



NREL Commercialization & Technology Transfer




State Energy Advisory Board

June 8, 2010

**Bill Farris, V.P.
Commercialization and
Technology Transfer**

NREL Mission

It is NREL's mission to ... commercialization activities that enable widespread adoption of renewable energy and energy efficiency technologies.



8.22-megawatt Alamosa, Colo., PV solar plant

Technology Portal Vision

Original concept introduced in Alliance proposal

Goal: Enhance visibility of EERE generated technologies and increase licensing deal flow!



What is the Portal?

- Web-based system which provides technology marketing summaries of clean energy-relevant technologies of NREL and our collaborators
- Designed for technology seekers (companies, entrepreneurs, venture capitalists) can **identify and bundle** energy-relevant technologies
- Provides:
 - “One Stop Shopping” for technology seekers
 - Powerful mechanism for synergizing disparate technologies into solutions
 - Tool for EERE to collect and survey all program funded technologies

EERE Technology Portal

U.S. Department of Energy
Energy Efficiency and Renewable Energy Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable.

Intellectual Property Portal

Home | About This Portal | Search Patents | Browse Available Technologies | Help | Contact

Facilitating Commercial Access to Climate-friendly Intellectual Property

New technology related to energy efficiency and low carbon energy sources offer one of America's best hopes for reducing global warming and establishing energy independence. The EERE Intellectual Property Portal is designed to facilitate access to these climate-friendly technologies and jumpstart commercial enterprises that can leverage them.

Log in:
 Password:

Search Patents and Patent Applications

Search by:

Browse Available Technologies

Biomass Technologies
 Building Technologies
 Geothermal Technologies
 Solar Energy Technologies
 Hydrogen Fuel Cells & Infrastructure
 Industrial Technologies
 Vehicle Technologies
 Wind & Hydropower Technologies

Solar Energy Technologies
 The Solar Energy Technologies Program focuses on developing cost-effective solar-energy technologies that have the greatest potential to benefit the nation and the world. Solar technologies diversify the energy supply, reduce the country's dependence on imported fuels, improve air quality, and offset greenhouse gas emissions. A growing solar industry also stimulates our economy by creating jobs in solar manufacturing and installation.

Featured Technologies

Preparation of Superconductor Precursor Powders
 A process for the preparation of a precursor metallic powder composition for use in the subsequent formation of a superconductor. The process involves an electrodeposition bath in an electrolyte medium and a cathode substrate electrode, and providing to the bath soluble salts of metals capable of exhibiting superconductor properties.

APPLICATIONS AND INDUSTRIES

- Electrodeposition
- Superconductor
- Power Storage
- Electric Motors

INVENTOR:
 Raghu N. Bhattacharya

Two Chamber Reaction Furnace
 A vertical two chamber reaction furnace. The furnace has a lower chamber with an independently operable means of heating the lower chamber and a gas inlet for admitting a gas to create an ambient atmosphere. It also has an upper chamber which can be independently heated. Between the lower chamber and the upper chamber is a vapor permeable diffusion partition.

APPLICATIONS AND INDUSTRIES

- Material Processing
- Ore Refining
- Manufacturing

INVENTOR:
 Richard D. Blaugher

Clean Fractionation
 This is a process for upgrading biomass feedstocks for a biorefinery by separating the cellulose, hemicellulose, and lignin into pure streams for conversion into value-added products. The technology improves extraction efficiency, reduces conversion times and increases yields.

APPLICATIONS AND INDUSTRIES

- Ethanol
- Pulp and paper
- Chemical
- Food processing
- Fuels

INVENTOR:
 National Renewable Energy Lab

Intellectual Property Portal Home | EERE Home | U.S. Department of Energy
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Search Patents and Patent Applications

Placeholder text. Select the criteria in the left margin on which you would like to search. Enter data in the fields below and click search at the bottom of the page.

Search by ...

- Keyword
- Title
- Claims
- Description
- Patent Number
- Application Number
- Date(s)
- Abstract
- Inventors
- Lab
- U.S. Class
- International Class
- Government Interest
- Assignee

Keyword:

 Searches Title, Abstract, Claims, and Description simultaneously.

Title:

Lab:
 Ames Laboratory
 Argonne National Laboratory
 Brookhaven National Laboratory
 Idaho National Laboratory
 Lawrence Berkeley National Laboratory
 Lawrence Livermore National Laboratory
 Los Alamos National Laboratory
 National Renewable Energy Laboratory
 Oak Ridge National Laboratory
 Pacific Northwest National Laboratory

Control-click to select more than one option within a section.

Your Search Query:
 Keyword_Contains [Biomass] AND Title_Contains [Ethanol] AND Lab_Is [Pacific Northwest National Laboratory]

This query will return:
 61 Patents and 104 Patent Applications

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Browse Available Technologies

Placeholder text. This is introductory dummy text for the Browse Available Technologies section of the EERE Intellectual Property Portal. This is introductory dummy text for the Browse Available Technologies section.

By Technology Category | **By Laboratory** | **By Industry / Application** | **By Development Stage**

Biomass

Biomass is a clean, renewable energy source that can help to significantly diversify transportation fuels in the United States. The Biomass Program is helping transform the nation's renewable and abundant biomass resources into cost-competitive, high performance biofuels, bioproducts, and biopower. This is dummy text for the Browse Available Technologies section of the EERE Intellectual Property portal.

Building Technologies

The Building Technologies Program partners with states, industry, and manufacturers to improve the energy efficiency of new and existing buildings. This is dummy text for the Browse Available Technologies section of the EERE Intellectual Property portal. This is dummy text for the Browse Available Technologies section of the EERE Intellectual Property portal.

Geothermal Technologies

EERE's Geothermal Technologies Program works in partnership with U.S. industry to establish geothermal energy as an economically competitive contributor to the U.S. energy supply. This is dummy text for the Browse Available Technologies section of the EERE Intellectual Property portal. This is dummy text for the Browse Available Technologies section of the EERE Intellectual Property portal.

Solar Energy Technologies

The Solar Energy Technologies Program focuses on developing cost-effective solar-energy technologies that have the greatest potential to benefit the nation and the world. Solar technologies diversify the energy supply, reduce the country's dependence on imported

Technology Portal Stakeholders

Brookhaven National Laboratory



Office of Science / U.S. Dept. of Energy



OAK RIDGE NATIONAL LABORATORY

Managed by UT-Battelle for the Department of Energy

Colorado State University



COLORADO SCHOOL OF MINES
EARTH ENERGY ENVIRONMENT



U.S. DEPARTMENT OF
ENERGY | Energy Efficiency &
Renewable Energy



Sandia
National
Laboratories



NREL National Renewable Energy Laboratory
Innovation for Our Energy Future



INL Idaho National Laboratory

Battelle
The Business of Innovation



Pacific Northwest
NATIONAL LABORATORY



BERKELEY LAB

LAWRENCE BERKELEY NATIONAL LABORATORY

Argonne



NATIONAL LABORATORY



Midwest Research Institute

solutions through



Lawrence Livermore
National Laboratory

Science in the National Interest

“Best in Class” Commercialization Practices: Enable Faster and More Impactful Transactions

External focus on customers increases customer satisfaction and repeat business

- **Decision-making** on new inventions informed by Analysis for market relevance
- **Model agreements** promote transparency in all customer interactions
- **Transaction authority** within C&D to streamline execution of agreements
- **Customer-driven-timeline** imparts a sense of urgency in all transactions

Internal focus on innovation increases our invention output and our effectiveness with clients

- **LDRD** – Increase the pool, with provisions for seed projects
- **Recognition and rewards** for contributors to the commercialization process
- **Entrepreneur in Residence** – EERE program implementation
- **Improved Mechanisms** for easy disclosure of inventions
- **“Brown Bag”** seminars to promote IP basics
- **Recruiting practices** for researchers with innovation track records

NREL Partnerships Continue to Grow

Background: During FY2009, NREL had 352 active partnering agreements.

- NREL has more active and new CRADAs than any lab in the DOE system
- Roughly half our CRADAs are with small businesses
- Roughly one quarter of our CRADAs are with large businesses
- More than 40% of our WFO agreements are with Federal, State or local governments
- One quarter of our WFO agreements are with small businesses

FY10 Year to Date:

- Partnership agreement volume continues to outpace prior years with 82 new CRADAs and WFO projects to date, with a total contract value over \$63M.
- More than half a dozen significant partners recruited to use key partnering facilities (PDIL, IBRF, NWTC, SRRL), including Loyola Marymount University, Utah State Energy Program, Alcoa, 3M, EPRI
- Through a collaborative effort with DOE-GO, partnership agreement processing time has improved by 30% as of February, allowing faster and more efficient agreement development



With DOE sponsorship, NREL's concentrating solar power team is developing a pilot-scale thermal energy storage test bed to be located at SolarTAC.

A New Commercialization Model



- Venture backed start-up using NREL and ORNL technologies
 - superconducting substrate technology portfolio from ORNL
 - silicon epitaxial growth technologies from NREL
- EERE funding used to bridge the “valley of death”
 - TCF funding from with Ampulse match
- Utilized NREL Process Development and Integration Laboratory for critical materials research
- National Labs served as the R&D arm of the early stage company
- Unique three party license negotiation
- Closed Series A financing in October 2009

TCDF/TCF Program Overview

NREL received \$4MM in pilot program

- Funding received Sept. 2007

Designed to help industry commercialize NREL IP

- Bridge commercialization “valley of death”

Mandates

- NREL intellectual property
- 50% minimum cost share from partner
- Clear commercialization pathway
- Greater than \$250k TCDF investment requires DOE approval

DOE Program Contacts

- EERE Commercialization Team: Wendolyn Holland and Carol Battershell

Privately Funded Technology Transfer: Accelerates Development and Deployment

- Introduced by Battelle in 1989/new for NREL
- Alliance investment in PFTT/Maturation will be a minimum of \$1.75 million over the 5-year contract period
- Similar in some ways to our existing GFTT program but involves substantial Alliance Investment
- Specific contract terms have been negotiated with GO
- The program seeks to increase the speed of technology transfer

Clean Energy Entrepreneurship Center

Innovation at the intersection of the public and private sectors relating to entrepreneurship, new ventures, and growth capital:

- 1) Create an Innovative and Entrepreneurial Environment that is a seamless part of the fabric of NREL
- 2) Make NREL the Catalyst for Economic Development by Accelerating Commercialization and Improving the Yield of regional clean energy innovations
- 3) Facilitate robust Access to Capital and other resources for clean energy entrepreneurs.

NREL Innovation Initiative Objectives

- To create an environment where our “innovation culture” is a seamless part of the fabric of the organization
- To deliver the best trained and most knowledgeable laboratory staff about commercialization and tech transfer of all the DOE labs

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NREL Commercialization Assistance Program

NREL's *NCAP* will help energy efficiency and renewable energy small businesses *by providing assistance or information* to help with *technology challenges* through access to NREL expertise and facilities.



Venture Capital Network: Pre-Staged Access to \$4 B of Investment Capital

Venture Fund Advisory Board will enable NREL and collaborators to:

- Focus science efforts on development of impactful technology
- Identify and foster technologies that can serve unmet market needs
- Form startups that can successfully raise financing
- Commercialize mission relevant technologies faster

Venture Fund Advisory Board members will also provide mentoring, education and networking opportunities through participation in C&D programs such as:

- NREL Industry Growth Forum
- EERE Entrepreneur in Residence Program
- EERE Technology Commercialization Fund
- Program for Entrepreneurial Growth

Letters of Commitment
from Venture Capital Funds to
participate in our Venture Fund
Advisory Board

Enertech
Flagship
Nth Power
Merrill Lynch
Mohr Davidow
MRI Ventures
Rockport Capital
Siemens
Battelle Ventures/Innovation
Valley Partners
NGP Energy Technology Partners

NREL Industry Growth Forum

For over a decade the NREL Industry Growth Forum has been the premiere clean energy investment event featuring the most innovative and promising clean energy companies.



The NREL Industry Growth Forum accelerates the commercialization of clean energy technologies by:

- Fostering ***hands-on-management and coaching*** for evolving clean energy companies
- Providing a ***relationship platform for companies (example: creating access to capital)***.

The 2010 Forum features:

- Presentations from 34 emerging clean energy companies
- Provocative panels led by thought leaders
- One-on-one meetings
- Strategic investors

*Source: New Energy Finance

**Source: Hoovers

Forum Success 2003 - 2009

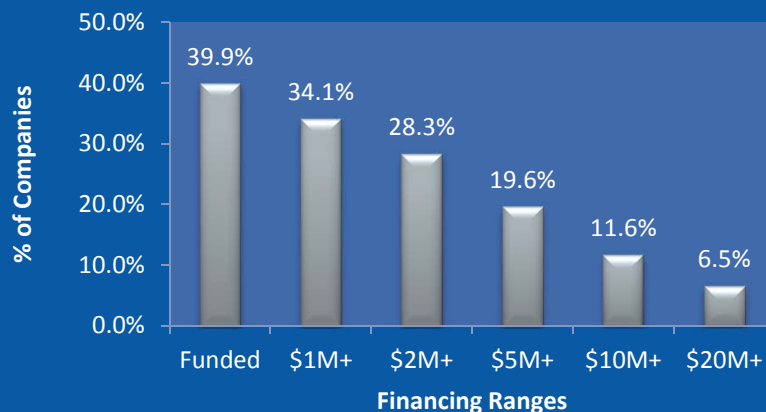
Since 2003, the companies presenting at the Forum have had success:

- More than half of the companies that participate in the Forum have received funding (91/171), cumulatively **raising over \$2.5 billion** in growth financing*
- Creating over **3,000 U.S. jobs****

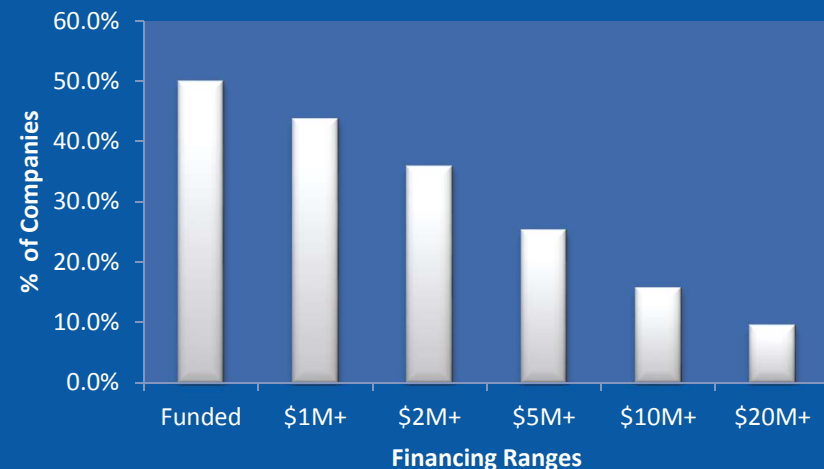
*Source: New Energy Finance

**Source: Hoovers

Percentage of Companies Receiving Funding within 1 Year of Presentation



Financing Amount Raised, 2 Years Since Presenting



NREL:

**Unique
Connected
Innovative**



Photo credit: Megavind