Summary of Input Request for Information DE-FOA-0001346 September 2015

Prepared for the Office of Technology Transitions and Technology Transfer Policy Board

Note: the views expressed in this document solely reflect the input received from the RFI respondents and do not necessarily represent DOE’s perspective.
Overview and respondent demographics

**RFI DE-FOA-0001346:** The U.S. Department of Energy (DOE) seeks feedback from public and private sector stakeholders regarding opportunities to enhance the commercial impact of DOE’s portfolio of Research, Development, Demonstration & Deployment activities.

**RFI Release Date:** May 6, 2015  
**RFI Response Deadline:** June 10, 2015

55 total submissions were collected and analyzed in response to the RFI

- **Industry:** 13 respondents (24%)
- **National Labs:** 10 respondents (18%)
- **Incubators/VCs:** 8 respondents (15%)
- **Contractors:** 7 respondents (13%)
- **Academic:** 6 respondents (11%)
- **Tech commercialization consultants:** 5 respondents (9%)
- **Independent Research Organizations:** 4 respondents (7%)
- **Other:** 2 respondents (4%)

**10 small technology developers**  
3 major technology developers (Dow, PPG Industries, Air Products & Chemicals)

**5 incubator/accelerators**  
3 venture capital firms

NREL, INL, and LLNL submitted a joint response
The 10 responses encapsulate ideas from 12 labs

National Association of State Energy Officials  
Guam Power Authority
Technology Transitions focus areas

Respondents provided insight and recommendations in 5 key focus areas.
Most respondents prioritized one area over another, or responded generally to the RFI.

1. Technology Commercialization Fund
   - Develop a forward-looking approach to the implementation of the TCF, which will leverage 0.9% of the RDD&D funding in DOE’s applied energy programs to pursue high impact technology commercialization activities

2. Cross-Research and Development Linkages and Innovation Cycle Transitions
   - Coordinate DOE activities to effectively transition technologies through the innovation cycle and foster cross-research and development linkages involving all programs of the Under Secretary for Science and Energy and other DOE units

3. Central Policies and Procedures
   - Clarify and streamline relevant policies and procedures

4. DOE National Laboratory Technology Transitions (Intramural)
   - Enhance technology transfer and commercialization at the national laboratories

5. Extramural Technology Transitions
   - Enhance the commercial impact of DOE’s activities with extramural partners in academia, industry, state and local government, and other entities

Note: The major themes, considerations, barriers/needs, and potential approaches described herein represent the perspectives and ideas generated by the respondents to the RFI.
OTT seeks information that could inform the design and implementation of the TCF, including, but not limited to, the following questions:

– What are the most important gaps and areas of need in the U.S. energy technology commercialization system that the TCF should address?

– How can a TCF be designed to most effectively leverage private investment to advance the commercialization of energy technologies?

– Similarly, how can a TCF be designed to most effectively leverage investments made by other federal agencies to advance the commercialization of energy technologies?

– How can a TCF be designed to have a broader, catalytic impact beyond the specific projects it supports?
# Technology Commercialization Fund: Major themes and recommendations

<table>
<thead>
<tr>
<th>Number of acknowledgements</th>
<th>% of respondent category (not % of total)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>TCF for 1st Valley of Death</td>
<td>21</td>
</tr>
<tr>
<td>TCF for Later Stage Demonstrations</td>
<td>20</td>
</tr>
<tr>
<td>External Funding / Matching Funds</td>
<td>20</td>
</tr>
<tr>
<td>Regional TCF Approach</td>
<td>13</td>
</tr>
<tr>
<td>Fund business related activities/ mentoring</td>
<td>12</td>
</tr>
<tr>
<td>Leverage other federal agencies/ programs</td>
<td>8</td>
</tr>
<tr>
<td>Prize-based innovation competitions</td>
<td>3</td>
</tr>
</tbody>
</table>

All of the RFI respondents addressed Question 1

### 1. Technology Commercialization Fund

#### Major themes and recommendations

- **TCF for 1st Valley of Death**: Difficulty transitioning proof-of-concept into a marketable product. 90% of National labs and 88% of Incubators/VCs.

- **TCF for Later Stage Demonstrations**: Fund/ incentivize partners to demonstrate technology at later stage. 60% of Industry and 40% of National labs.

- **External Funding / Matching Funds**: Seek external funding partners and offer matching funds. 75% of Incubators/VCs and 50% of National Labs.

- **Regional TCF Approach**: Establish relationships with regional partners, match TC to local needs. 75% of Incubators/VCs and 40% of National Labs.

- **Fund business related activities/ mentoring**: Researchers are unfamiliar with the non-technical aspects of TC. 88% of Incubators/VCs.

- **Leverage other federal agencies/ programs**: Evenly distributed among respondent types. Interagency R&D portfolio offers larger pool of potential technologies.

- **Prize-based innovation competitions**: Low barrier to entry for applicants and high speed program cycle. Streamline processes to fast-track innovation and commercialization. Examples include: X-Prize, SunShot.

Note: 55 total respondents
Technology Commercialization Fund: Summary of Recommendations

Technology Maturation Funding

• 10 responses recommended the TCF focus on tech maturation funding specifically as #1 top priority; 8 of these responses were from national labs

• Entrepreneurial training: “Inventors seeking TCF for tech maturation should do rigorous entrepreneurial training”

• Two-pronged approach (model: NM Venture Acceleration Fund)
  – Phase 1: Funding for lab tech maturation as CRADA with industry partner
  – Phase 2: Funding to industry partner for early commercialization efforts

• Multi-pronged approach:
  – Authorize labs to designate allowable overhead $ for tech maturation
  – Multi-lab centers/projects to mature classes of technologies
  – TCF funding for individual labs via DOE RFPs

• Local management of lab tech maturation programs / reduced strictures or operational impediments that cause delay to commercialization

• Note: several responses did not address need for private cost share, no discussion of a SBV-like TCF model
Technology Commercialization Fund: Summary of Recommendations

Seed-Stage Funding

• 12 responses recommended the TCF focus on seed-stage funding specifically as the TCF’s #1 top priority

• Focus on seed-stage funding for businesses attempting to commercialize technologies developed at national labs and universities

• Primary focus on seed funding to support early commercialization activities: business model development, customer identification, team formation

• Focus on “mini-Series A,” following initial seed funding ($250-750k)

• Partner with impact investors: matching funds with qualified investments would allow TCF funds to be syndicated and “vastly multiply impact”

• Capitalize local/regional investment funds structured as nonprofits, which could match/leverage federal funds & maximize dollars as revolving funds

• Proof-of-concept centers and “bridge” awards (model: NYSERDA program)
Technology Demonstrations

• 4 responses recommended focusing TCF on tech demonstration projects as the #1 top priority
• Emphasis on demonstrating technologies “to provide the data needed for end users and purchasers to make informed decisions and drive the entry of technologies into the commercial market”
• “Multiple demonstrations are needed in normal, real-world operating conditions to provide the comfort level required for market acceptance”
• “Any demonstration program absolutely must include a requirement for data collection and analysis that collects performance, usage, maintenance, reliability, cost, and other user data. The collection and dissemination of this data is critical to filling the knowledge gap that exists”
• “Providing real-world demonstration is critical to enable commercial entities to better identify the risks associated with new technologies and more clearly quantify the benefits to their prospective customers”
Leveraging Regional Resources

• 8 responses recommended regionally-oriented TCF approaches as #1 top priority
• Make TCF matching funds available to state or regional organizations focused on energy technology development, including existing state programs
• Encourage the development of multi-institutional regional mechanisms to facilitate commercialization of DOE RDD&D portfolio
• TCF-funded companies could be encouraged to work with DOE-sponsored Clean Energy Incubator Network incubators
• Partner with geographically dispersed technology-based economic development entities, which play a critical role at regional level
• “The probability of commercialization success among startup technology companies increases significantly when they take advantage of resources available in their own local or region”
Market Pull / Customer-Centric Approach

• 9 responses emphasized importance of market pull and a customer-centric approach

• Designate TCF funds to be used by companies for tech commercialization with reputable, early adopters (corporates, utilities, govt, school systems, etc.)

• Focus the TCF on helping early-stage businesses obtain a first “beta” customer, which can de-risk potential investments for corporates and VCs

• Use the TCF to seed the participation of corporate dollars in transitioning technologies from proof of concept to commercially validated

• A portion of TCF funding should be used to sustain “Requirements Definition” programs, regardless of which stage the TCF addresses

• Operate the TCF as much like a private fund as possible, using decision processes of private investors, potentially in partnership with a private investment firm. Short of this, Private sector input into TCF selection decisions is critical for ensuring market discipline.
Technology Commercialization Fund:  
Summary of Recommendations

Other Ideas and Recommendations

• Leverage existing test-bed facilities and infrastructure, such as utility and university test-beds; foster a national network of related test-bed facilities
• Link TCF funds to a JOBS-ACT web-based funding platform focused on early-stage cleantech deals to participate in qualifying investment syndicates/funds
• Fund an advisory group of experts (from DOE, universities and companies) to meet with investor groups and explain key emerging technologies
• Partner with a trade organization in each industry vertical to hire a tech scout to cull labs for technologies, similar to DHS Transition to Practice program
• Serve as a patient, high-risk capital pool that nonprofit incubators and accelerators need to support their startups and small businesses
• Subsidize IP licensing costs for small businesses
• Scale up existing programs, both at DOE and at the regional level
• Use to TCF to break down DOE silos, stay open to cross-cutting and novel ideas outside of existing, defined programmatic areas
OTT seeks information that could inform its approach to coordinating DOE activities to effectively transition technologies through the innovation cycle and foster cross-research and development linkages, toward the goal of enhancing the commercial impact of DOE’s RDD&D portfolio.

- What opportunities exist to enhance linkages and technology transitions across different DOE RDD&D performers, ranging from national laboratories and universities to small businesses and other parts of industry? How might OTT address these opportunities?

- How can DOE more effectively track RDD&D projects and technologies at different stages of development to identify connections and transition opportunities?

- What opportunities exist to enhance RDD&D linkages and technology transitions across DOE Program Offices? How might OTT address these opportunities?

- What best practices exist at other institutions for fostering RDD&D linkages and technology transitions, including industry, universities, national laboratories, government agencies, and other entities?
Cross-Research and Development Linkages:
Major themes and recommendations

<table>
<thead>
<tr>
<th>Information Resources</th>
<th>Online Wiki/ database of technologies &amp; IP</th>
<th>41 of the 55 RFI respondents addressed Question 2</th>
<th>46% of all Q2 respondents Broadly mentioned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process approach and cultural changes</td>
<td>Manage from a problem-perspective</td>
<td>8</td>
<td>75% of Incubators/VCs</td>
</tr>
<tr>
<td></td>
<td>Establish clear TT goals and strategy w/ centralized management</td>
<td>7</td>
<td>Broadly mentioned across the respondent types</td>
</tr>
<tr>
<td></td>
<td>Use facilitators, entrepreneurs, and others with industry/ TT experience</td>
<td>7</td>
<td>Broadly mentioned across the respondent types</td>
</tr>
<tr>
<td>Industry engagement, events, and marketing</td>
<td>Engage industry through major conferences and events</td>
<td>8</td>
<td>Contractors (60%), Large industry (50%), and labs (40%)</td>
</tr>
<tr>
<td></td>
<td>Create an OTT/DOE Innovation Summit</td>
<td>7</td>
<td>Broadly mentioned</td>
</tr>
<tr>
<td></td>
<td>Need for high quality print and web-based communications</td>
<td>6</td>
<td>Primarily supported by industry (50%), VC firms (50%)</td>
</tr>
<tr>
<td>Funding</td>
<td>Concentrate funding (bundle lab capabilities)</td>
<td>7</td>
<td>Acknowledge by academia (50%), large industry (50%), and the labs (40%)</td>
</tr>
<tr>
<td></td>
<td>Minimize risk to industry/ first adopters</td>
<td>4</td>
<td>Primarily of concern to small technology developers (want help growing their technologies)</td>
</tr>
</tbody>
</table>
Cross-Research and Development Linkages:

Summary of Recommendations

• DOE should support enhanced digital solutions including:
  - Substantial support for and expansion of the Energy Innovation Portal
  - Development/Improvement of Patent Landscape solutions
  - Development of an open source and licensable software portal
  - Investing in a CRM solution for account management and opportunity velocity measurement
  - Partnering with external IP and TT solutions such as iBridge and Flintbox and utilize more online social networking opportunities

• Support a broad strategy of increased live TT/Innovation event attendance and promotion of DOE partnership opportunities both with HQ and the Labs. Including:
  - Developing a co-branded exhibit booth
  - Engaging in national and regional Technology transfer events
  - Sponsor an annual Technology Transitions Summit and/or Event
  - Develop hard copy and digital promotion content for TT opportunities, events and successes at DOE and the labs.

• Consider mechanisms for DOE to provide enhanced direct support for technology transfer offices.

• Consider and analyze how to best incentivize collaborations among labs/programs
Central Policies and Procedures:

RFI Section Prompt

• What opportunities exist for DOE to clarify, streamline, or otherwise improve existing central policies and procedures related to the following areas, toward the goal of enhancing the commercial impact of DOE’s RDD&D portfolio?
  
  – Conflict of interest and entrepreneurial activity policies;
  
  – Agreement mechanisms, approval, and speed of business;
  
  – DOE risk tolerance and risk mitigation approaches;
  
  – Contract requirements pertaining to technology transfer and commercialization;
  
  – Government information that is classified or has export controls; and
  
  – Data and metrics collection, aggregation and reporting.
Central Policies and Procedures: Major themes and recommendations

37 of the 55 RFI respondents addressed Question 3

- Expedite Processes: 23
- Licensing Policy Suggestions: 18
- Conduct a Policy Review/ Lessons Learned: 10
- Encourage lab staff to take entrepreneurial leave: 11
- Rethink Conflict of Interest and Entrepreneurial Activity Policies: 11
- Rethink International Restrictions: 9
- Adjust Risk Tolerance: 4

- 62% of all Q3 respondents
- Mentioned by all large businesses and all Incubators/VCs
- Mentioned by all large businesses, 50% of labs, and 50% of Incubators/VCs
- Broadly mentioned
- Primarily by 75% of contractors, 50% of academia, and 3 national labs
- Supported by all large businesses and mentioned by several contractors, labs, and research organizations
- 3 of the 4 responses were from industry
Central Policies and Procedures:

Summary of Recommendations

• Consistent, standardized, defined and clear policies across all labs and field offices (COI, entrepreneurial leave, contracting, CRADAs)
  – Encourage lab staff to take entrepreneurial leave or provide time for outside consulting
  – Limit data calls and mandated reporting (coordinate to limit number and frequency)

• Continue to expedite processing speed is key
  – Expand contracting options (more flexible terms, FedACT), simplify paperwork and reduce approval times (pre-approved templates, model foreign CRADA, improved patent waivers, master/blanket agreements, better foreign partner review)

• Focus on desired outcomes of commercialization
  – Compare existing processes to efforts on a blank slate; where are they similar, where do they differ?
  – Operational knowledge of what can be done and what has been done

• Make TT a priority and factor in all DOE/ lab strategic planning
  – OTT can advocate within DOE for TTOs and staff
  – OTT can serve as convener between industry and DOE
  – OTT can remain a high level office, empower the labs and DOE offices to commercialize their own technology

• Regularly seek external feedback on tech transfer efforts
  – Adopt best practices of other agencies
  – May need multiple organizations to take an idea from proof-of-concept to commercial
  – Understand personnel limitations (e.g., not all researchers can adopt an entrepreneurial mindset)
• OTT seeks information that could inform Intramural Tech Transitions, including, but not limited to, the following questions:

  – Supporting the transition of laboratory technologies for commercial uptake and addressing barriers that impede the progression of laboratory technologies through the innovation cycle, such as through technology maturation activities, personnel recognition or incentives, and other measures;

  – Encouraging partnerships between national laboratories and the private sector that support core DOE mission priorities and enhance the science and technology capabilities of the laboratories, while also meeting private sector needs;

  – Developing greater capabilities at the national laboratories to support technology commercialization activities, including the capabilities of the technology transfer offices, the commercialization capabilities of laboratory researchers, and the effectiveness with which the technology transfer offices and researchers work together;

  – Fostering industry connections and awareness of laboratory and user facility capabilities and available intellectual property or licensable software applications, such as through outreach activities, events, webinars, digital information resources, and other efforts to increase visibility and provide ready access to information;

  – Better identifying market opportunities and industry needs through more proactive customer discovery, customer relationship management, value proposition identification, and techno-economic analysis;

  – Improving the ease and affordability of industry access to laboratory capabilities, especially for small businesses;

  – Identifying, measuring, and monitoring key tasks and paths to success for interested parties and potential customers during their engagements with DOE and its national laboratories; and

  – Other laboratory policies, procedures, and culture related to commercial impact.
## DOE National Laboratories (Intramural Tech Transitions):
### Major themes and recommendations

<table>
<thead>
<tr>
<th>Improve informational resources to facilitate partnerships</th>
<th>Improve Marketing, Awareness, and Industry Engagement</th>
<th>Number of Acknowledgements</th>
<th>31</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase Accessibility</td>
<td>Increase Accessibility</td>
<td>28</td>
<td></td>
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<tr>
<td>Metrics/ Success Tracking</td>
<td>Metrics/ Success Tracking</td>
<td>16</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Improve technical &amp; commercialization capabilities through training, incentives, or partnerships</th>
<th>Enhance Technical and Commercialization Capabilities</th>
<th>Number of Acknowledgements</th>
<th>17</th>
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</thead>
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<tr>
<td>Personnel Experience/ Training (entrepreneurial)</td>
<td>Personnel Experience/ Training (entrepreneurial)</td>
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<tr>
<td>Financial Incentivization for Lab Personnel</td>
<td>Financial Incentivization for Lab Personnel</td>
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<table>
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<tr>
<th>Other key considerations for intramural tech transitions</th>
<th>Prioritize Tech Transfer</th>
<th>Number of Acknowledgements</th>
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<tr>
<td>Standardize Operations Across Labs</td>
<td>Standardize Operations Across Labs</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### Number of Acknowledgements

- **31** for Improve Marketing, Awareness, and Industry Engagement
- **28** for Increase Accessibility
- **16** for Metrics/ Success Tracking
- **17** for Enhance Technical and Commercialization Capabilities
- **16** for Personnel Experience/ Training (entrepreneurial)
- **6** for Financial Incentivization for Lab Personnel
- **6** for Prioritize Tech Transfer
- **5** for Standardize Operations Across Labs

### % of respondent category (not % of total)

- **70% of all Q4 respondents**
  - All large businesses and 70% of labs
- **64% of all respondents**
  - All large businesses, 67% of academia, 60% of Incubators/VCs
- **75% of TC consultants, 60% of incubators/VCs, and 40% of labs**
- **80% of incubators/VCs and 50% of the national labs**
- **Mentioned by 80% of incubators/VCs and 50% of the national labs**
- **3 of the 6 acknowledgements were from national labs**
- **Positive responses from 4 different segments**
- **All large businesses (3 of the 5 acknowledgements)
Summary of Recommendations

- Development an Annual Technology Transfer Summit and an Industry Partnership workshop series
  - Encourage lab staff to take entrepreneurial leave or provide time for outside consulting
- Commission OTT or independent analyses
  - Industry specific needs (matched to RDD&D portfolio)
  - Techno-economic analyses and studies assessing the barriers to technology transitions activities in DOE and the Labs
  - The effectiveness with which DOE-funded labs deliver on collaborative R&D with industry vs generating revenue from lab generated IP (develop best practices and lessons learned)
- Increased support for digital solutions
  - An improved/expanded Energy Innovation Portal (list of technologies available for distribution)
  - Use of a CRM or marketing measurement solution
  - Central IT solution enabling improved data collection and reporting
- Enhance the consistency and standardization of TT processes, activities and policies
  - Unify IP agreements, NDA protocols, COI’s
  - Clarify what terms are/are not negotiable
  - Clear long-term positioning of DOE role in tech transitions/ commercialization
- Recognize personnel limitations (change the culture, incentivize TC, or find partners)
  - Not all staff can/need to be focused on TC (roles)
  - Researcher TC education: IP protection, royalty agreements, publishing v. patenting, etc.
  - Clearly defined roles (e.g., proof-of-concept, tech maturation, commercial applicability, business development) by multiple entities may be needed to overcome personnel experience limitations
Extramural Technology Transitions:
RFI Section Prompt

• OTT seeks information on opportunities to enhance the commercial impact of DOE’s RDD&D portfolio by transitioning and commercializing DOE-sponsored technologies in collaboration with the following external partners:
  – Universities and other research-based institutions
  – Startups and incubators
  – Small and large businesses
  – State governments, local governments, and other intergovernmental partners
  – Industrial consortia
  – International partners
  – Project developers and financiers
  – Angel investors, venture capitalists, and other early-stage investors
  – Other regionally-based organizations
Extramural Technology Transitions:
Major themes and recommendations

16 of the 55 RFI respondents addressed Question 5
(relevant recommendations were captured in responses to the other questions)

- **Use a multi-organizational tech commercialization approach to leverage existing capabilities and resources**
  - Leverage organizational expertise to establish clear roles in the TT development pipeline
    - 9 mentions
    - Mentioned by all respondent types
  - Regional focus for strategic partnerships
    - 4 mentions
    - Positive responses from 3 different segments

- **Use external resources to accelerate commercial readiness of technologies**
  - Develop strategies to de-risk technology maturation
    - 7 mentions
    - Various strategies articulated by a wide array of respondents (see back up slides for details)

- **Use portfolio reviews and technology showcases to identify potential markets**
  - Leverage external resources for technology identification
    - 5 mentions
    - Mentioned by national labs, contractors, industry, and incubators

- **Incentivize industry to try new technologies**
  - Develop strategies to minimize risk to early adopters
    - 2 mentions
    - Mentioned by an incubator and a technology commercialization consultant

- **Reduce restrictions on international collaborations**
  - Take a clear stance on international work
    - 2 mentions
    - Mentioned by a small technology developer and an independent research organization
Extramural Technology Transitions:

Summary of Recommendations

• Use a multi-organizational tech commercialization approach to leverage existing capabilities and resources, establishing clear roles in the TT development pipeline
  – Encourage academic institutions and other research organizations to work jointly on R&D
  – Focus on technology maturation at the labs before attempting to develop full commercialization capabilities
  – Evaluate how incubator networks, universities, industry, and other entities can be leveraged

• Use external resources to accelerate commercial readiness of technologies
  – Leverage existing state and regional technology commercialization organizations (see Cleantech Incubator Network)
  – Provide mentoring and coaching to innovators and entrepreneurs
  – Encourage an entrepreneurial culture at the labs

• Use portfolio reviews and technology showcases to identify potential markets
  – Leverage existing extramural partners networks and knowledge

• Incentive industry to try new technologies
  – Support clean energy procurement actions to include innovation clauses in performance contracting RFPs that gives larger organizations an incentive to work with startups or higher risk technologies.
  – Make the lab IP portfolio easier to search (wiki/database) and access (ease of contracting)

• Reduce restrictions on international collaborations