Fukuoka Hydrogen Strategy

Hy-Life Project

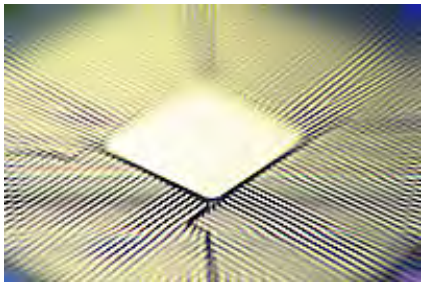
Fukuoka's Challenges Towards a Hydrogen Society

Sept, 2010

Fukuoka Strategy Conference for Hydrogen Energy

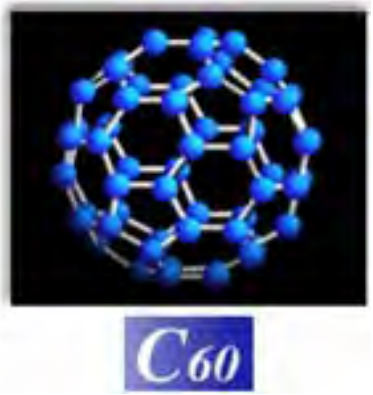
Fukuoka Industrial Clusters

Hydrogen Energy



Semiconductor & LSI

Biotechnology



Nanotechnology

Automobile

Robotics

Digital Contents

Fukuoka's competitive advantages in the hydrogen energy field

- Kyushu University's world-leading intellectual resources
- 500 million cubic meters of hydrogen are generated annually as a by-product from steel plants in Kitakyushu City.

  A 10-km long hydrogen pipeline passing through the city — the only one of its kind in Japan.
- A highly concentrated, wide-ranging manufacturing sector, ideal for commercializing hydrogen energy.

Kyushu University Ito Campus

Kitakyushu Eco-Town

Diverse manufacturing industries

An overview of Hy-Life Project

HYDROGENIUS (AIST)

Development of a "Hydrogen Town"

Construction of a "Hydrogen Highway"

Fukuoka Personnel Training Center for Hydrogen Energy

R&D

Human resources development

Community demonstrations

1. Promote measures against Global warming
2. Promote the widespread use of new energies
3. Encourage community-based innovations

New industries based on hydrogen

International hub for hydrogen knowledge

Hydrogen Energy Test & Research Center (HyTReC)

International Hydrogen Energy Development Forum

An organization promoting Hy-Life Project

Fukuoka Strategy Conference for Hydrogen Energy:

Japan's largest industry-academia-government project in the hydrogen energy field

Established : August 3, 2004

Advisors : Wataru Aso (Governor of Fukuoka Prefecture)
Setsuo Arikawa (President of Kyushu University)
Kenji Kitahashi (Mayor of the City of Kitakyushu)
Toru Takimoto (Director General of Kyushu Bureau of Economy, Trade and Industry)
Makoto Haya (Representative Director and President, Nippon Steel Engineering Co., Ltd.)
Hiroshi Yoshida (Mayor of the City of Fukuoka)

President : Keisuke Kuroki (Representative Director and Executive Vice President, Nippon Steel Corporation)

Vice Presidents: Hisato Ueha (Senior Executive Director and Executive Officer General Manager, Iwatani Corporation)
Ikutoshi Matsumura (Executive Consultant, JX Nippon Oil & Energy)
Yukitaka Murakami (Trustee/Vice President, Kyushu University)
Hiroyuki Watanabe (Senior Technical Executive, Toyota Motor Corporation)

No. of members: 602 as of Sept 1, 2010
(Corporations: 461 , Universities: 109 , Government/Research/Sponsoring institutions: 32)

Initiatives of Fukuoka Hydrogen Strategy #1: R&D

HYDROGENIUS and Kyushu University, world renowned for hydrogen energy research, play central roles in the R&D activities.

Research Center for Hydrogen Industrial Use and Storage, AIST

AIST: National Institute of Advanced Industrial Science and Technology

- **AIST established the "Research Center for Hydrogen Industrial Use and Storage (HYDROGENIUS)" on Kyushu University's Ito Campus in July 2006.**
- **Adopting the Western approach to research, AIST and Kyushu University conduct research in a collaborative and integrated manner.**

HYDROGENIUS
Hydrogen saves the Earth

Director, Professor Yukitaka Murakami
(Trustee/Vice President of Kyushu University)

A world-class research institutions “HYDROGENIUS”

M.Sc. Jussi Solin
VTT Technical Research Centre of Finland
FINLAND

Prof. Gary Marquis
Helsinki University of Technology
FINLAND

Prof. Reiner Kircheim
Institut für Materialphysik
GERMANY

Dr. Sergiy M. Stepanyuk
Paton Electric Welding Institute of National Academy of Sciences
UKRAINE

Dr. Vladyslav Shyvaniuk
Institute for Metal Physics
UKRAINE

Dr. Maxim Artamonov
State Centre for Civil Aviation Flight Safety
RUSSIA

Prof. Roderick A. Smith
Imperial College,
UK

Dr. Brian P. Somerday
Sandia National Laboratories
USA

Prof. R.O. Ritchie
University of California
USA

Prof. Jean-Marc Olive
University of Bordeaux I
FRANCE
(Professor, Kyushu University)

Dr. Isabelle Aubert
LMP-University of Bordeaux1
FRANCE

Dr. Nicolas Saintier
LAMEFIP-ENSAM
FRANCE

Prof. Jader Furtado
Air Liquide Groupe Expert R&D:Metallurgie Physique
FRANCE
(Professor, Kyushu University)

Prof. Dan Eliezer
Ben-Gurion University of the Negev
ISRAEL

Prof. Petros Sofronis
University of Illinois
USA

Prof. Ian M. Robertson
University of Illinois,
USA

Initiatives of Fukuoka Hydrogen Strategy #2: Community demonstrations – Part 1

Development of the Fukuoka Hydrogen Town

Develop the world's largest Hydrogen Town through community-based installations of residential fuel cell systems, as a showcase of a society based on hydrogen energy

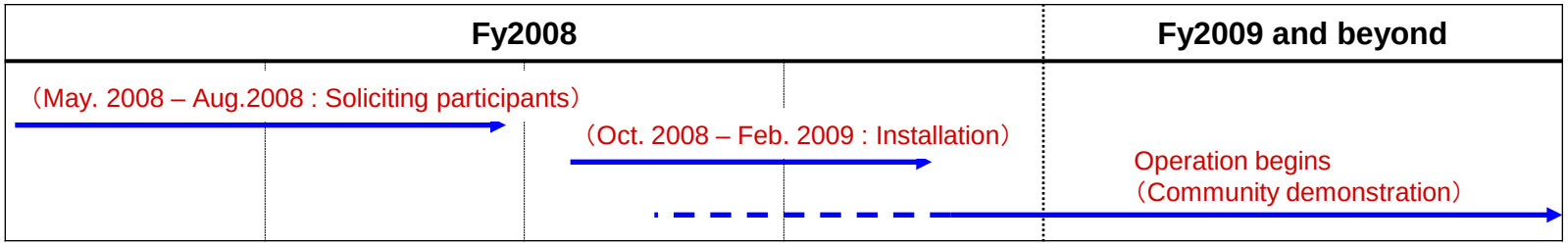
LPG-based 1 kW (residential) Fuel Cell System

ENE·FARM

Concentration of installations
（Approx. 150 residences）

With the collaboration of:
JX Nippon Oil & Energy
Saibu Gas Energy Co.,LTD

Minakazedai and Misakigaoka residential developments in Itoshima City



Areas Selected for Fukuoka Hydrogen Town

(1) Location: **Itoshima City, Fukuoka**

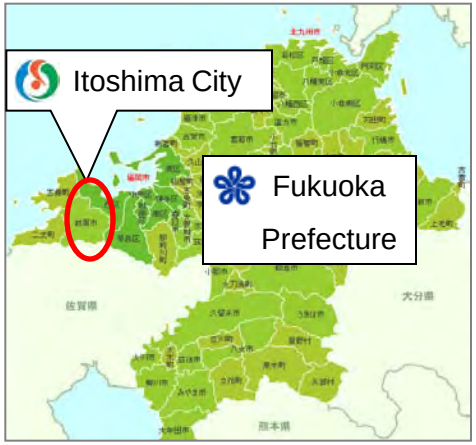
1. Minakazedai
   No. of households: 1,181
   (community gas users: 695)
   Population: approx. 3,836

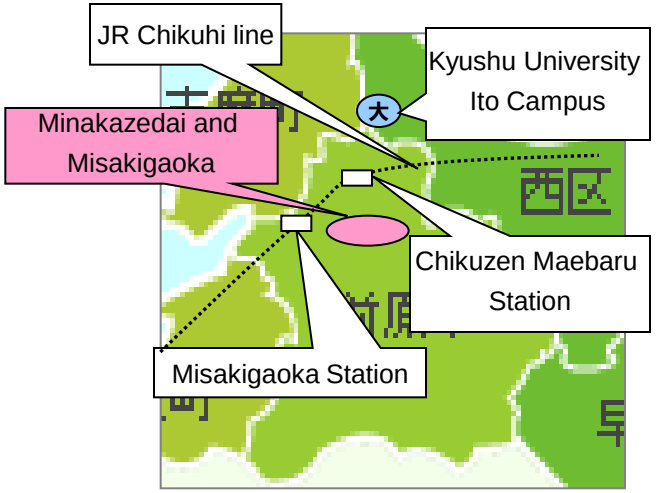
2. Misakigaoka
   No. of households: 785
   (community gas users: 475)
   Population: approx. 2,514

(2) No. of installations: 150

(3) Installation period: October 2008 to February 2009

(4) Operation period: Approx. 7 years





LP gas tanks

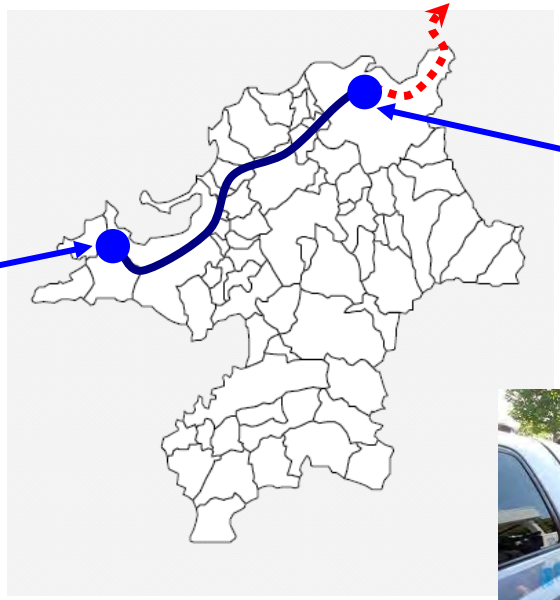
Residential area

Initiatives of Fukuoka Hydrogen Strategy #2: Community demonstrations – Part 2

Construction of a Hydrogen Highway

Build a "Hydrogen Highway" between Kitakyushu and Fukuoka by installing hydrogen stations at two locations: Higashida area of Kitakyushu City, and Kyushu University in Fukuoka City.

Hydrogen Station on Kyushu University campus
（Based on renewable energy）



Hydrogen Station in Kitakyushu City
（Based on by-product hydrogen supplied through a pipeline)

Hydrogen vehicles have freedom of operation.

	2008	2009	2010 and beyond
Hydrogen station	（－Sep. 2009：Construction）		（Operation/hydrogen supply）
Fuel cell vehicles **Hydrogen engine vehicles**		（Demonstration: limited time only → Long-term use）	

Kyushu University Station

On-site type station which produces H_2 from renewable energy

With the collaboration of:
- Kyushu Electric Power Co.,INC.
- Kyushu University
- Taiyo Nippon Sanso Corporation
- Kyuki Corporation

Operation/hydrogen supply:
- September 2009

Construction site
- Fukuoka City
- (Kyushu University's Ito Campus)

Filling Pressure
- 35MPa

Kitakyushu Station

Off-site type station that is provided with H_2 direct through pipeline from Steel Work

With the collaboration of:
- Iwatani International Corporation
- Nippon Steel Corporation
- JX Nippon Oil & Energy

Operation/hydrogen supply:
- September 2009

Construction site:
- Kitakyushu city
- (Yawata-Higashida Green Village)

Filling Pressure:
- 35MPa

Showcasing fuel cell vehicles

FC vehicle (Toyota FCHV-adv) debuted as Kitakyushu's municipal car (April 2009)

FC vehicle presentation ceremony
(Fukuoka Prefecture, April 21, 2009)

FC vehicle presentation ceremony
(Kitakyushu City Hall, April 21, 2009)

Iwatani International Corporation operate Premacy Hydrogen RE Hybrid featuring hydrogen rotary engine

Initiatives of Fukuoka Hydrogen Strategy #3: Human resources development

Launched Fukuoka Personnel Training Center for Hydrogen Energy, only one of its kind in Japan, in October 2005. Provides assistance in human resources development to the hydrogen industry.

Fukuoka Personnel Training Center for Hydrogen Energy

(Director: Hiroyuki Watanabe, Senior Technical Executive, Toyota Motor Corporation)

1. Business managers program

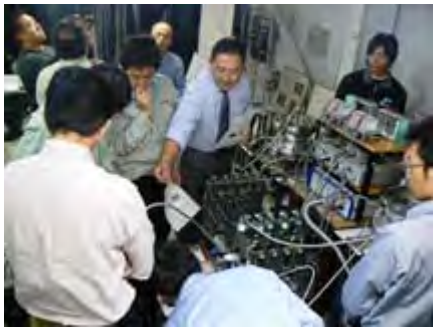
Designed for business owners aiming to enter a hydrogen-related field.
(Cumulative no. of participants: 331)

Instructors

- Kyushu University
- Hydrogen Energy Systems Society of Japan
- Toshiba Fuel Cell Power Systems Corporation
- Toyota Motor Corporation

2. Engineers program

For engineers to work at the forefront of the industry.
(Cumulative no. of participants: 182



Instructors

- Iwatani International Corporation
- ENEOS CELL TECH Co., Ltd.
- M-NET Co., Ltd.
- Kyushu University
- Taiyo Nippon Sanso Corporation
- Toyota Motor Corporation

3. Expert technologists program

For producing experts, the foundation of our new hydrogen energy industries. (To be offered in 2008, Cumulative no. of participants: 111)

Instructors

- AIST
- Kyushu University
- Japan Automobile Research Institute
- Matsushita Electric Industrial Co., Ltd.
- JX Nippon Oil & Energy
- NEDO
- TOTO Ltd.
- Toyota Motor Corporation

Initiatives of Fukuoka Hydrogen Strategy #4: Building an international hub of hydrogen knowledge

International Hydrogen Energy Development Forum 2010

- **The only event in the world where experts on hydrogen materials meet to present the latest research on hydrogen energy.**
- **Hosted annually since 2007.**

February 3, 2010 (venue: Grand Hyatt Fukuoka)
Free admission, Japanese-English simultaneous interpretation available

Session 1 Global Hydrogen Strategy for the Realization of a Hydrogen Energy Society

Mr. Wataru Aso
（Governor of Fukuoka Prefecture）

Mr. John W. Tak
(President and CEO of the Canadian Hydrogen and Fuel Cell Association (CHFCA))

Dr. Andreas Ziolek
(Fuel Cell and Hydrogen Network North Rhine-Westphalia）

Session 2 The Front-Lines of Hydrogen Studies－Hydrogen Technology from Basic Research to Engineering Activities

University of California	Prof. Robert. O. Ritchie	（USA）
University of Illinois	Prof. Petros Sofronis	（USA）
Sandia National Lab	Dr. Brian. P. Somerday	（USA）
Air Liquide CRCD	Dr. Jader Furtado	（France） etc

February 4, 2010 (venue: Ito Campus, Kyushu University) Free admission

Workshop (HYDROGENIUS research team, Kyushu University Fuel Cell Team)

Initiatives of Fukuoka Hydrogen Strategy #5: Development of new hydrogen industries

Hydrogen Energy Test & Research Center (HyTReC)

Objective: To assist SMEs and ventures to enter into new hydrogen industries.

Facility size ※Operation in April , 2010

Total floor area: 2,092 m^2 (RC structure)

Land area: 5,361 m^2

Services/projects

1. Product testing for prototypes, etc.

- Product testing at the center facilities (common facilities)
- Product testing using limited-access facilities

2. Development of product-testing methods

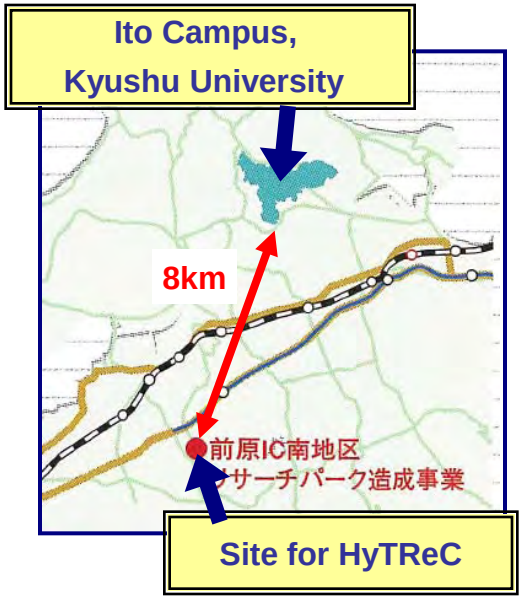
- Development of product-testing methods on public commissions (e.g., standardization of testing methods (JIS))
- Development of product-testing methods on private contracts

3. Development of hydrogen products

- Product development through joint research with private sector (e.g., valves, new materials)

4. Seminars / PR activities

- Seminars on hydrogen energy (workshops on safety, etc.), PR activities



Advanced Hydrogen Energy Community

Goal: Develop an "Advanced Hydrogen Energy Community" committed to R&D, demonstrations, human resources development, and dissemination of knowledge in the hydrogen field.

Help create a low-carbon society by establishing the first hydrogen community and spreading its know-how in Japan and abroad.

Fukuoka's initiatives towards Advanced Hydrogen Energy Community

- **Introduce new initiatives for Hydrogen Town:**
  Support the development of residential FC for the global market.

- **Promote construction of hydrogen stations:**
  Construct a hydrogen highway between Fukuoka and Tokyo to develop and popularize hydrogen/hydrogen-engine vehicles.

- **Implement advanced demonstration programs:**
  Lead a review of regulatory framework based on new knowledge.