

JAPAN

New Energy and Industrial Technology Development Organization

INTRODUCTION AND BACKGROUND

NEDO's New Energy Technology Department is promoting technology development projects encompassing basic research, experimental studies, and the establishment of benchmarks and standards in cooperation with industry, academic institutions and public research institutes. NEDO is now carrying out the projects in the fields of PEFC, SOFC and hydrogen supply & utilization technologies.

UPDATE ON MEMBER'S ENERGY FRAMEWORK

The government announced a "Strategic Road Map for Hydrogen and Fuel Cells" in June 2014. The road map to realize a "Hydrogen Society" comprises three phases.

By 2025, in phase 1, hydrogen utilization is dramatically expanded due to the commercialization of Fuel Cells such as residential, stationary and vehicles. The potential of hydrogen energy will be demonstrated by taking advantage of the Tokyo Olympics.

In phase 2, hydrogen power generation will be introduced. Large-scale hydrogen supply systems using liquid hydrogen and chemical hydride will be established by 2030.

Around 2040 in phase 3, CO₂-free hydrogen supply system using renewable energy and CCS technology will be established.

UPDATE ON RELEVANT POLICIES

Key goals of the Strategic Energy Plan (updated by Cabinet on April 11th, 2014) to realize "Hydrogen Society" are as follows:

1. Promote Stationary FC
2. Create preferable market conditions for FCVs commercialization
3. Develop new applications aimed at wider H₂ utilization (H₂gas-based power generation, etc)
4. Develop large-scale hydrogen supply chain (production/storage/delivery)
5. Develop an H₂/FC Roadmap that fosters a "Hydrogen Society"

UPDATE OVERVIEW ON RELEVANT PROGRAMS AND PROJECTS

Funding

From 2013, the Japan Energy Agency has subsidized about 50% of the CAPEX for the newly constructed commercial hydrogen refueling stations (HRS).

Highlights of Progress

Prior to market introduction of FCVs, 100 HRSs will be installed in 4-major-population-centers (Tokyo, Aichi, Osaka, Fukuoka) in 2015.

VITAL STATISTICS

Population

127 Million

Territory

377,962 km²

Capital

Tokyo

GDP/capita

USD 38,491 (FY2013)

Average Annual GDP Growth

1.5% (FY2013)

Primary Energy Structure

FY 2012 Production

Total production 20,819 PJ

Coal: 23%

Oil: 44%

Natural Gas: 25%

Large-scale Hydraulic: 3%

Nuclear: 1%

Others: 4%

Electricity

857 billion kWh

Production

Total production broken into segments

Hydro: 9%

Thermal: 79%

Nuclear: 12%



HYDROGEN R,D&D SPECIFICS

PROGRAMS, PROJECTS, INITIATIVES IN BRIEF

Hydrogen supply & utilization technologies

Status and Accomplishments

This project consists of three sub-projects as described below:

1. Research and Development of Technologies for Hydrogen Utilization – This project was launched in 2015 for a 5-year period. The interim review will be carried out in 2015. The project addresses three major HRS subjects: streamlining regulations, low cost equipment and reliability.
2. Technology Development for the Realization of the Hydrogen Society – The three new projects for realizing hydrogen society have started.
3. Energy Carrier Project – Beginning in 2014, new projects have started to reduce the cost of energy carrier technology. They include: H₂ with development of electrolyze; storage conversion; and transportation.

Participation

Both academia and industry participate in Japan's R,D&D in hydrogen.

Funding

NEDO funded hydrogen R,D&D at the JPY 4.8 billion level in FY2014.

Development of Polymer Electrolyte Fuel Cell (PEFC) Technologies for Practical Application

Status and Accomplishments

The project likewise consists of three sub-projects as described below. They expect to achieve targeted advancements during the full-scale commercialization stage (2020 to 2030). During this stage FCVs are expected to have a lifespan exceeding 100,000 km and residential stationary fuel cells are expected to have a service life comparable to that of home appliances.

1. Fundamental Technology: Several R&D projects by academic-industry consortia are carried out to improve the performance of PEFCs and reduce the amount of Pt catalyst in order to realize a cost reduction.
2. Development of Basic Production Technology: The projects for the technology Development for PEFC Highly Utilization are carried out.
3. Development of Technology for Next-Generation Fuel Cells: Innovative and advanced research and development is being carried out to facilitate high performance reliability and reduce the cost of PEFCs.





Participation

Both academia and industry participate in Japan's PEFC R,D&D.

Funding

NEDO funded hydrogen R,D&D at the JPY 3.2 billion level in FY2014.

Technology Development for Promoting SOFC Commercialization

Status and Accomplishments

1. Fundamental Study for Rapid Evaluation Method of Solid Oxide Fuel Cell (SOFC)
Durability: The objective of the study is to develop a rapid evaluation method of cell stack durability in order to accelerate the R&D cycle. The target is to obtain a forecast of 90,000 hour durability with thermodynamics, chemical and mechanical analyses of samples after short term tests.
2. Demonstration Study of SOFC System for Business Use: The three-year demonstration study of 5kW SOFC system and hybrid system of tubular SOFC and gas turbine began in 2013.
3. Development of Next Generation Technologies: The objective is the early practical realization of revolutionary high-efficiency power generation technology "triple-combined cycle system" (SOFC, gas-turbine and steam turbine).
4. Elemental Technology Development of SOFC System for Large-Scale Power Generation: Mitsubishi Hitachi Power Systems (MHPS), (Continued from FY 2012)

Participation

Both academia and industry participate in SOFC technology development to advance SOFC commercialization.

Funding

NEDO funded SOFC Technology Development at the JPY 1.3 billion level in FY2014.

ELEMENTS COMMON TO PROGRAMS, PROJECTS AND INITIATIVES

The status of market introduction of hydrogen and fuel cells is important and relevant to all programs, projects and initiatives discussed in the Hydrogen R,D&D specifics section.

A total of 75 stations from seven companies qualifying for subsidy are operating or planned as of 2014. Toyota began to sell the Mirai as a commercial fuel cell vehicle in December 2014. By the end of the fiscal year, 102 commercial vehicles had been delivered.



REFERENCES

MEMBER WEBSITE

<http://www.nedo.go.jp/english/index.html>

OTHER IMPORTANT WEBSITES

http://fccj.jp/index_e.html

<http://hysut.or.jp/en/index.html>

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