

CLEAN ENERGY, INNOVATION, AND TECHNOLOGY TRANSFER

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Technology Transfer Mechanisms

Transfer officials at the Department of Energy (DOE) define the following as technology transfer:

- **Cooperative Research and Development Agreements (CRADA)**

- Federal lab employees collaborate with non-federal partners to carry out R&D projects in line with DOE program goals and the partner's goals.
- Partner must contribute funds, in-kind resources, or both; the lab contributes personnel, equipment, or other in-kind resources.
- DOE funds cannot flow to the private partner.

- **Non-federal Work-for-Others agreements**

- DOE lab conducts research on behalf of a non-federal sponsor.
- Research **need not** directly benefit DOE programs.
- The sponsor must pay the entire cost of the project.

Technology Transfer Mechanisms (cont.)

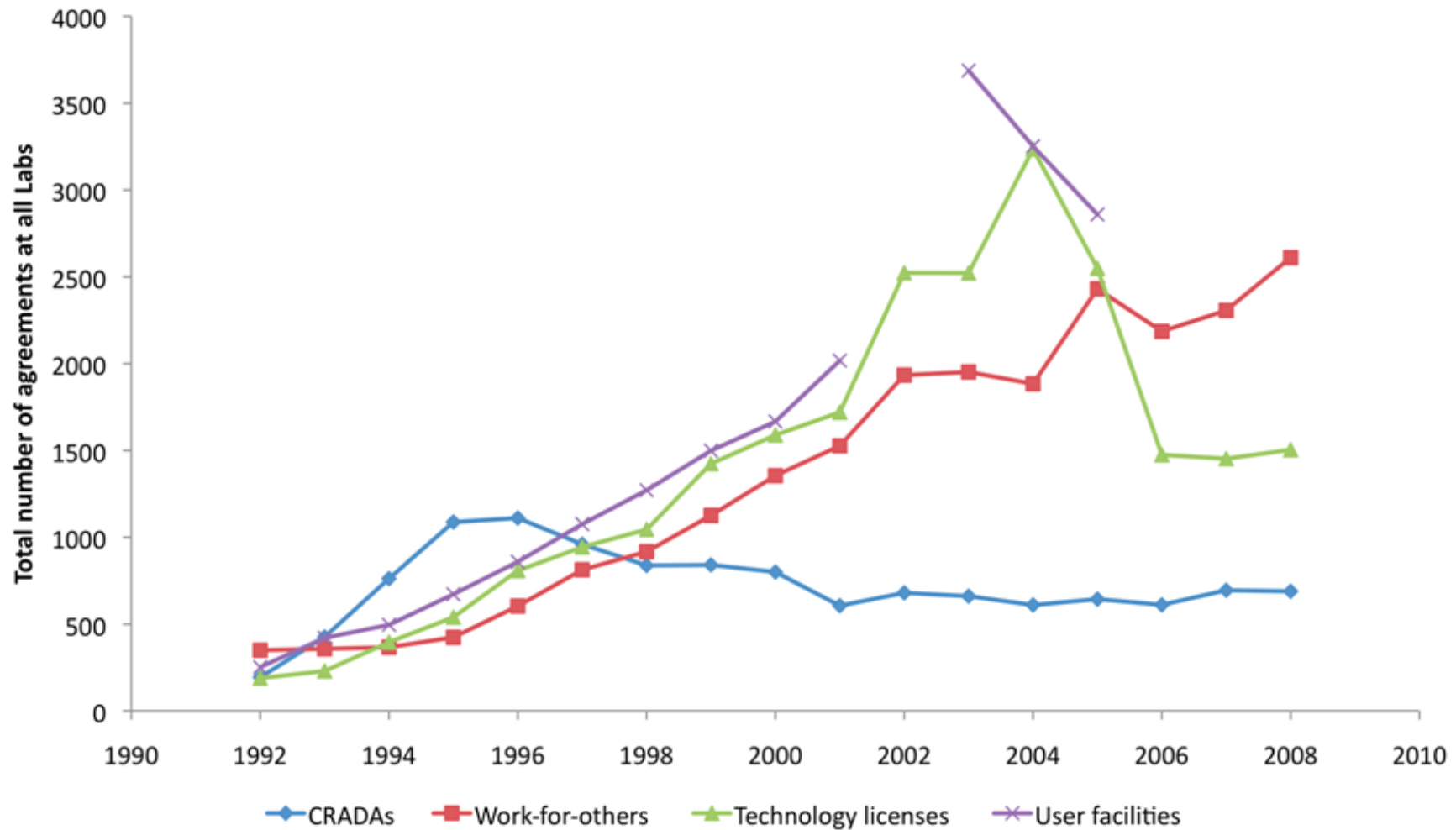
Licensing agreements

- Labs share their technologies by licensing their patented discoveries or other IP to non-federal entities.
- Licensee may pay fees or royalties to the lab.

User facility agreements

- Scientists from outside organizations use lab equipment for their own research, sometimes in collaboration with laboratory staff.

Growth in Technology Transfer Activities



Private Sector Goals

Large and mid-size firms need to outsource or overcome R&D hurdle

- CRADAs, Work-for-Others, User facility

Venture Capital or investor wants to identify technologies for commercialization

- Lab-by-lab showcases, newsletters, IP databases

Start-up firm or entrepreneur wants to collaborate with lab

- Work with partnership office at lab and locate in business park

CEO, Venture Capital, and Private Equity want to connect researcher with portfolio company

- Entrepreneurial leave, contact scientist directly

Private Sector Challenges

- **Navigation:** Lack of a centralized DOE technology transfer office that could grant easy access to information about technologies available for commercialization.
- **Identification:** Limited availability of laboratory-specific information regarding recent innovation available for commercialization.
- **Funding Structures:** Requirement to pay laboratories up front for their services.
- **Decentralized:** Lack of clear structure within DOE labs to facilitate access to the private sector.

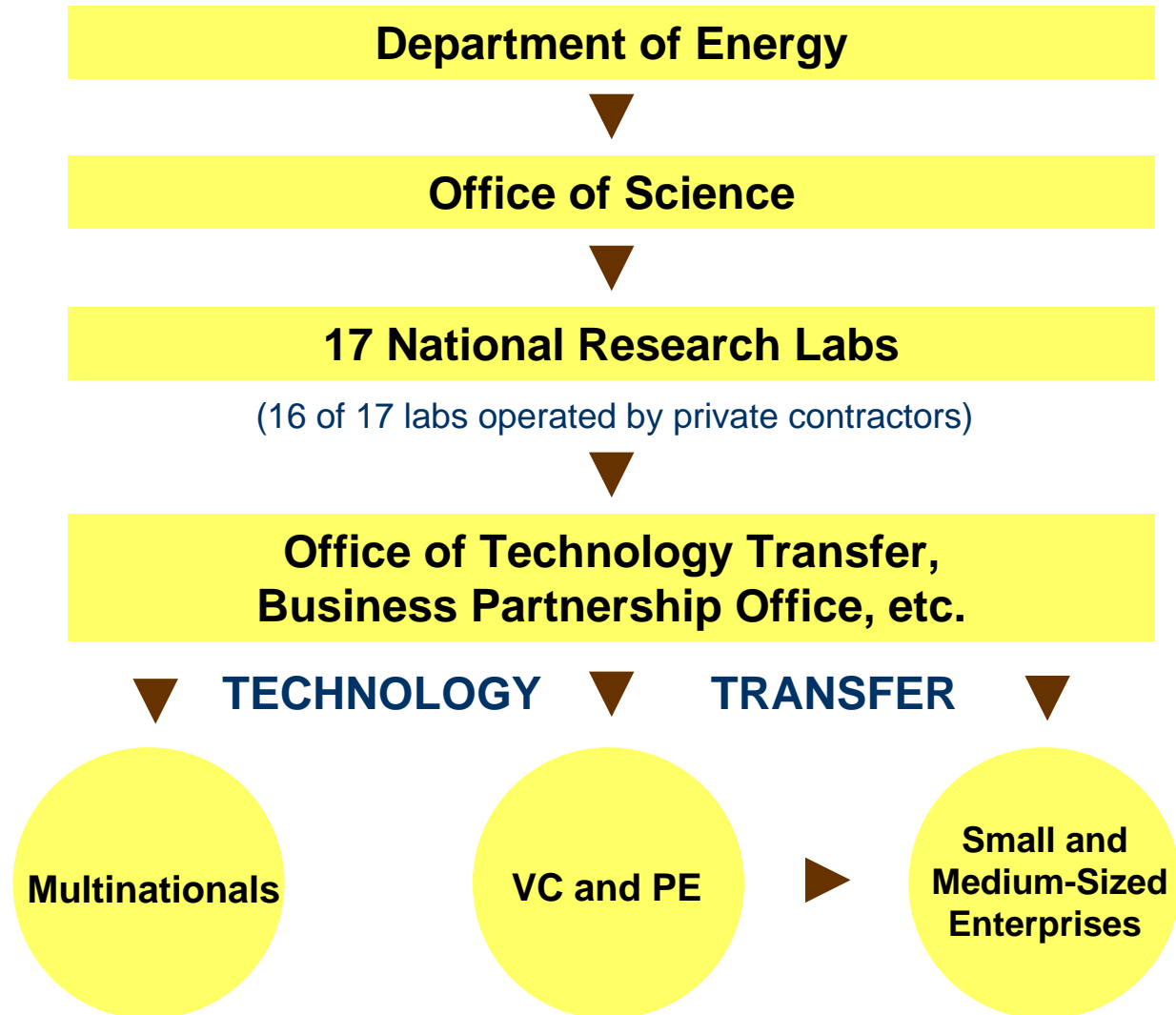
Comparison of Selected Laboratories

LABORATORY		NREL	BERKELEY	OAK RIDGE	SANDIA
Primary Technologies Offered	Solar	✓	✓	✓	✓
	Wind	✓			✓
	Fuel Cells	✓		✓	✓
	Batteries	✓	✓	✓	✓
	Biofuels	✓	✓	✓	✓
	Energy Efficiency	✓		✓	
	CCS				✓
Channels to Engage Private Sector	Public Showcases/Technology Expos	✓	✓		✓
	Online Database of Transferable Technologies	✓	✓	✓	
	Entrepreneur in Residence		✓		✓
	Entrepreneurial Leave Policy			✓	✓
	Business Park			✓	✓
	Promotion/Marketing		✓	✓	
	Entrepreneurship Luncheons		✓	✓	
Organizational Structure	Office of Technology Transfer	✓	✓		
	Partnership Development Office	✓		✓	✓
	Number of Employees	1,000	4,000	4,600	8,300
	Annual Funding	\$328.3 million	\$600 million	\$1.4 billion	\$1.38billion
Primary Private Sector Participants	Venture Capital	✓	✓		✓
	Private Equity	✓			
	SMEs	✓	✓	✓	✓
	Corporations	✓	✓	✓	✓

DOE Laboratories' Challenges

- **Core Competence:** Prioritization and expertise to identify promising technologies and potential markets.
- **Resources:** Lack of funding to develop and test technologies to attract private partners for commercialization.
- **Framework:** Less flexibility in technology transfer agreement negotiations, especially regarding funding.
- **Structure:** Lack of a clearly defined DOE definition of technology transfer, priorities, and goals.
- **Coordination:** Competition between labs for DOE funding inhibits cooperation.

DOE Structure for Technology Transfer



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Australian Framework

Department of Innovation, Science, and Research

Science Group

Cooperative Research Centres (CRC) Program

Currently 48 CRCs

Publicly Funded Researchers

Cooperative Research Centre

Australian
End-User

Australian
Higher
Education
Institution

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia's national science agency that provides research for 26 of the 48 CRCs.

Technology Transfer Process: Australia vs. U.S.

		Australia	U.S.
Objective	Commercialization	✓	x
	Research	x	✓
Structure	Flexible	✓	x
	Institutionalized	x	✓
	Includes End-User	✓	-
	Cost Sharing	✓	-
	Bidding Required	✓	x
	Education Program Requirement	✓	x
	Primary End-User	Corporations	✓
	SMEs	x	x
Obstacles	IP Requirements	✓	✓
	Application Process	✓	✓
	Adequate ROI	✓	?
	Transaction Costs	✓	✓

First Solar:

Collaborative Research Contributes to Major Financial Returns

- **Technological Hurdle:** Improve unique deposition process to reduce cost of manufacture.
- **Lab Support:** R&D grants, NREL researchers and facilities.
- **Outcome:** With manufacturing costs driven down, its thin film PV modules achieved lowest cost per watt in industry.
- **Results:** Completed a 10 MW thin film solar plant in 2008 (the largest in North America); now part of the S&P 500.



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Powering Innovations in Energy and Technology

About

POLICY CAPITAL ADVISORS helps institutional investors identify opportunities in energy, natural resources, and technology while navigating the shifting policy and regulatory framework.

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