

# DOE Plan for Transfer and Commercialization of Technology

## I. Background:

Through strategic investments in science and technology, the U.S. Department of Energy (DOE) helps power and secure America's future. DOE's capabilities, and the innovations it supports, help ensure the country's role as a leader in science and technology. In particular, technology transfer supports the maturation and deployment of DOE discoveries, providing ongoing economic, security, and environmental benefits for all Americans.

DOE along with its national laboratories and facilities seeks to transfer technologies to the private sector for commercialization as efficiently and fairly as possible. DOE seeks to leverage its technology transfer activities, user-facilities and other resources for the overall benefit of U.S. competitiveness, enhancement of the nation's energy security, national security, and quality of life.

For purposes of this document, "technology transfer" refers to the process by which knowledge, intellectual property, or capabilities developed at the Department of Energy's national laboratories, single-purpose research facilities, plants, and other Facilities ("Facilities") are transferred to other entities, including private industry, academia, and state or local governments. Such transfers may take many forms, including but not limited to: Cooperative Research and Development Agreements, Work-For-Others Agreements, Agreements for Commercializing Technology, User Facility Agreements, and licensing of intellectual property.

Technology transfer does not happen at discrete points in the innovation cycle. Rather, it is a continuous process from the moment research is conducted to the time a product or service enters the marketplace. Shepherding new technologies from the laboratory to the marketplace requires an intricate support system that hinges on a breadth of expertise across the innovation and commercialization cycle. It is human interactions during the transition from one step to the next that truly enables the transfer of knowledge from the research entity to the private sector. Over the last several years, DOE has been working on developing metrics that drive behavior for optimal technology transfer at DOE Facilities. In general, technology transfer metrics are notoriously poor in measuring outcomes and impact, rather, they typically measure output, which can be useful, but does not necessarily support or drive the desired behavior. In addition, there are a number of other technology transfer outcomes that are not necessarily captured in the current metric collection, such as an invention that is not patented or licensed yet leads to the development of an entirely new industry or results in ground-breaking efficiencies.

## II. Overall Goals

Increase collaborations, where appropriate, between DOE and its Facilities with the private sector to support commercialization and technology transfer of technology developed through its research and development investments. Where there is alignment with mission, use technology transfer activities and tools to leverage DOE resources for the overall benefit to U.S. competitiveness, enhancement of the Nation's energy security, national security, environmental security, scientific leadership, and quality of life.

## III. Strategy and Plan

As mentioned earlier, the transfer of publically funded research and development to the private sector is a process that typically occurs over multiple years with identifiable steps. Although there are discrete steps in the process, it is the multiyear link that leads to successful outcomes. Therefore, the measures of success are related most often across multiple years. Commercialization results will only be achieved through the smooth transition of these discrete steps in the technology transfer process. A critical early step in the process is the reporting of the invention. Scientists and technologists must recognize the value of their invention and the importance of reporting. Figure 1 is a simplified version of the process to demonstrate the minimum steps and the hand-offs that must take place. It is important to recognize that the process can only be sustained through the support for the people, policies, and funding that enables a successful technology transfer program.

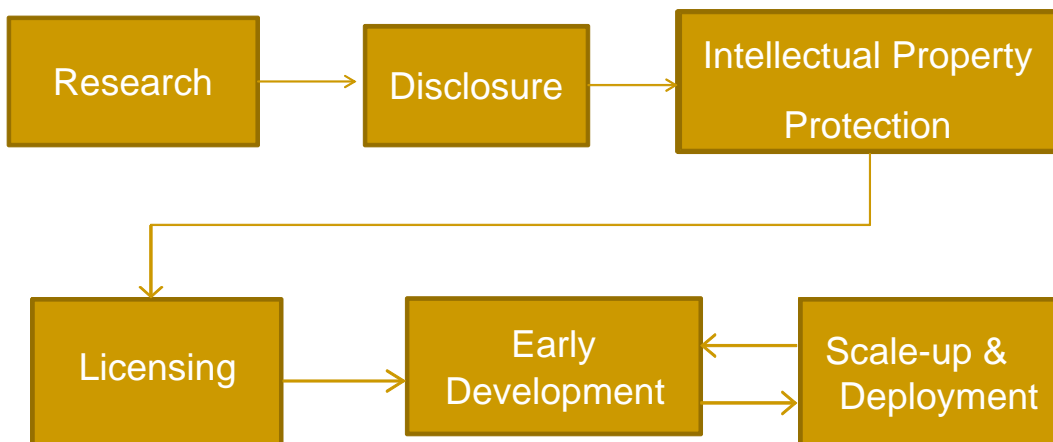


Figure 1: Basic Technology Transfer Process

## IV. Objectives and Measures

**(Note Definitions and Reporting guidance listed in Appendix A; Summary of Suggested Measures listed in Appendix B)**

1.0 Objective: Establish strong foundation for successful commercialization of inventions with policies and actions that encourage inventorship and outreach.

### Measure 1.1: Policy

- 1.1.1 The inclusion of appropriate technology transfer goals and measures in DOE programs and laboratory performance plans.
- 1.1.2 The implementation of policies and procedures to streamline technology transfer mechanisms and to improve public availability of federally funded inventions, facilities, and information.
- 1.1.3 In support of requirements in the Stevenson-Wydler Technology Innovation Act of 1980 (P.L. 96-480), DOE laboratory directors should ensure that efforts to transfer technology are considered positively in laboratory job descriptions, employee promotion policies, and evaluation of the job performance of scientists and engineers in the laboratory.

### Measure 1.2: Outreach

- 1.2.1 Policies and procedures implemented at Facilities to “reach out to scientists and technologists,” encouraging inventors to support the reporting, patenting and licensing activities at the Facility. To be measured by the number of technology transfer educational/informational activities at the Facilities for its Employees each Year.
- 1.2.2 Procedures for publicizing DOE technologies for use by non-federal entities. To be measured by number of technologies widely publicized during the Year.
- 1.2.3 The ratio of active technology availability announcements to the number of invention disclosures from the preceding Year on which at least a provisional patent application has been filed.

### Measure 1.3: Invention Reporting

- 1.3.1 The ratio of the invention disclosures to research expenditures at DOE Facilities each Year.

2.0 Objective: Widely promote promising technologies and make available to the public the knowledge, intellectual property, and capabilities developed at DOE Facilities through patenting, licensing, and collaboration. These intermediate steps in the process are necessary for successful commercialization.

### Measure 2.1: Patenting Effectiveness

- 2.1.1 The ratio of patents issued in the current year to patent applications filed during the past three Years, using a rolling three year average over said years.

### Measure 2.2: Licensing Effectiveness

- 2.2.1 The ratio of active patents that have ever been licensed or optioned to the total of active patents.
- 2.2.2 The ratio of active licenses with commercialized technology to total active licenses.

### 3.0 Objective: Streamline the Process

The Department of Energy has made significant strides in streamlining its licensing practices. Last year the Department announced a new program that would reduce the cost of option agreements for start-up companies. An option is a precursor to a license agreement where specified terms can be outlined as a condition for license execution. It can provide critical time for a start-up to bring together other resources needed for the company to become successful. The duration of the option is typically 12-months with the possibility of an extension. The DOE program, called “America’s Next Top Energy Innovator,” was created to support the larger “Administration Start-Up America” effort. This Program, along with the introduction of an “Energy Innovation Portal” - <http://techportal.eere.energy.gov/>- which lists DOE technologies available for licensing along with summaries of over 500 technologies, has enabled a larger group of stakeholders to capitalize better on DOE’s technology investment.

The focus has been on how DOE can make it easier for the private sector, specifically entrepreneurs and small companies, to engage with DOE Facilities. To that end, DOE has updated its policy and financial handbook to substantially reduce the

number of days required for advance payment by Sponsors for work to be performed at the Facilities. This requirement for advance payment assures that the Facility has the funds to commence, and continue performing work for the Sponsor company. The original 90-day requirement was onerous for both large and small companies. It has been reduced to 60-days, and can be reduced even further when the cognizant DOE field CFO makes a determination that an individual Facility has adequate procedures to allow for a shorter period for advance payment. This is the type of system-level improvement DOE is seeking to implement.

## Future Objectives

### Measure 3.1: Reduce the time to review and approve Cooperative Research and Development Agreements

Many in the private sector have expressed difficulty in executing Cooperative Research and Development Agreements (CRADA) with DOE Facilities. DOE is tackling this issue head-on and on a number of levels. Last year the DOE undertook a 'Speed of Business Study' to identify bottlenecks in the current CRADA approval process. DOE then convened a best practices meeting for DOE Facilities. The Facilities have been able to reduce processing and approval cycle times significantly—one laboratory achieving a 45-day cycle, down from 150 days. In addition to improving the process as a whole, DOE has also begun to streamline the CRADA contract itself. DOE is revising its DOE Order governing CRADAs and updating its model CRADA to eliminate outdated clauses, consolidate clauses where appropriate, and eliminate redundancy. DOE will introduce a short 'small-CRADA' model for contracts under a threshold amount.

### Measure 3.2: Effectiveness of CRADA Execution

- 3.2.1 The review and approval cycle for CRADAs at DOE Facilities will average no more than 60-days, and, will apply to CRADAs for which outside participants have been diligent in providing their responses during the negotiation process.
- 3.2.2 A streamlined approval process is implemented for Contracting Officers to follow.
- 3.2.3 Facilities making full use of the small-CRADA for contracts under the threshold amount, when appropriate.

#### 4.0 Objective: Streamline the SBIR Program to be more responsive to small businesses

The award process for applicants to the SBIR (Small Business Innovative Research) program is undergoing a major streamlining assessment. The DOE SBIR program has made significant improvements over the past year in reducing the award cycle to be more supportive of the small businesses it supports. The reauthorization of the SBIR/STTR programs (H.R. 1540, section E) that was signed by the President on December 31, 2011, mandates a number of additional changes to these programs that partially overlap with the recommended changes in the memo.

In FY11, DOE received three high quality, fundable applications for every Phase I award made; we are not currently experiencing a shortage of high quality applications. In FY11, DOE established an “other” subtopic to each topic that allowed applicants to submit ideas that might fall outside of the technology areas in our focused topics. Traditionally DOE has used topics focused on selected technology roadblocks for the SBIR/STTR programs. Small businesses have provided feedback that this may preclude them from submitting their best ideas, particularly in clean energy technologies. In FY12, DOE will pilot a solicitation with broad clean energy topics to address this opportunity.

DOE will implement a Fast Track application process in FY13 that will allow applicants to eliminate the Phase I-II funding gap, a program feature of particular interest to startup companies. Also in FY13, DOE will also introduce a Phase II follow-on program that will require private sector cost sharing to continue product R&D and commercialization beyond Phase II.

Often SBIR companies are in need of mentoring, an area to which DOE lends its support. Mentoring is carried out directly by DOE project managers as well as through specific programs put in place by DOE program offices. For example, the Office of Energy Efficiency and Renewable Energy currently has a formal mentoring program in place for SBIR/STTR awardees.

In FY12 DOE implemented a webinar-based outreach program and is targeting external organizations such as small business technology development centers, proof-of-concept centers, and innovation clusters to ensure emerging companies are aware of DOE programs. In addition, the flexible commercialization assistance provision in the reauthorization legislation will also enable companies to leverage commercialization assistance resources of these proof-of-concept centers and innovation clusters to move their technologies forward.

Measure 4.1: Compress the award schedule

- 4.1.1 Reduce the time from close of solicitation to notification of award from 5.5 to 3.5 months in FY12
- 4.1.2 Implement a Fast Track program in FY13 to eliminate the Phase I-II funding gap.

The DOE SBIR/STTR Programs Office has developed a preliminary set of performance metrics that it has started to use for program evaluation. The reauthorization legislation requires agencies to develop performance metrics and report on them annually. In addition, an Interagency Policy Committee, to be convened by OSTP, will be chartered to make recommendations on performance assessments for the SBIR and STTR programs. DOE plans to issue its first annual performance report in FY13 and, to the extent possible, utilize metrics that are common to all agencies. We anticipate these metrics will be refined over the first few years of implementation.

## **Facilitate Commercialization through Local and Regional Partnerships**

Collaborations among stakeholders are a crucial element of successful technology transfer and a robust innovation ecosystem. DOE Facilities have a long history of external partnerships with regional economic organizations, universities, and the private sector to support both their research mission, and technology commercialization. The Department's user facilities are an excellent example of dedicated facilities that foster external partner interaction with laboratory scientists. A large portion of DOE's research budget funds research and development at universities, and these funding recipients often collaborate with the DOE Facilities. The Facilities are usually available to work with industry as well, on a cost-recoverable basis if the work is aligned with DOE missions.

As discussed in Section 3, DOE has taken a number of steps to streamline its contractual vehicles that enable industry to collaborate with the Facilities either on a cost-sharing basis or under full-cost recovery. We anticipate the changes proposed in Section 3 will result in valuable partnerships between DOE Facilities and the private sector, which includes small businesses.

A number of opportunities have emerged for the Department of Energy to support the cluster development efforts that have been funded by the Department of Commerce, such as i6 Green Challenge. This program focused on creating proof of concept centers, which support all aspects of the entrepreneurship process, from assisting with technology feasibility and business plan development to providing

access to early-stage capital and mentors to offer critical guidance to innovators. DOE is partially funding three of the six recipients of the award to support the development of clean energy technologies.

Two years ago the Department of Energy released an *Innovation Ecosystem* Funding Opportunity Announcement (FOA) and awarded contracts to five organizations across the country to support the regional commercialization of technologies. Each organization has a different structure, which will be helpful in evaluating the success of the different approaches and allow the participants to share best practices. This year DOE released a new FOA, *National Clean Energy Business Plan Competition*, and awarded six universities the opportunity to run business plan competitions with a focus on clean energy. The DOE is working with the awardees to assist in leveraging laboratory technologies and resources that are available to them.

DOE supports a Regional Innovation Cluster on clean building technologies, which is a multi-agency effort including the Economic Development Administration (EDA), which is part of the Department of Commerce. Within Facilities, there are regional economic development components that range from several individuals co-located within the Technology Transfer Office (TTO) at the Facility to connections with regional economic organizations funded by state or local government.

5.0 Objective: Determine level of regional economic development at laboratories

Measure 5.1: Establish baseline level of interactions between Facilities and regional economic organizations, with State and local government and non-government organizations

5.1.1 Conduct a survey of regional economic development activities at the 17 National Laboratories by end of FY13.

5.1.2 Share best practices across DOE Laboratories about ways to engage with their regional economic development organization by end of FY14.

Measure 5.2: Identify ways to support regional economic development through partnerships with universities, industry and consortia

5.2.1 Promote the use of DOE intellectual property in the Asset Revitalization Initiative through the identification of partnership opportunities before end of FY15.

6.0 Objective: Provide positive impact on the U.S. economy by commercializing DOE-funded intellectual properties



The objective addresses the heart of DOE's technology transfer goal, that is, the commercial use and benefit of government-developed technologies. Measures established for this objective should be outcome-oriented.

Measure 6.1: Commercialization Success

- 6.1.1 The number of new commercialized technologies and the number of active commercialized technologies in a Year.
- 6.1.2 The number of new start-up companies and the percentage of start-up companies launched three Years previously that continue to be operational.
- 6.1.3 Economic Contribution of Commercialized Technologies. The dollar value of the commercialized technology sold or in commercial use in a Year (derived from royalty and other reporting by licensees).

## **Progress Evaluations**

After each year, data will be gathered from DOE programs (regarding Measure 1.1 and others as appropriate) and DOE Facilities that conduct technology transfer to evaluate progress toward meeting the goals set forth here. Comparisons, where possible and appropriate, will be made between the DOE Facilities and a group of ten universities that are “best in class” in technology transfer as indicated by data from the annual Association of University Technology Managers (AUTM)U.S. and Canadian Licensing Activity surveys.

DOE expects to measure continued improvement throughout the five-year plan period on the necessary precursors for creating positive impact on the U.S. economy through DOE technology transfer (i.e., the measures in Objectives 1.0 and 2.0). By the end of the five years, DOE expects that there will be continued improvement on each of the Outcomes described in Section 6.0: the number of commercialized technologies, the number of new start-ups that can continue to act as engines of economic growth, and the economic value of commercialized technology provided by DOE and its Facilities.

Due to the variety of research conducted across the Department of Energy Facilities, these measures are intended to apply to the Department of Energy’s technology transfer effort as a whole and are not intended to measure individual Facility performance. DOE will work toward having the individual technology transfer progress for a specific Facility included in its annual performance plan.

## **Review Requirement**

The Technology Transfer Coordinator along with the Technology Transfer Policy Board shall continue to review, and revise as appropriate, the Department’s technology transfer policies and regulations. The goal of such review and revision shall be to accelerate and simplify the process of transferring technology from DOE Facilities. The Technology Transfer Coordinator shall report to the Secretary on the results of such reviews as well as other efforts to improve the Department’s technology transfer practices.

DOE Programs, as appropriate for their missions, will support and guide the Facilities as they work to accomplish their technology transfer goals. In addition, DOE Programs will periodically re-examine how the Department can better integrate technology transfer in Government-wide efforts to address America’s energy, environmental, and nuclear challenges while supporting US competitiveness. These efforts to accelerate and simplify technology transfer and commercialization will incorporate current review processes to address environmental, safety and security concerns. For the National Nuclear Security Administration (NNSA) and related efforts, national security risks will continue to be reviewed per current practice.

## APPENDIX A

### Definitions and Reporting Guidance

For clarity, this section provides definitions of the terms, acronyms and proposed metrics that DOE will use. To the extent possible, DOE has aligned these descriptions with the Association of University Technology Managers' (AUTM) definitions to facilitate any future benchmarking efforts.

Active Licenses – Those licenses in legal force during a year.

Commercialized Technologies – A product, process, method, or service that was sold either to the public or to industry. It also refers to a licensed technology that is a process put into commercial use as opposed to developmental use by a company. A licensed technology may also be considered a commercialized technology if it is bundled with other technologies when made available to the end-user. For reporting purposes, include separately both active and newly commercialized technologies during the year. A new commercialized technology is one that was initially sold or licensed during the Year. An active commercialized technology is one that continues in commercial use during the Year.

DOE – Department of Energy, including the National Nuclear Security Administration (NNSA).

Economic Contribution of Commercialized Technologies – The dollar value of commercialized technology sold or in commercial use (derived from royalty and other reporting by licensees).

Invention Disclosure – Declaration and initial reported record of an invention.

Patent Application – An application in a particular Year for an invention which resulted from government support, and/or in which the government retains some reserved rights (for reporting purposes, include non-provisional parent application (i.e., the first U.S. utility filing or a PCT application that is the first non-provisional application where the U.S. is designated), U.S. continuation-in-part, continuation, divisional, and reissue applications. Exclude provisional filings and requests for continued examination).

Patent Issued – Those U.S. patents issued or reissued in a particular year.

Research – Experimental and creative work, including DOE work and sponsored work, conducted systematically to increase the stock of knowledge (research) and to use this stock of knowledge to devise new applications (development). R&D covers basic research, applied research, and development.

Research Expenditures – All research expenditures (i.e., cost) incurred during the tracking period from an institution’s current operating funds that are separately budgeted and accounted. It should reflect work performed and include fully loaded costs (both direct and indirect cost distributions), equipment purchased in support of research, and costs arising during the period from research funds passed through to a sub-recipient organization. Research expenditures do not include large capital projects (i.e., construction or renovation of research facilities).

Start-up Company – A new company that was dependent on licensing a DOE Facilities’ technology for its formation (i.e., not including when a technology was licensed to a start-up that is already existing). An operational start-up company possesses sufficient financial resources and expends these resources to make progress toward stated business goals. The company must also be diligent in its efforts to achieve these goals. A company that has been acquired and no longer operates independently is still considered operational for the purposes of the measures if the license is still active and in compliance.

Technology Availability Announcement – A written announcement regarding the availability for licensing of an invention. That announcement is available through electronic searches (and may also be available through other media) and includes at least a brief description of the invention and its potential commercial applications.

Year – Federal Fiscal Year (October 1 to September 30).

## APPENDIX B

### Summary of Suggested Measures

The following table is a summary of the measures described above which will have numeric values.

1.2.1	Inventorship Promotion Effectiveness (Policies and procedures implemented at laboratories and facilities to “reach out to scientists and technologists,” encouraging inventors to support the reporting, patenting and licensing activities at the laboratory.)	To be measured by the number of technology transfer educational/informational activities at the Facilities for its scientific and technical staff each Year.
1.2.2	Invention Publicizing Effectiveness (Procedures for publicizing DOE technologies for use by non-federal entities.)	To be measured by number of technologies widely publicized during the Year.
1.2.3	Invention Publicizing Effectiveness	The ratio of active technology availability announcements to the number of invention disclosures from the preceding Year on which at least a provisional patent application has been filed.
1.3.1	Invention Reporting	The ratio of active technology availability announcements to the number of invention disclosures from the preceding Year on which at least a provisional patent application has been filed.
2.1.1	Patenting Effectiveness	The ratio of patents issued in the current year to patent applications filed during the past three Years, using a rolling three year average over said years.
2.2.1	Licensing Effectiveness (Patents)	The ratio of active patents that have ever been licensed or optioned to the total of active patents.
2.2.2	Licensing Effectiveness (Licenses)	The ratio of active licenses with commercialized technology to total active licenses.
6.1.1	Commercialization Success (Technologies)	The number of new commercialized technologies and the number of active commercialized technologies in a Year.
6.1.2	Commercialization Success (Start-ups)	The number of new start-up companies and the percentage of start-up companies launched three Years previously that continue to be operational.