Introduction of NEDO

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What is NEDO?

1 NEDO's Role in Promoting Research and Development Projects

NEDO promotes research and development projects that individual private enterprises alone are incapable of implementing. NEDO facilitates these activities by enabling widespread collaboration between industry, universities and public research organizations and by providing financial support with public funding.

Next-Generation R&D

Integration of diverse technologies is required.
High risks involved require a medium- to long-term perspective.

Beyond the Scope of Individual Private Enterprises

NEDO Promotes and Supports R&D Projects

NEDO's Role

Japan's Largest R&D Management Organization	As Japan's largest core research and development management organization, NEDO promotes research and development across a wide range of fields, including advanced industrial, environmental, new energy and energy conservation technologies. In addition, NEDO promotes the dissemination of the developed technologies.
Overall Coordination of R&D	NEDO provides comprehensive research and development coordination to achieve superior research results by bringing together the combined strengths of the industrial, academic and government sectors.
Expertise in R&D Management	NEDO is focused on bringing a professional management approach to research and development management, ranging from the cultivation of new technology seeds to the promotion of mid- to long-term projects and support for the development of practical applications.

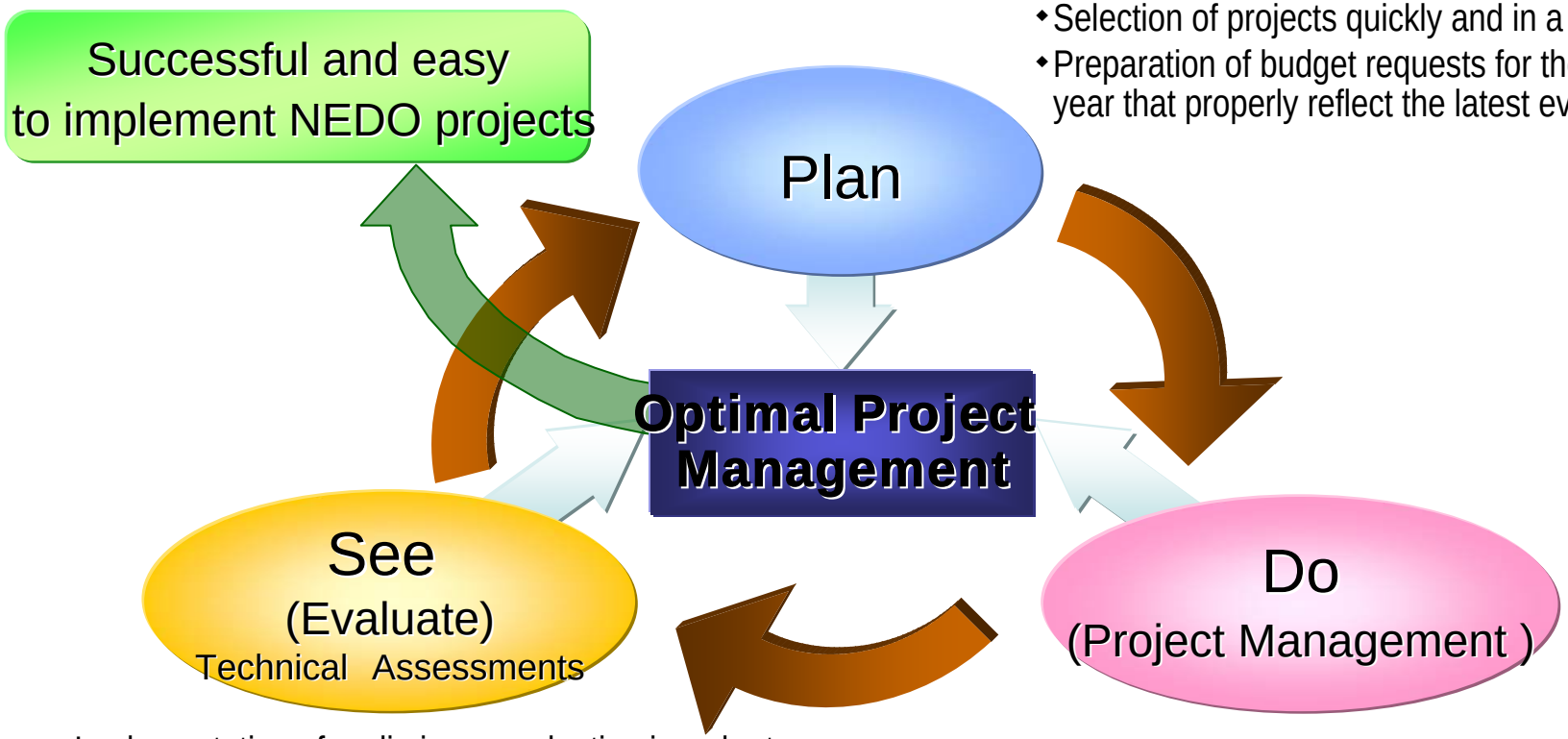
Mission of NEDO

- Promote R&D to Enhance Japan's Industrial Competitiveness
- Promote New Energy and Energy Conservation to Strengthen Japan's Energy Security and to address Global Environmental Problems
- International Cooperation

We have International Joint Research programs for hydrogen technology!

NEDO's "Plan-Do-See" Approach to Optimal Project Management

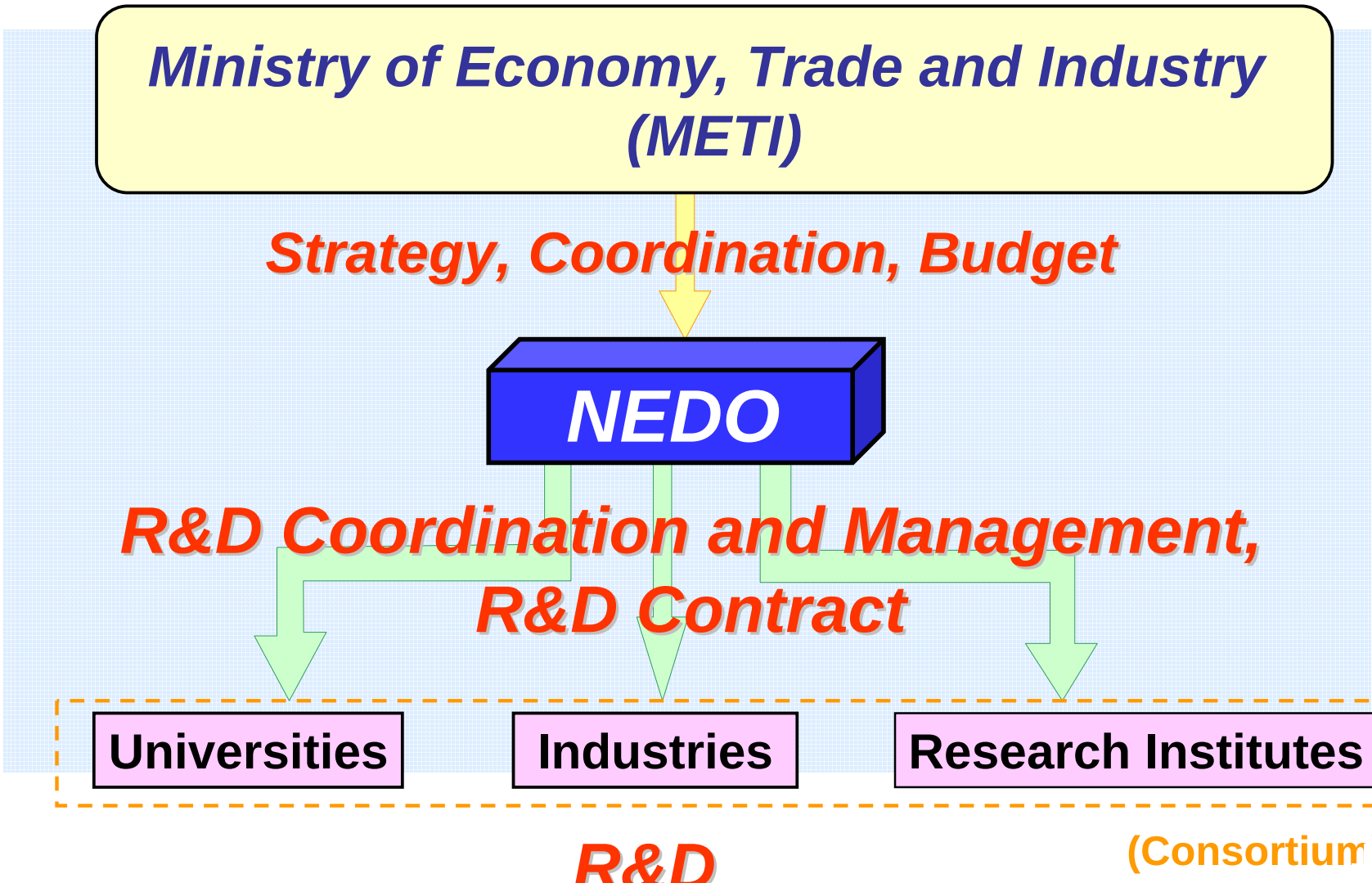
- Development of fundamental project plans based on industrial technology policy
- Selection of projects quickly and in a fair way
- Preparation of budget requests for the next fiscal year that properly reflect the latest evaluation results



- Implementation of preliminary evaluation in order to determine if a project should be undertaken
- Implementation of mid-term evaluations for all projects after 3 years and post-project evaluations after project completion
- Implementation of follow-up surveys in order to improve evaluation methods and project management tools

- Organization of project implementation groups
- Effective management through appropriate assignment of roles to NEDO and project managers
- Promotion of smooth and continuous R&D through multi-year contracts

Role of NEDO in R&D Promotion Scheme



Budget of NEDO (FY2007)

		(billion Yen) Amount
Technology Development & Research Development Projects		**149.3**
	1. Grants for Proposal - Based R&D Projects	5.9
	2. Next-generation , High Risk R&D	125.3
	3. Promotion of Practical Application of Industrial Technology projects	16.8
	4. Others (Personal Training, Survey Project, etc…)	1.3
New Energy and Energy Conservation Technology Introduction and Dissemination Projects		**78.2**
	1. Field Tests, and Demonstration projects	32.1
	2. Introduction and Dissemination Projects	41.4
	3. Coal Resources Promotion Projects	4.6
Kyoto Mechanism Credit Acquisition program		**12.9**
others		**7.9**
TOTAL		**216.5**

Outline of R&D Projects (Budget: 149.3 Billion Yen)

Support for Young University and Other Researchers

(*535 grants were provided in FY2006)

"Grant for Industrial Technology Research"

(Research fields: life science, IT, environment, nanotechnology, etc. (former International Joint Research Program has been reorganized as the international field of this program in FY2007))

Coordination

e.g. Matching of academic technology seeds and company needs

National Projects <131 projects>

Life Science

① Health and medical technology (17 projects)
② Utilization of biotechnology (4 projects)

IT

① IT and device technology (12 projects)
② Space technology (4 projects)

Nanotechnology and Materials

① Nanotechnology (9 projects)
② Technology to create innovative components (12 projects)

New Production Technology

① New production technologies (4 projects)
② Robot technologies (3 projects)

Environment

① Global warming prevention (5 projects)
② 3R (1 project)
③ Chemical management (5 projects)
④ Next-generation low-pollution vehicle
⑤ Basic technology for civil aircraft (2 projects)

Energy

① **PEFC and hydrogen energy (11 projects)**
② New energy technology (18 projects)
③ Energy conservation technology (9 projects)
④ Environment-friendly energy technology (8 projects)
⑤ Other related themes (4 projects)

Relevant, Crossover and Peripheral Fields

"Fundamental Technology Research Facilitation Program," etc. (3 projects)

Support for Practical Application

(*421 themes were adopted in FY2006)

"Grant for Application of Industrial Technology Innovation"

"Promotion of R&D on Practical Welfare Equipment"

"Strategic Development of Energy Conservation Technology Project"

Coordination

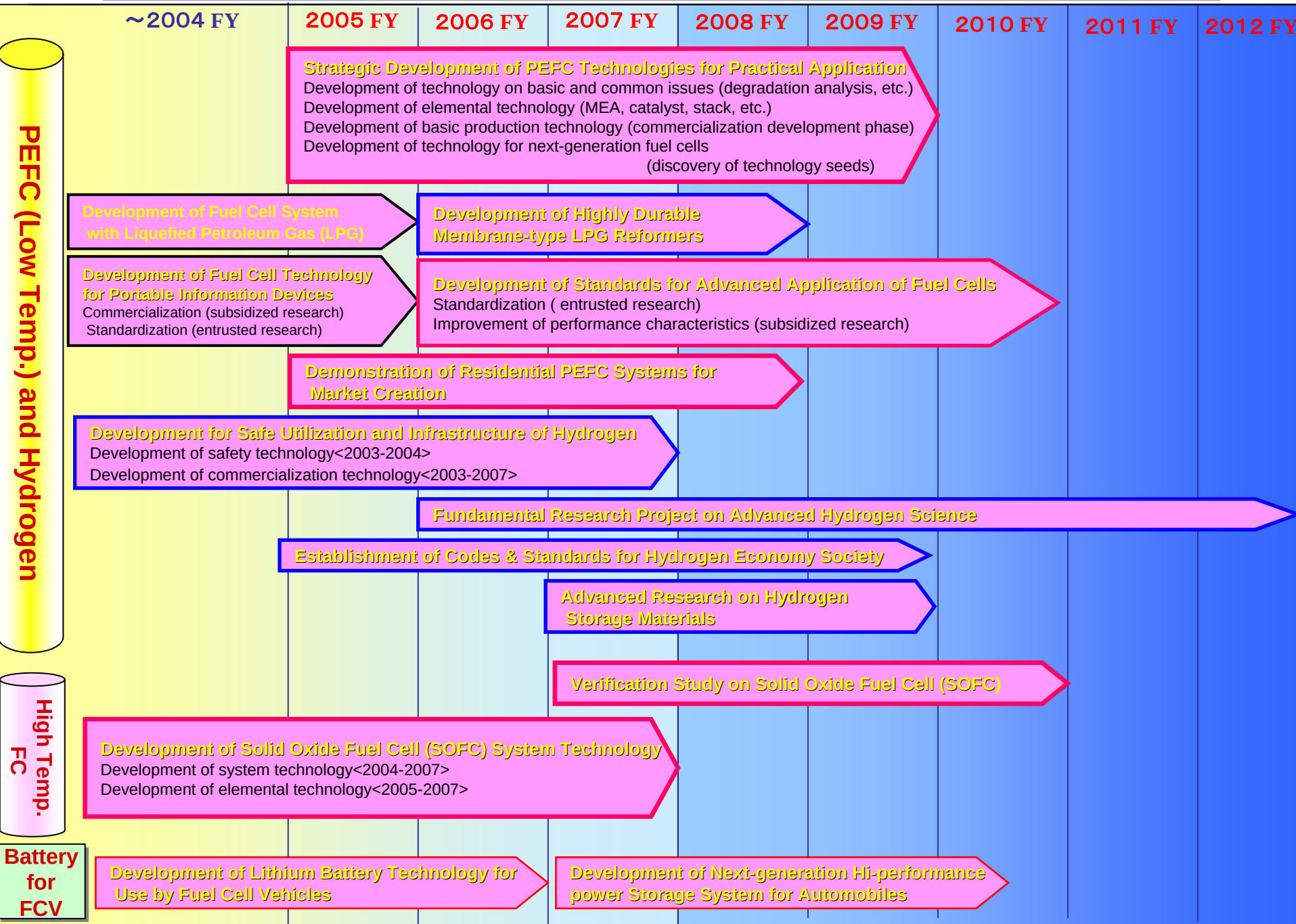
e.g. Advancement of research having excellent results

Human Resource Development (fellowships)

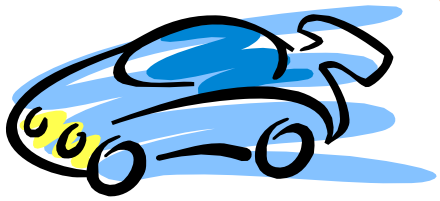
Other Projects (surveys, dissemination of results, etc.)

Note: Budget amounts are based on the budgetary request of the Japanese government.
Note: A part of new energy and energy conservation introduction and dissemination activities are included.

R&D on Fuel Cell and Hydrogen Technologies at NEDO



NEDO Fuel Cell and Hydrogen Technology Development Department Objectives



Vehicular fuel cell

Create innovative breakthroughs
＜Fundamental research＞
＜Innovative research＞

Stationary fuel cells

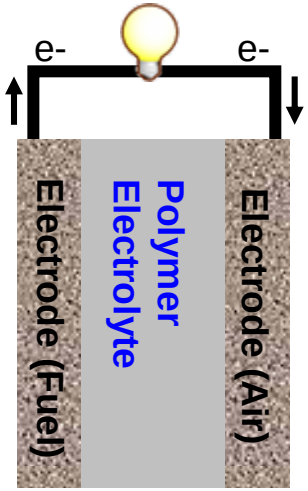
Implement stationary fuel cells
＜Technology development＞
＜Demonstration study＞

Hydrogen technology

Construct Hydrogen Society
<Hydrogen utilization technology>
<Promote standardization and safety enhancement>

Strategic Development of PEFC Technologies for Practical Application

Major technical challenges with PEFCs



Electrode (Platinum Catalyst)

●Reduction of platinum content (for cost reduction)

Increasing platinum can improve power generation reaction (efficiency and durability), but at increased cost.

●Understanding of degradation mechanism

Degradation mechanisms of precious metal catalysts (i.e., platinum dissolution, redeposition and agglomeration should be clarified to enable the development of degradation prevention methods.

●Development of alternative (low-cost) precious metal catalysts

Highly-active alternative catalysts to replace expensive precious metal catalysts are required.

Separator

●Development of highly-conductive, low-cost metal separators

While metal processing costs are inexpensive and mass production of metals is not difficult, a reduction of conductivity due to surface corrosion is a concern.

●Low-cost carbon separators

Machined high density graphite is a highly-conductive material suitable for use as a separator but is expensive to process.
Performance, as well as the processing accuracy of mold separators, should be improved.

Peripheral Systems

●Reduction of Platinum (for cost savings)

Reformer: A significant quantity of precious metals is used to reduce CO emissions.
Increasing platinum can improve performance (efficiency and durability), but at increased cost.

●Necessity of compact modular construction

Control systems: As fuel cells are delicate, various (temperature/humidity) control systems (e.g., flow meters, pumps, control valves)

Solid Polymer Electrolyte Membrane

●Development of inexpensive, durable electrolyte membranes

Fluorine polymer membranes are mainstream products, but unsatisfactory due to cost and durability issues.
Inexpensive, durable electrolyte membranes are essential.
Robust membranes that can withstand frequent starts/stops and dramatic temperature and humidity variation are required.

●Understanding of degradation mechanisms

While higher output power requires high conductivity of hydrogen ions, highly conductive membranes are not sufficiently durable.
Measures to control water content, enable low temperature operation (sub-freezing), and prevent dehydration are required.

●Development of water management technology and high-temperature membranes

Water is essential for hydrogen ion conduction. Humidification and moisture control are important. High-temperature operation above 100℃ tends to be unstable and difficult.

Demonstration of Residential PEFC Systems for Market Creation

Data Collection based on PEFC Operation at Home (Data on Operation and Trouble)

Problems Extraction

- Recognition of present technology level
- Durability improvement based on operation data
- Cost Reduction caused by Demonstration of Residential PEFC Systems for Market Creation production

Feed-Back Effect to Manufacturers

- Data from demonstration will be directly used for R&D at manufactures.

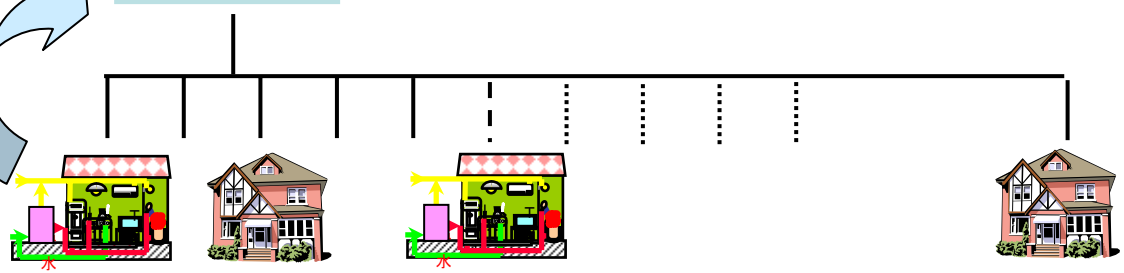
Operational Data :

- Power Generation at the System
- Consumed Power at the System
- Fuel Supply (HHV)
- Heat Recovery
- Generating Period
- Trouble (Region, Cause etc.)
- Amount of Electricity
- Amount of Hot Water

NEDO → **Analysis Committee** → **To R&D**

Reports Operational State, Trouble Mode

NEF Data Collection, Analysis, and Management

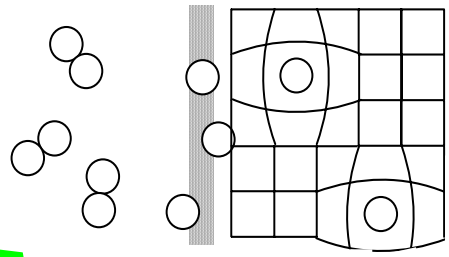


Advanced Research on Hydrogen Storage Materials

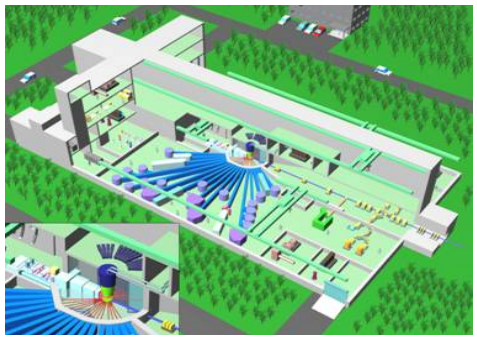
In order to realize the hydrogen energy society, the technology to transport and store massive hydrogen in a compact and efficient manner is required.

Project researches
- Elucidate the principles of hydrogen storage
- Fundamental research toward hydrogen storage application
- Establish the basis of hydrogen storage materials designing

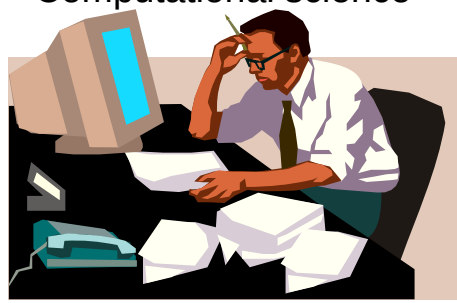
Experimental research



Structural characterization



Computational science



More hydrogen in less volume with less weight