Initiatives in Hydrogen Business

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Mitsutoshi Shigeta,
Chief Green Transformation Officer,
Panasonic Corporation

Notes: 1. This is an English translation from the original presentation in Japanese.
2. In this presentation, “Fiscal 2024” or “FY3/24” refers to the year ending March 31, 2024.
To Achieve Our Target Vision for 2030

The best partner that balances

Maintain and improve well-being and Solving social and global issues

(Well-being) (Sustainability)

Value

Society

Providing safe and secure Lifestyle Infrastructure

People

Improving the Quality of Life for each person

Planet

Contributing to decarbonization and the circular economy

Necessary businesses to realize our target vision

B2B business

- (1) HVAC system
- (2) Overseas electrical construction materials
- (3) Energy solutions (including hydrogen business)
- (4) CO₂ refrigeration system
- (5) Electrical construction materials in Japan
- (6) Display cases

B2C business

- (7) Home appliances in Japan
- Home appliances in China, Asia, other regions
- Age-free services (elderly-care)
- Electric bicycles, etc.

Each business achieving well-being and sustainability

Life tech& ideas
People-oriented technology and value proposing capabilities

Panasonic Brand
Trust and Foresight

Panasonic Corporation
Global Trends and Social Issues

Transition to a ‘Decentralized Society’ is required to address global challenges

Global Energy Trends

To combat global warming and needs on decarbonization (carbon neutral), energy shift to renewables (solar, wind, etc.) is accelerating globally. Decoupling fossil fuels accelerates energy security needs.

Countries Declared Carbon Neutral

Social Issues

Strengthening the resilience of local infrastructures (transition to a ‘Decentralized Society’) is required as a countermeasure to increasing negative impacts caused by climate change and natural disasters such as earthquakes.

(Case) Damage to roads and power lines caused by earthquakes and large typhoons: prolonged large-scale power outages in urban areas

Source: Ministry of Economy, Trade and Industry in Japan (2021)
Panasonic’s Commitment to Solving Social Issues

EXPANSION OF LIFESTYLE ENERGY INFRASTRUCTURE BUSINESS

Net Zero Energy Building
Multiple FC Connections Rooftop Installation
Pure Hydrogen Fuel Cell (FC) (Co-genelations)
Hydrogen Supply
Zero-emission Facilities

By utilizing clean energy (CO₂ free hydrogen, etc.)
Realize Distributed Energy Package*

RE100 Solution
RE100 Town

* A package of hardware (e.g., Pure hydrogen fuel cells), software (energy management system: EMS), services, etc.

Household Pure Hydrogen FC

Vision for Hydrogen Business

MISSION
Life tech & ideas
For the wellbeing of people, society and the planet

Panasonic’s Commitment to Solving Social Issues

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Hydrogen Business Opportunities

Distributed hydrogen-related Market: 2030 approx. 6 trillion yen

Renewable Energy Power Generation
- Mega solar power generation
- Large-scale wind power generation

Hydrogen Production
- Large-scale hydrogen production plant and equipment
- Marine and intercontinental hydrogen pipeline transportation

Domestic Delivery and Supply
- Natural gas infrastructure, trucking supplies

Supply & Demand Control
- Services

Use (Fuel Cell)
- Factory
- Buildings
- Smart Town
- Mobility

Target area: Distributed Energy Package

2030 Estimated Market Size

Distributed energy: Approx. 6 trillion yen
Distributed energy package (under 1MW, Europe and Japan): Approx. 650 billion yen

*1 EMS: Energy Management System
*2 Market size is estimated by Panasonic based on third party research (e.g. Fuji Keizai, Nikkei)
Distributed Energy Package Use Cases

Aiming to establish a competitive advantage in the small- and medium-scale (1 MW or less) areas that are close to people’s lives.

Panasonic GREEN IMPACT

Factories
Buildings and Commercial Facilities
Kusatsu factory
Rooftop Installation

Distributed Energy Package Use Cases

CO2 Diagnose
Operation
Maintenance
Energy Management
Lease
Electricity retail
Environmental Approval dealing
Power value Investigation

Resilience
Zero-CO2
Stable Supply

Gas (H2)
PV
Fuel cell
Storage Battery

Panasonic

Smart Town
(Less than 1,000 units)

EPC: Engineering, Procurement and Construction

※ EPC: Engineering, Procurement and Construction

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The World's First RE100 Solution Overview

Through RE100 Solution of “3 Battery Collaboration + EMS”,
Achieving decarbonization, efficient energy use and resilience

Fuel Cell Plant

Providing value according to customer conditions (land constraints, etc.)
Advantage of installing fuel cells: installation area 1/7 and cost 1/3
Customer Value Update

Approx. 450 companies visited RE100 solution and obtained valuable feedback from various customer's needs

Customer's Voice

- Request for transition and response to decarbonization from suppliers are increasing
- Stable energy supply (such as electricity and heat) is concerns
  - Need to strengthen business continuity (resilience)
- Requests for packaged proposals which include hydrogen supply and EMS
  - Needs for total cost reduction, including installation, construction and maintenance

1: Decarbonization and creation of environmental value
- Accumulation and utilization of data/visualization of CO₂ emissions

2: Secure and stable energy self-sufficiency
- Autonomous power self-sufficiency through three batteries
  - Stable heat supply

3: TCO · Optimization · Total cost of ownership
- Lower total energy costs
Achievements in Demonstration

Developing our unique EMS and core technologies through demonstration of RE 100 solutions

Realization of Local Production and Consumption (Upgrade of EMS Function)

- Upgrading EMS through RE100 Solution
  - Power purchase control rate: increase to 98%
  - Total base power generation: 30% reduction

Utilization of Electricity + Heat

- Appealing environmental value by utilizing electricity + heat
  - Achieved 95% overall primary energy use

Evolution of Pure Hydrogen Fuel Cells

- Strengthening cost competitiveness, developed with “Ene-farm” and evolution of reliability (high resilience) by linking multiple units of equipment

**Amount of power generated (kWh)**

- Total Generated Power = Electricity Demand
- Create Power on Demand

**Diagram**

RE100 Hydrogen fuel cell “Co-generation” system

- Boiler Preheat
- Waste Heat Utilization (approx. 60°C)
- Linkage of Exhaust Heat Line

Realized approx. 95% total efficiency
Trends in Europe

Acceleration of de-fossil fuels raise further interest in hydrogen

Facing Challenges: Stable electricity prices and supply as the electricity prices rose

<table>
<thead>
<tr>
<th></th>
<th>August 2021</th>
<th>August 2022</th>
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<tbody>
<tr>
<td>(kWh)</td>
<td>11.2 yen</td>
<td>67.7 yen</td>
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<tr>
<td>(kWh)</td>
<td>14 yen</td>
<td>79.8 yen</td>
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Approx. 6 times

Acceleration of transition from fossil fuels (e.g. natural gas) to hydrogen

The President of Germany, government officials along with approx. 80 business delegate visited the Kusatsu H2 KIBOU FEILD site

Source: Electricity prices estimated by our company based on various publicly available information.
Scale of Investment
RE100 Demonstration Launches in Europe

Focal Investment in "strengthening core technology development in Japan" and "launching Proof of Consent (PoC) in Europe"

A foothold to attract customers in Europe, where interest and marketability is high.

Europe (UK and Germany)

FY24: PoC (RE100 Solution) launches

Japan

- Enhance value provided by each customer
- Evolution of three core technologies

Investments and Costs (Hydrogen business overall)
Approx. 20 billion yen (FY23 -24 total)
Medium- & Long-term KPI

Business Development

Forcusing on Europe and Japan,
Target to increase customer and commercialization of RE100 solutions in the next mid-term period

- Aimed Business Scale: 100 billion yen or above

Cost Competitiveness

Strengthen overall cost competitiveness by developing EMS algorithm and fuel-cell Hardware

- Total Energy Cost * (per KWh):
  - FY26: -30%
  - FY31: 1/3

*Pure hydrogen fuel cell hardware, control system, hydrogen raw materials, etc.
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