

# Pathways to Commercial Success: Technologies and Products Supported by the HFCIT Program

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# Overview

## Timeline

- ▶ Project start date 08/2007
- ▶ Ongoing

## Budget

- ▶ Funding in FY08: \$250K
- ▶ Funding in FY09: \$100K
- ▶ Funding in FY10: \$200K  
(100% DOE funded)

## Barriers Addressed

- ▶ Inconsistent data, assumptions, and guidelines

## Partners

- ▶ HFCIT personnel and lab/contractor researchers to identify potential technologies and contacts
- ▶ Various private sector vendors and other technology providers to obtain data on technologies

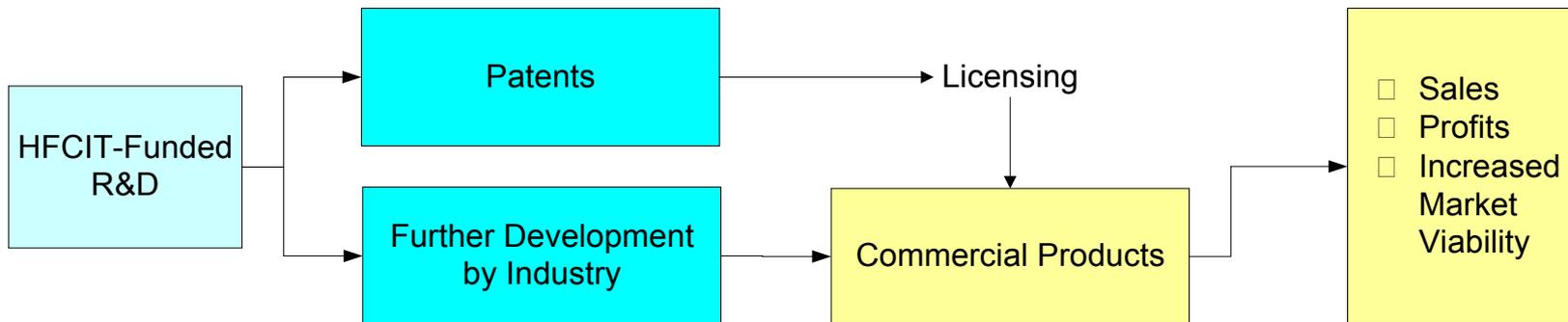


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# Objective/Relevance

Assess HFCIT program benefits by tracking the commercial success of technologies developed by HFCIT and HFCIT predecessor programs and by estimating their impacts and benefits.



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# Milestones and Deliverables

## Month/Year

## Milestone/Deliverable

September 2009

*Deliverable:* Update the HFCIT technology tracking database containing information on commercial and emerging technologies. **(Completed)**

October 2009

*Deliverable:* Prepare the HFCIT report on the status of commercialized and emerging technologies and patents. **(Completed)**

September 2010

*Deliverable:* Update the HFCIT technology tracking database containing information on commercial and emerging technologies. **(On track to complete)**

October 2010

*Deliverable:* Update the HFCIT report on the status of commercialized and emerging technologies and patents. **(On track to complete)**



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# Approach

## ▶ **Task 1: Conduct initial patent search and continue to update it (ongoing)**

Continue updating the patent list for technologies linked to HFCIT program efforts.

## ▶ **Task 2: Develop initial list of potential commercial and emerging technologies and update annually (ongoing)**

Interview HFCIT staff and patent holders to create the initial list of commercial and emerging technologies. Contact lab/contract researchers annually to update status.



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# Approach

## ▶ **Task 3: Create, Populate, and Update HFCIT Technology Tracking Database (ongoing)**

Gather data on newly and previously identified commercial and emerging technologies and update the tracking database by category (fuel cell, production/delivery, and storage).

## ▶ **Task 4: Produce and Update HFCIT Report (ongoing)**

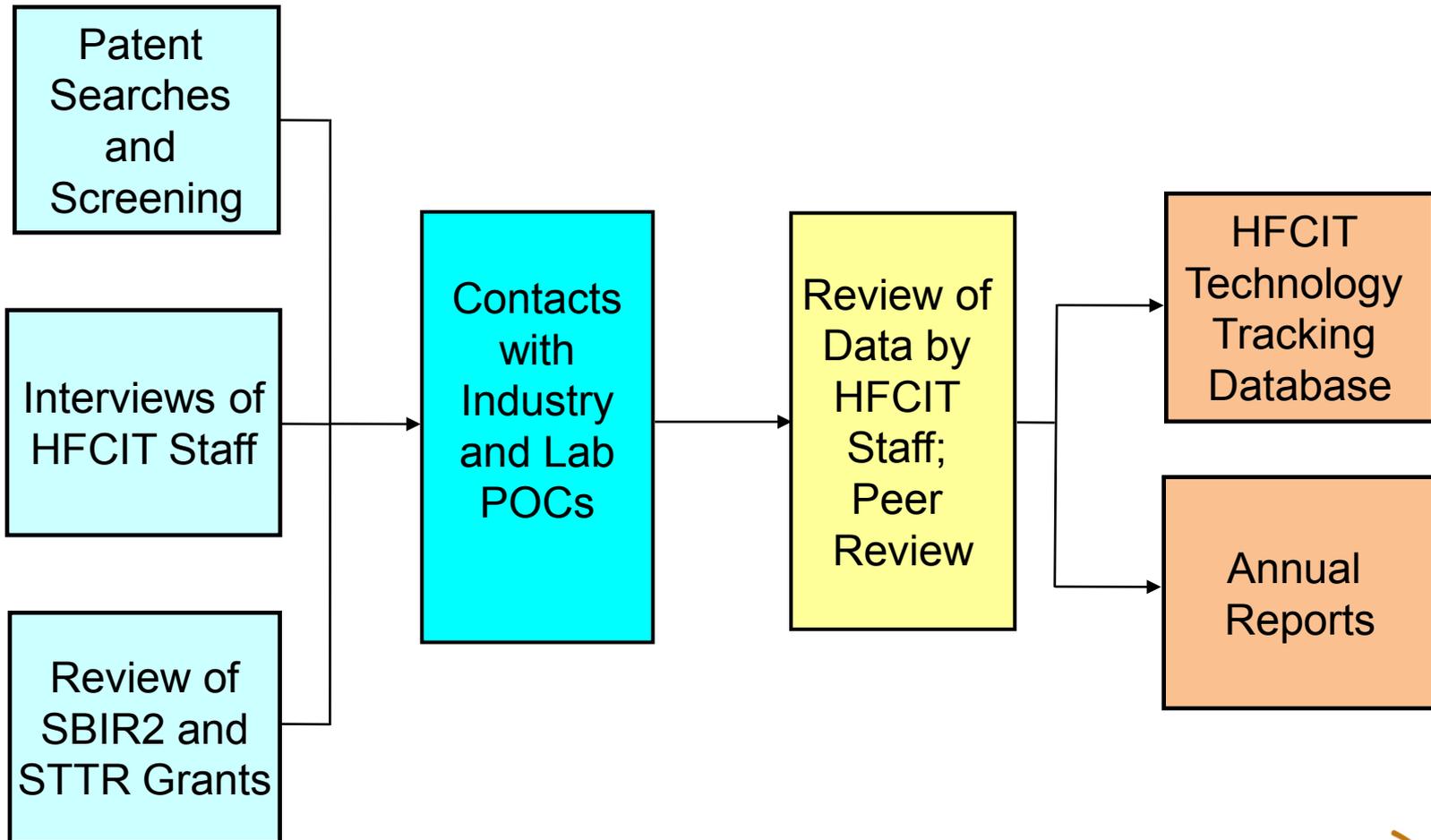
Create technology pages for newly identified commercial and emerging technologies and update pages for previously identified technologies; obtain reviews by researchers/industry contacts. Complete and continue to update the HFCIT report.



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# Technology Tracking Project: Process



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# Accomplishments: Task 1 – Patent Search

- ▶ Conducted a fuel cell patent search. Results reviewed by PNNL and HFCIT staff and narrowed to
  - 73 fuel cell patents
  - 49 hydrogen production/delivery patents
  - 21 storage patents.
  
- ▶ Contacted patent holders to determine patent status.

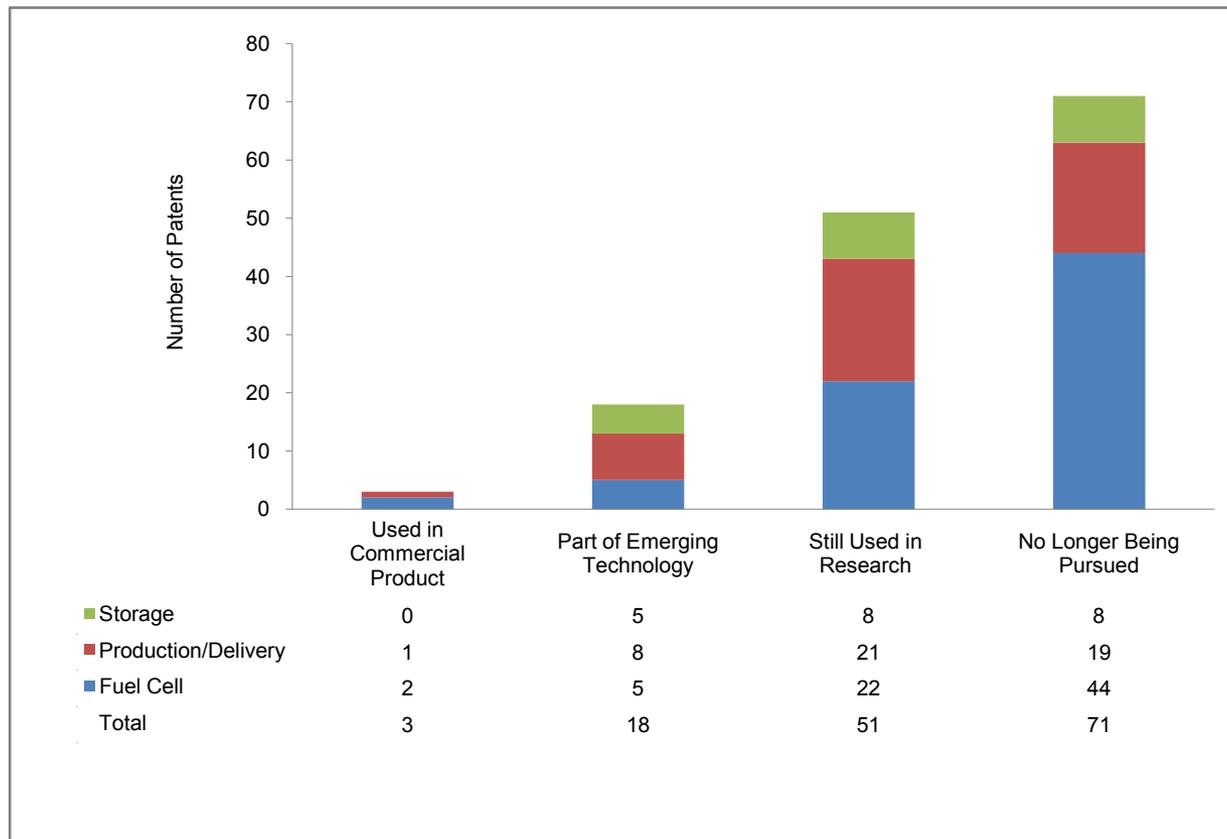


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# Accomplishments: Task 1 – Patent Search

Of the 143 patents reviewed, 50% are being used in commercial products, are part of emerging technology development, or are still being used in research.



# Accomplishments:

## Task 2 – List of Commercial and Emerging Technologies

- ▶ Using 2002-2009 annual reports, interviewed HFCIT staff to create list of potential commercial and emerging technologies.
- ▶ Contacted patent holders to determine whether their patents were being – or had been – used to develop any technologies.
- ▶ Reviewed 2002-2009 SBIR2 and STTR grants to identify potential emerging and commercial technologies.
- ▶ Contacted private sector vendors and other technology providers to determine each technology's status.

# Accomplishments: Task 2 – List of Commercial and Emerging Technologies

- ▶ As of 03/31/10, the list included
  - Fuel Cells: 17 commercial, 28 emerging
  - Production/Delivery: 9 commercial, 19 emerging
  - Storage: 2 commercial, 6 emerging.
  
- ▶ The list is a living document, with information updated continually in the database and annually in the report.



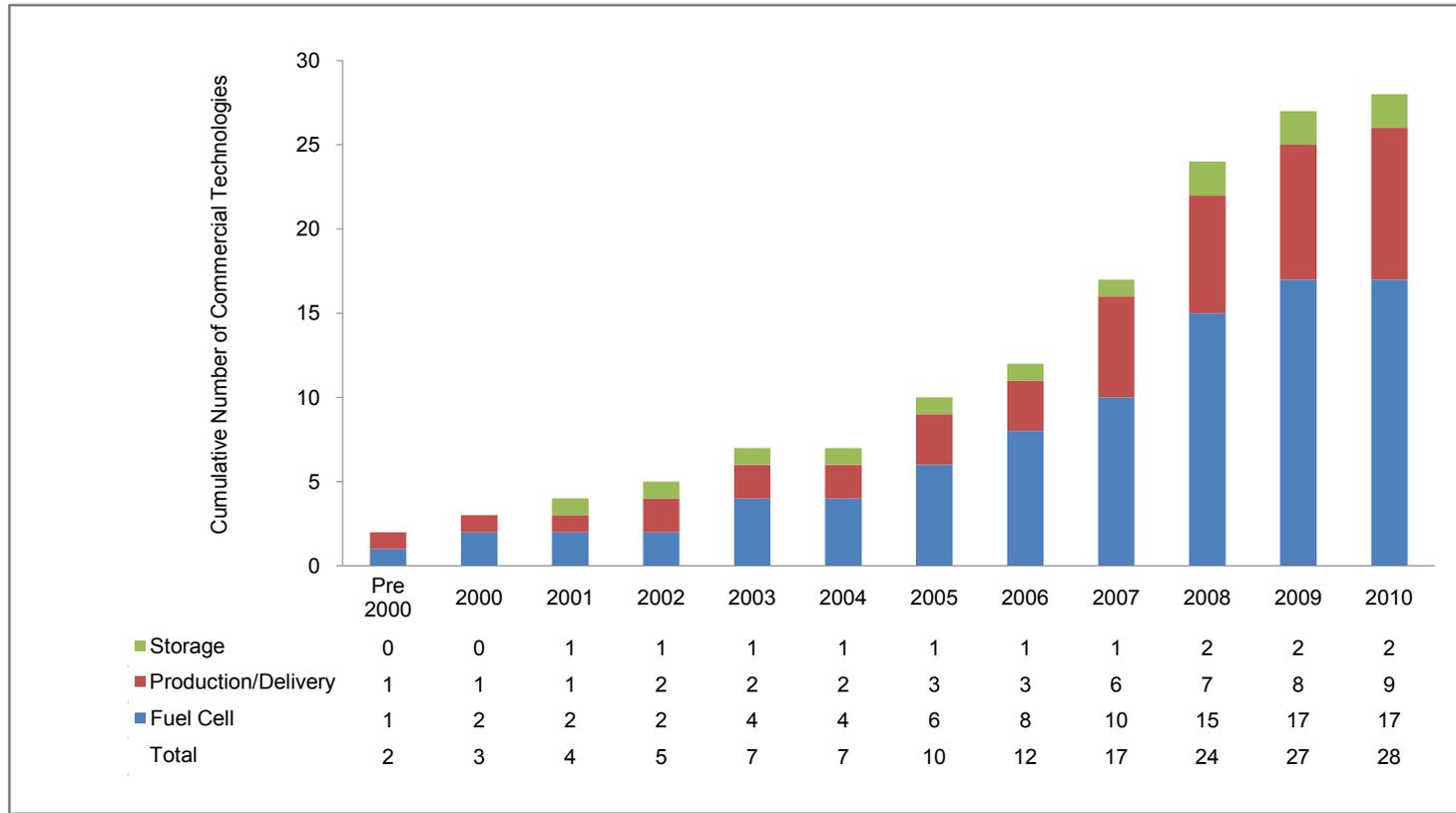
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# Accomplishments:

## Task 2 – List of Commercial Technologies

Since 2006, an increasing number of HFCIT-funded technologies have been entering the market.

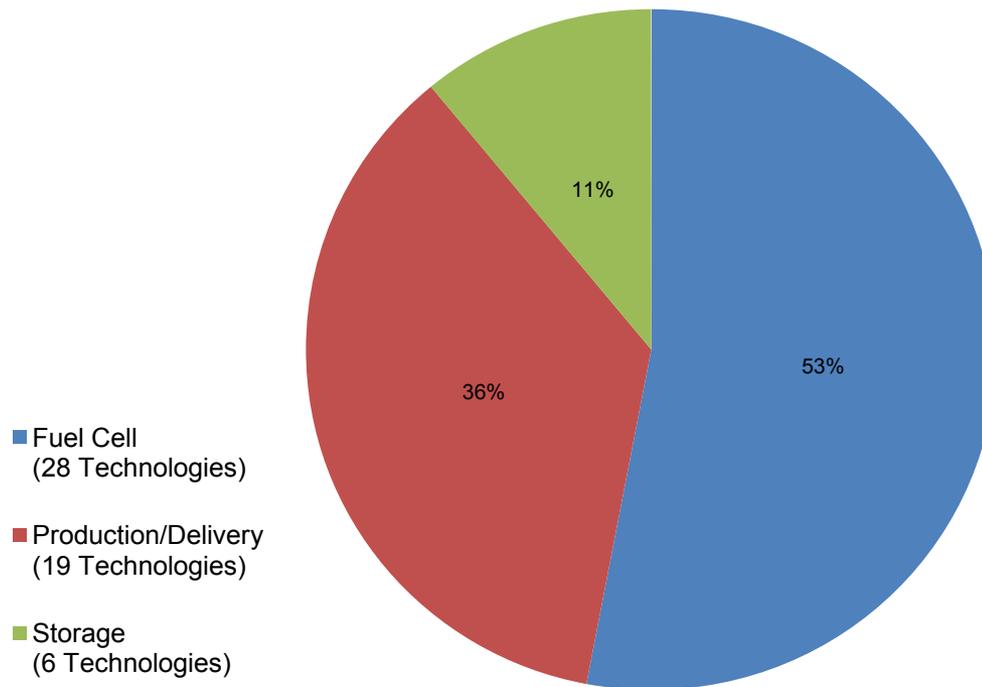


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# Accomplishments: Task 2 – List of Emerging Technologies

These 53 emerging technologies form the potential pool from which future technologies could be commercialized.



# Accomplishments: Task 2 – Examples of Commercial Technologies

## XX25™: Portable Reformed Methanol Fuel Cell



- Developed and sold by UltraCell Corporation
- Commercialized in 2007 with **200+ units sold**
- Lightweight, rugged fuel cell unit for mobile power
- Supplies up to 25 watts of continuous power for radios, laptops, etc.

## Hydrogen Composite Tanks



- Developed and sold by Quantum Fuel System Technologies Worldwide, Inc.
- Commercialized in 2001 with **2000+ tanks sold**
- Lightweight, all-composite tanks for high-pressure storage
- High capacity improves the range of hydrogen-powered fuel cell vehicles



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# Accomplishments:

## Task 3 – Technology Tracking Database

- ▶ Interviewed private sector vendors and other technology providers and entered data into the database.
- ▶ Divided database into commercial and emerging technologies and into fuel cell, production/delivery, and storage.
- ▶ Maintained database at PNNL and DOE-HQ on an internal server that is available to HFCIT staff.



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# Accomplishments:

## Task 3 – Technology Tracking Database

For each technology, collected the specific types of data from the private sector vendor and other technology provider for the database.

### Technology Title

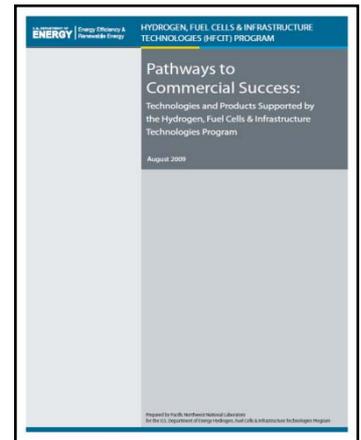
- ▶ **Overview:** Industry partner or research organization, year commercialized, and number of operating units.
- ▶ **Applications:** Areas where technology can be applied.
- ▶ **Description:** Summary of the technology, research development activities, and benefits.
- ▶ **Benefits:** Qualitative description of technology improvements, including environmental, quality, productivity, and safety.
- ▶ **Graphic:** Depiction of technology.
- ▶ **Capabilities:** Operational characteristics displaying improvement over the baseline technology.
- ▶ **Contacts:** DOE and industry partner name, address, and phone number.
- ▶ **Status:** Annual update on technology activities and commercialization efforts.
- ▶ **History:** Summary of prior years' efforts.



# Accomplishments: Task 4 – HFCIT Report

▶ The report's technology pages include the following:

- Description (2-3 paragraphs)
- Graphic/photo
- Overview (developer/manufacturer and units sold)
- Applications (uses for the technology)
- Capabilities (technical information highlighting improvements)
- Impacts/Benefits (e.g., sales, safety, and environmental benefits)
- Contact information (company and POC).



- ▶ Technology pages are approved by private sector vendors, other technology providers, and HFCIT staff.
- ▶ HFCIT report is peer reviewed, finalized, and being updated to detail the impacts/benefits of commercial technologies and the potential impacts/benefits of emerging technologies.



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# Collaborations

- ▶ Contacted private sector vendors and other technology providers for data on commercial and emerging technologies:
  - Fuel Cells – 45
  - Production/Delivery – 28
  - Storage – 8.
- ▶ Worked with HFCIT staff to obtain technology tracking list and contact and background information on research projects from the list.
- ▶ Worked with HFCIT staff to obtain patent information.



# Future Work

- ▶ Update the HFCIT report.
- ▶ Meet with HFCIT staff to review FY10 results and update the FY11 technologies' list.
- ▶ Update status of all technologies by annually contacting each company/organization.
- ▶ Enter information into the database and produce technology pages (for all new technologies).
- ▶ Update patent listings using information from technology patent POCs and patent searches.



# Summary

- ▶ Technology tracking provides
  - Effective management of R&D programs
  - Budget defense
  - Strategic planning
  - Portfolio management
  - Institutional memory.
- ▶ Report and database help highlight HFCIT-sponsored commercial products' impacts and benefits, potentially expanding their markets.
- ▶ Report and database help publicize emerging technologies to interested commercialization partners.