Asahi Kasei’s Activities On A Green Hydrogen

14 October 2020
Hydrogen Energy Ministerial Meeting

Asahi Kasei Corporation
Executive Officer
Masami Takenaka  Ph.D.
About Asahi Kasei Corp.
Corporate Profile

**Trade name**
Asahi Kasei Corp.

**President**
Hideki Kobori

**Head office**
Tokyo, Japan

**Founding**
1922

**Fiscal 2018 results**
- Net sales ¥2,170.4 billion
- Operating income ¥209.6 billion
  - *As of March 31, 2019

**Diversified chemical company with three business sectors**

**Asahi Kasei Corp. [holding company function]**

<table>
<thead>
<tr>
<th>Material</th>
<th>Homes</th>
<th>Health Care</th>
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</thead>
</table>
| • Asahi Kasei Corp.  
• Asahi Kasei Microdevices Corp.  
• Asahi Kasei Homes Corp.  
• Asahi Kasei Construction Materials Corp.  
• Asahi Kasei Pharma Corp.  
• Asahi Kasei Medical Co., Ltd.  
• ZOLL Medical Corporation |
Sustainability for Asahi Kasei

Contributing to **sustainable** society
Providing solutions to the world’s challenges

- Business development; Innovation
- Internal and external connections/dialogue
- High profitability Return to stakeholders

**Sustainable growth of corporate value**

Sincerity, Challenge, Creativity
Medium-term management initiative “Cs+ for Tomorrow 2021”

Contributing to sustainable society

Contributing to life and living for people around the world

Priority fields for provision of value
- Environment & Energy
- Mobility
- Life Material
- Home & Living
- Health Care

New “C”

Care for People, Care for Earth

Employee action principles
- Compliance
- Communication
- Connect

Creating new value

Challenge

Diversity & Capability to change

“Cs” in CT2018

Strengths
Medium-term management initiative “Cs+ for Tomorrow 2021”

Contributing to the environment with various technology (CO₂ chemistry, semiconductors, etc.)

Global challenges/trends

Greater adoption of clean energy

Transition to low-carbon society

Care for Earth

Clean energy
- Battery separators
- Alkaline water electrolysis system to produce green hydrogen

Energy conservation/environmental improvement
- CO₂ sensors
- Water filtration modules
- Ion-exchange membranes

Low-carbon society
- Next-generation CO₂ chemistry
- New CO₂ separation/recovery system

Note: Some overlap with other fields
We started hydrogen production by water electrolysis in 1923, using electricity from our own hydro power stations which are still in use.

Asahi Kasei is the first Japanese company that industrialized ammonia production.
Since 1975

30 countries

150 production sites

1.5 million tons $H_2$
Fukushima Hydrogen Energy Research Field (FH2R)
Fukushima Hydrogen Energy Research Field (FH2R)

Opened on Mar. 7, 2020 in Namie, Fukushima as a NEDO development project

Source: NEDO
World’s Largest Scale Alkaline Water Electrolyzer
### Performance of FH2R Water Electrolysis System

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Power</strong></td>
<td>max. 10 MW</td>
</tr>
<tr>
<td><strong>Hydrogen Production</strong></td>
<td>300 to 2000 Nm³/h (27 to 180 kg/h)</td>
</tr>
<tr>
<td><strong>Power Variation Rate</strong></td>
<td>±0.5 MW/s</td>
</tr>
<tr>
<td><strong>Hydrogen Pressure</strong></td>
<td>8 bar (by using compressor)</td>
</tr>
<tr>
<td><strong>Hydrogen Purity</strong></td>
<td>≥ 99.97% (ISO14687-2 Grade)</td>
</tr>
<tr>
<td><strong>Number of Electrolysis Cells</strong></td>
<td>170 cells</td>
</tr>
</tbody>
</table>
ALIGN-CCUS PJ
In Europe
▪ ALIGN-CCUS unites 30 research institutes and industrial companies from 5 European countries (DE, NL, NO, RO, UK).

▪ WP4 which AK is joining, consists of RWE(DE), MHPSE(DE), TNO(NL), Julich(DE), RWTH Aachen(DE) and FEV(DE).

▪ Aiming at transforming six European industrial regions into low-carbon centres by 2025.
- Pilot plant at RWE’s Coal Innovation Centre in Niederaussem in Germany
- Sector coupling and carbon recycling / synthetic fuels from CO₂ capturing
- Asahi Kasei provides electrolyser module to convert water into hydrogen
*ALIGN-CCUS Project*

- Start of basic engineering for the project in January, 2019
- Placing of two-containers system at the power plant of RWE in October, 2019
- Now proceeding test operation of electrolyzer system at the site
- Demonstrate the total process to produce DME by the end of November in 2020
The all system is applied European and German standards and RWE internal safety rules.
Established remote monitoring system with wireless and wired connect.
The interface on remote monitoring (ex. Temperature data)

Asset management system for planned maintenance. Here is stored the data on locations, components, spare parts, documents, maintenance, etc…
Hydrogen for More Sustainable Chemicals
Hydrogen For More Sustainable Chemicals

NH₃ (Ammonia) → Fertilizer

H₂

Specialty Chemicals
- Synthetic rubber / Elastomer
- Engineering Plastics
- Fibers & Textiles
- Coating Materials

CH₃OH (Methanol) → Fuels

CCU

Commodity Plastics

Aqualyzer™
Creating for Tomorrow

make the most of life and attain fulfillment in living.
Since our founding, we have always been deeply committed
to contributing to the development of society,
boldly anticipating the emergence of new needs.
This is what we mean by “Creating for Tomorrow.”