ supports early innovation and fills Valleys of Death
 - *(though U.S. Energy is low relative to other Departments and other Countries)*

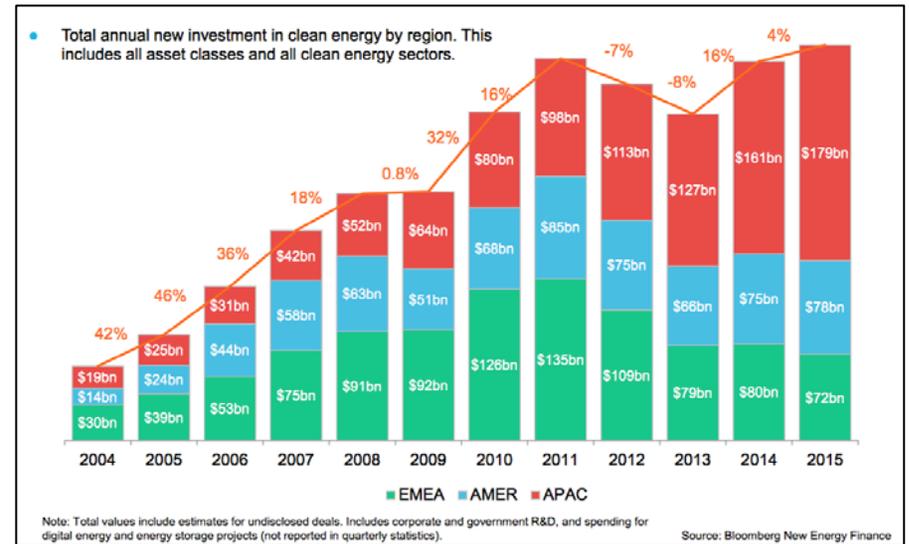


The Backstory

- ▶ Private sector \$\$ move technologies to the market
- ▶ Private sector investment in early-stage energy (“VC”) has been waning
 - VC’s (or their LP’s) prefer capital light in market-pull sectors - ENERGY is neither



Source: Bloomberg New Energy Finance



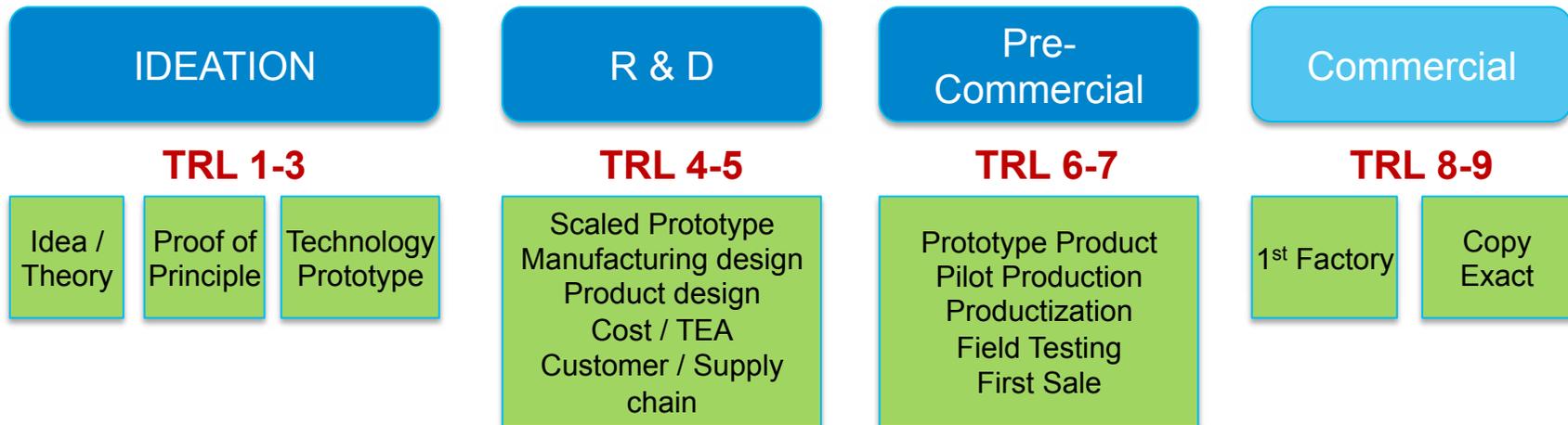
- ▶ *What other capital resources are available?*

Energy Technology Challenges (new business opportunities)

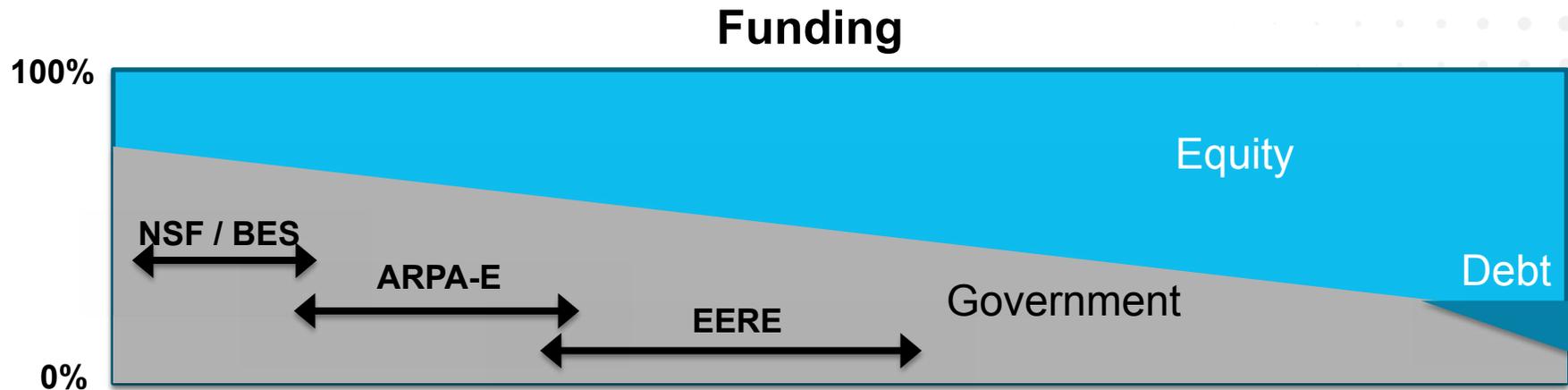
- ***Shifting from Central to Distributed Generation***
 - *Grid Integration / Creating Micro-grids*
 - *Regional / Local Islanding (grid independence)*
 - *(μ -) CHP (residential, commercial, community)*
- ***Energy Storage – a broad spectrum of desired solutions***
 - *Grid-level (T&D Investment deferral, Renewables Integration)*
 - *As a Distributed Energy Resource (transform Intermittent to dispatchable)*
 - *Transportation*
- ***Electric Vehicles***
 - *Range Improvement*
 - *Smart Charging*
- ***Renewable Fuels***
 - *Lowering cost of production*
 - *Food vs Fuel*
- ***Improved extraction & use of Natural Gas***
 - *Well-head monitoring & capture*
- ***Controls***
 - *DER grid integration*
 - *Behind-the-meter utility interface*
 - *Energy efficiency*

Nomenclature *(as it relates to Risk)*

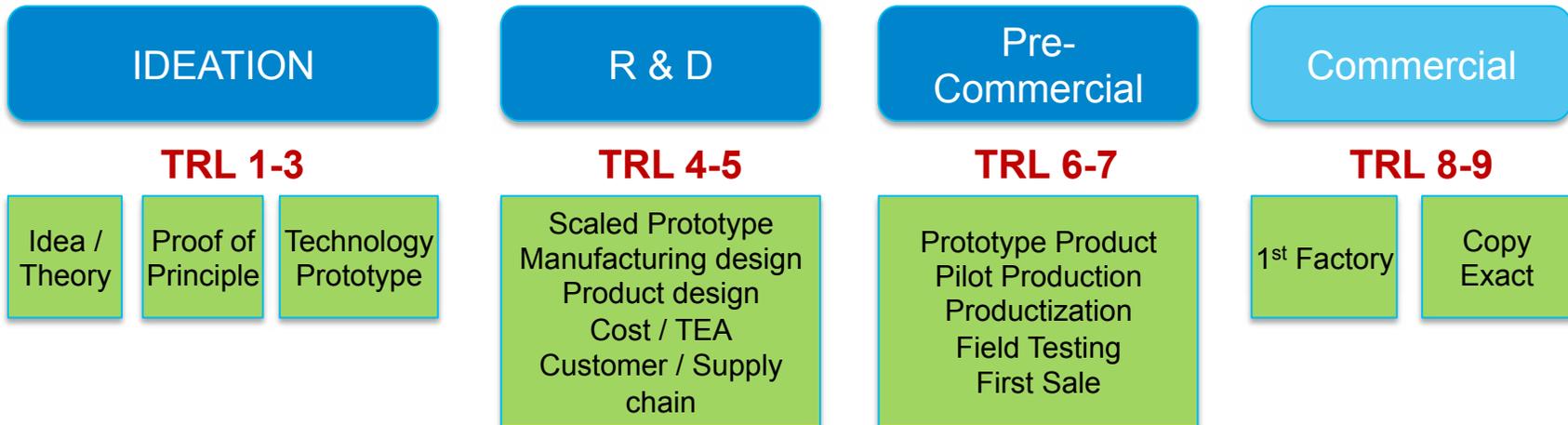
- ▶ Capital = Funding
- ▶ “HardTech” (vs. Softtech)
 - Hardware w/o Manufacturing Risk
 - Generators / vehicles / electronics
 - Hardware w/ Manufacturing Risk
 - Thin-film & crystalline Solar PV / batteries / fuels & chemicals
- ▶ “Early Stage”



Funding Sources

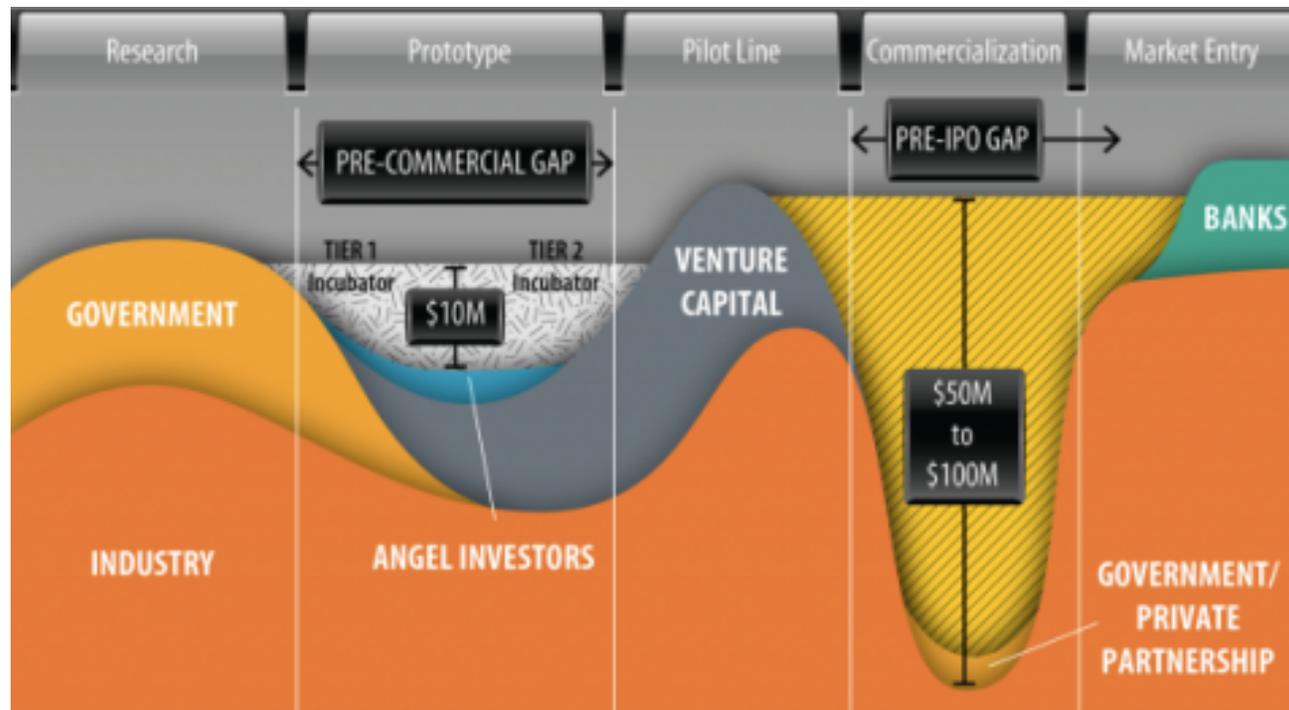


► “Early Stage”



Funding Challenge - The Valley's of Death

- Gaps in funding that occur when a substantial amount of capital is needed to move a technology to the next level
 - Post Govt. research / pre-scaling
 - Post revenue / pre-profitability



Follow-on Funding Attributes Unique to ARPA-E

(-) >50% of award selections go to non-corporate entities

- An Entrepreneur and formation of a Corporate entity is required

(-) Little or no Govt. funding for Product Demo / Pilot Manufacturing phase

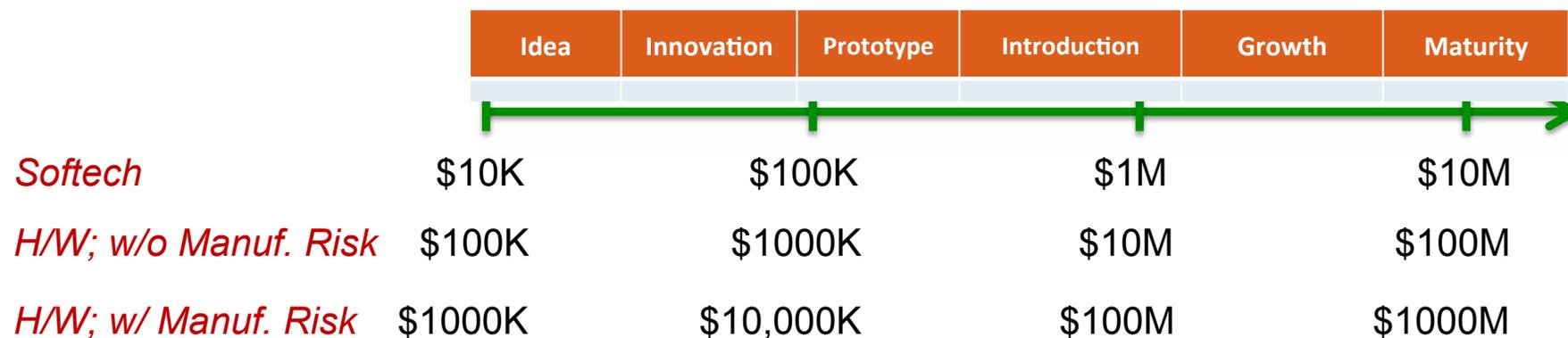
- Scaling of product prototype and/or demonstration of manufacturability critical for traditional VC funding

(+) Technology-to-Market program de-risks market in addition to technology

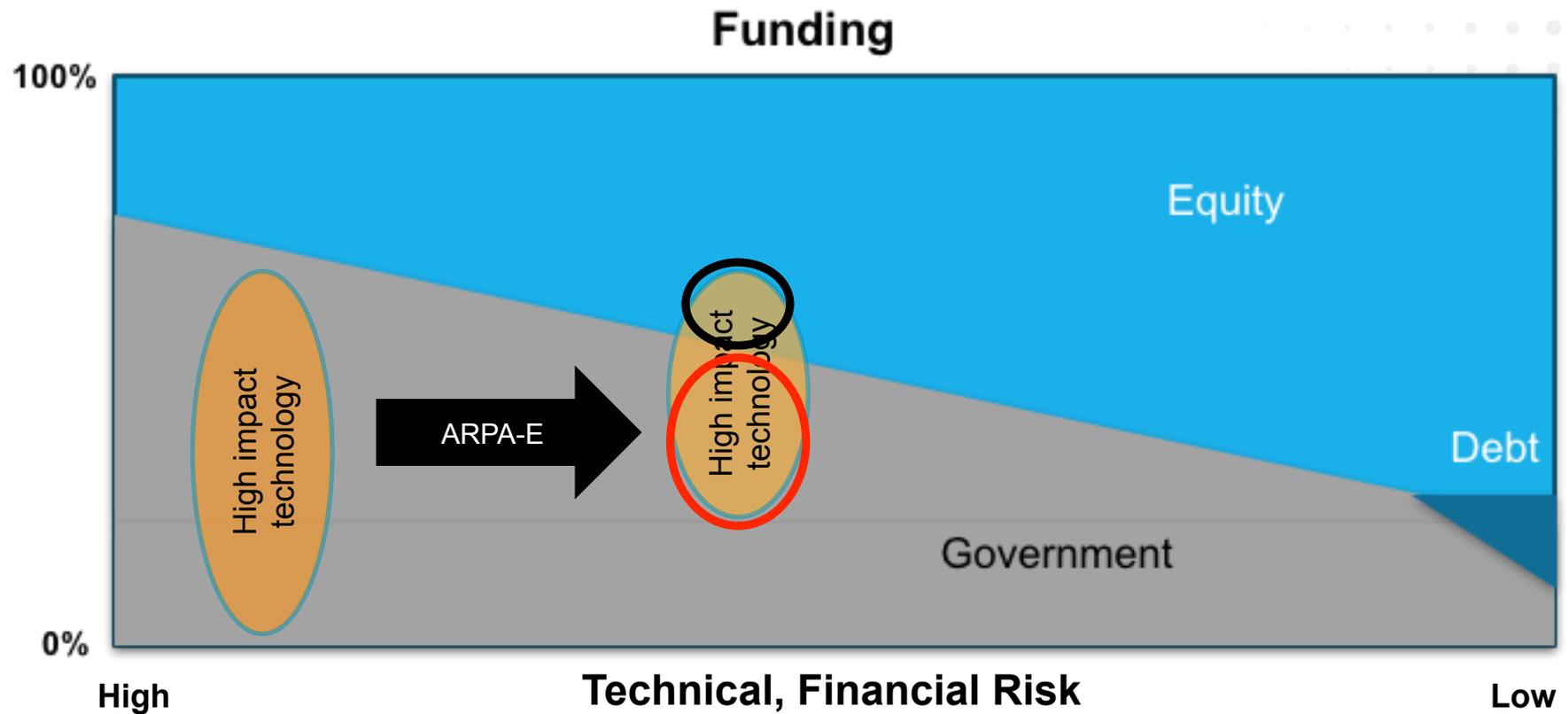
- ARPA-E Project Teams are well prepared to have substantive conversations with capital sources

Funding Challenges Unique to Clean Tech/Energy

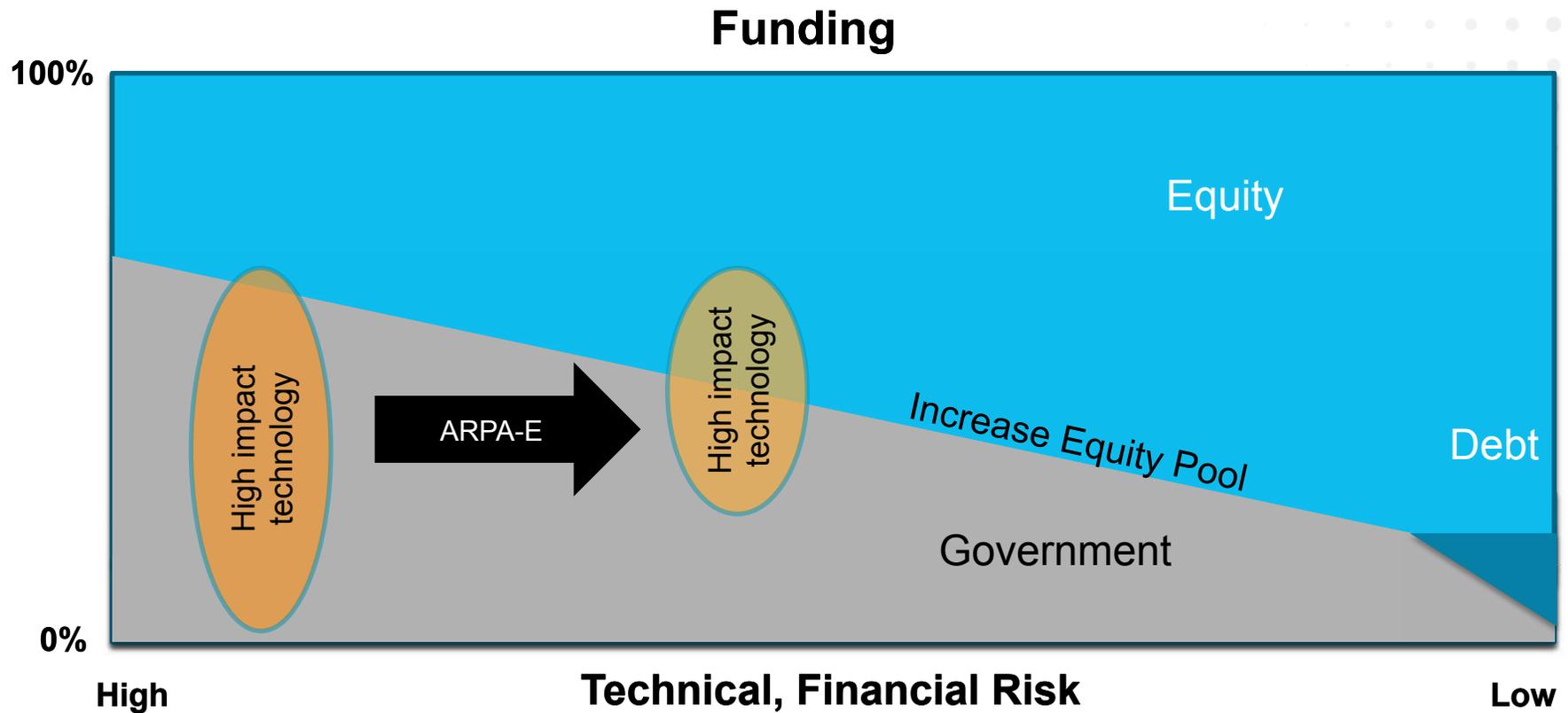
- **Introducing new energy products is a Market “Push”**
 - Displacing legacy infrastructure (electricity, fuels) is difficult
 - Energy markets, while vast, are often low margin or highly volatile
 - Non-level playing field with traditional hydro-carbon technologies (*no current monetization of carbon attributes*)
- **Energy is a political issue**
 - Regulatory reform, policy changes to encourage clean energy are absent
- **“Hardtech” Energy technologies are not typically “capital light” as Investor’s prefer**
 - Investing in manufacturing development is not cheap



Who Gets Funded?

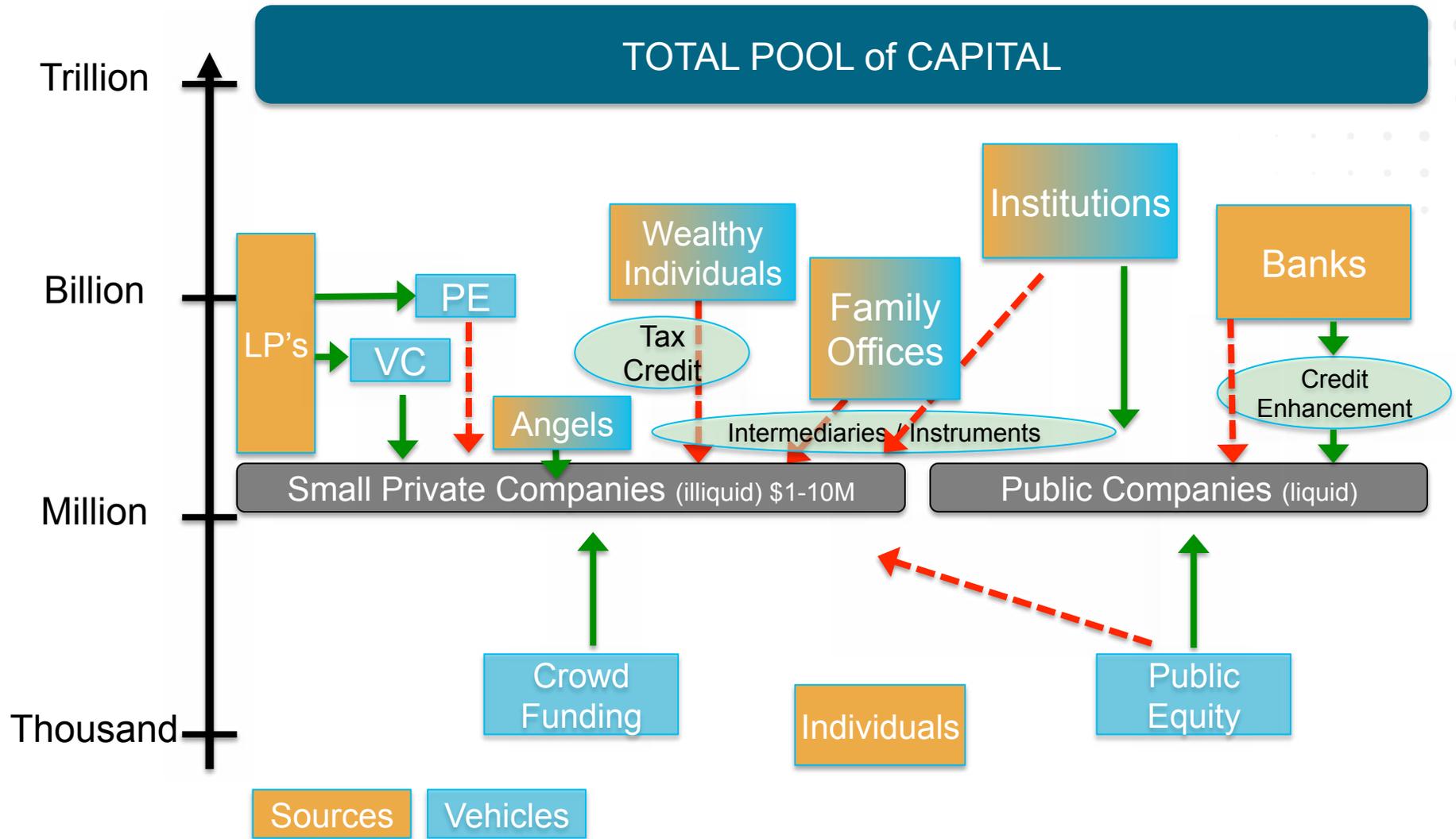


Who Gets Funded?



Goal -> Increase the # of funded entities!

Capital Sources, Flow & Structures



Private Capital Flow / Barriers

- ▶ Private capital flows (*or doesn't*) into companies based on:
 - Desired rate of return on equity or debt
 - Liquidity of investment
 - Risk
 - Market dynamics of product or service
 - Tax benefits / Law or policy
 - Emotional factors such as social benefit
 - Alternative options (bonds, CD's)
 - Company maturity
 - Management Team
- ▶ Cleantech and Clean energy, especially early stage, offer LOWER performance metrics , but potentially HIGH social benefit and policy support
- ▶ Few mechanisms exist that facilitate the flow of capital into early-stage energy

Workshop Premise

- ▶ **Assumption: Increasing the pool of capital for early-stage energy would increase the availability, competitiveness and market share of clean energy technologies**
- ▶ **Questions we would like to discuss**
 - How does increasing “early-stage” capital impact up and down-stream capacity?
 - How would the additional capital be deployed?
 - Quantity vs Quality (the “bar”) of deals
 - What new financial structures can bridge the gap?
- ▶ **Questions we want to avoid**
 - How much is enough? 2X or 10X?
 - If we just improve business models, then...
 - If we just improve the companies, then...

Workshop Approach

▶ Goal

- *To stimulate conversations that will catalyze increased capital flow to early-stage energy technology via new financial structures and improved understanding of opportunity and risk.*

▶ Methodology

- Convene a broad spectrum of financial, technology and entrepreneurial acumen to bridge gaps of knowledge and encourage cross-disciplinary problem solving
- Provide real-world scenarios to engage participants in substantive conversations regarding capital flow challenges and potential solutions
- Distill strategies for enhance capital and technology capacity
- Present distilled discussion to broader groups for further debate

Who is here?

▶ **Capital Sources**

- Traditional Venture Capital
- Corporate Venture
- Other venture / other equity
- Family Offices
- Philanthropy
- Corporate strategics
- Angels
- Asset managers
- Commercial banking

▶ **Intermediaries / Financial structures**

- Insurance
- Credit enhancement
- Structured Finance
- Tax equity
- Transaction legal
- Incubators
- Policy

▶ **Innovator/User**

- Entrepreneurs / Execs
- National Lab
- Academia
- Utility
- Govt. – domestic and International

Workshop Elements

▶ Framework

- State of the Industry (BNEF)
- **Foundational** – “Mini Presentations”
- **Foundational** – Sarah Kearney (Prime Coalition)
- **Case Studies** – 2 Company Scenarios
 - Investment journey & technology journey
 - Purpose: Getting Innovators & Investors on the same page
- **Breakout #1**
 - Innovators (2 groups) - *Define the Technology Challenge & Related Mitigation*
 - Investors (3 groups) - *Define the Investment Challenge & Related Innovation*
- **Breakout #2** - *Linking Investor & Innovator Perspectives*
 - Fuse Innovators & Investors - Seeking mechanisms to mitigate the gap risk
- **Breakout #3** - *Deploying 10X Capital*
 - Institutionalize Capital Structures
 - Institutionalize Technology Capacity
 - Align Policy Makers

Public Equity

▶ Is public equity an option for early-stage energy (entrance rather than exit)?

– Advantages

- Enhanced liquidity (*dependent on trading volume*)
- Accessible to individual investors
- With sufficient market cap, accessible to institutional investors
- Public stock can be used as currency instead of cash

– Disadvantages

- Requires additional reporting, internal controls etc. (\$\$)
- Raising capital has more hurdles based on % of Market Cap

– Either or Or

- Different Board constituency (Independent Directors vs Investors)
- Earlier liquidity for Mgmt. Team

▶ Why not more often?

- Securities trading increment changed from 1/8 to 1/16 in 1997 and then to decimal \$0.01 in 2001.

- Reduced the liquidity in less-active stocks and the incentive for market-makers in micro-cap (\$50-300M) listings



THANK YOU

John R Tuttle, Ph.D.

Senior Commercialization Advisor

john.tuttle@hq.doe.gov

jtuttle59@mac.com