



Asahi**KASEI**

Asahi Kasei's Business Vision On A Green Hydrogen Society

Creating for Tomorrow

At 15th ADEME-NEDO WS

04 Dec. 2020 /

Asahi Kasei Europe GmbH

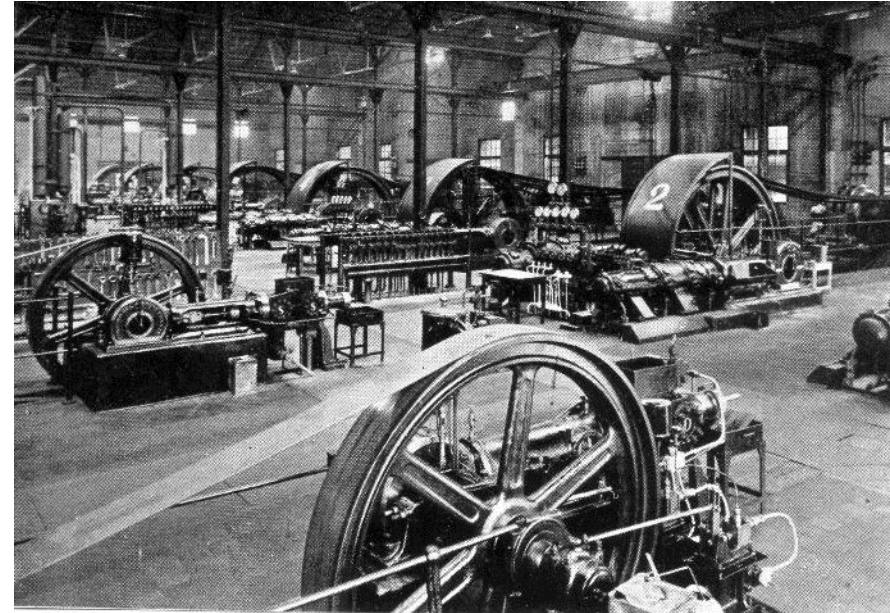
Hiroshi Kakihira

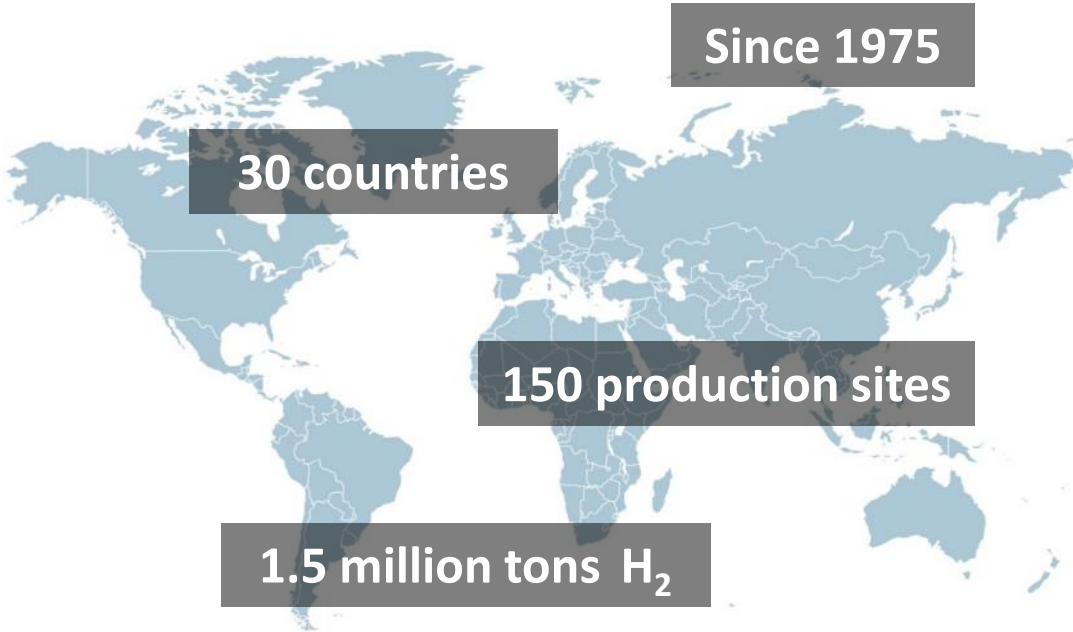
Agenda

- Origins
- Toward a Green Hydrogen Society
- The Solution Provider
- Ongoing Projects

Origins

- 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





Towards A Green Hydrogen Society

Material - Environment & Energy

- Clean energy
 - *Alkaline water electrolysis system*
- Energy conservation / environmental improvement
- Low carbon society

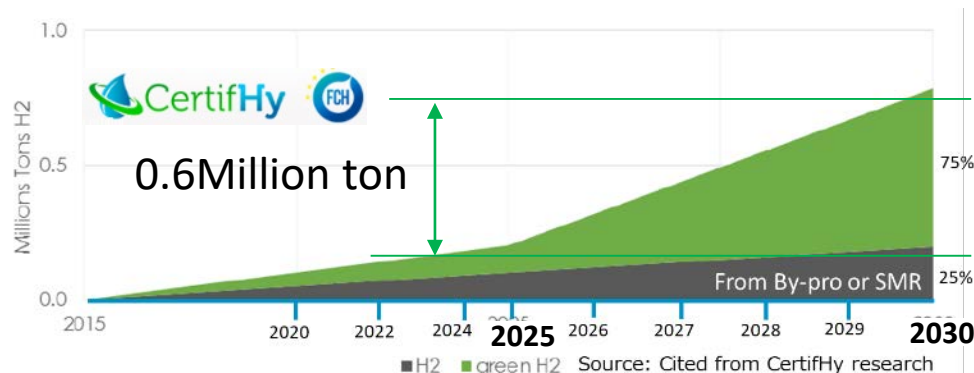
Global challenges/trends

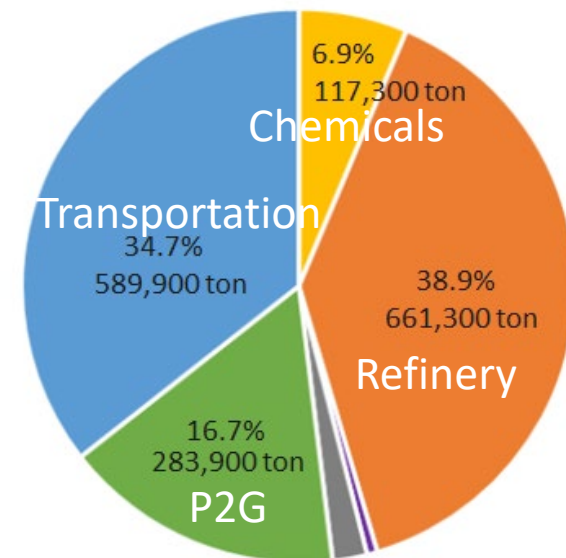
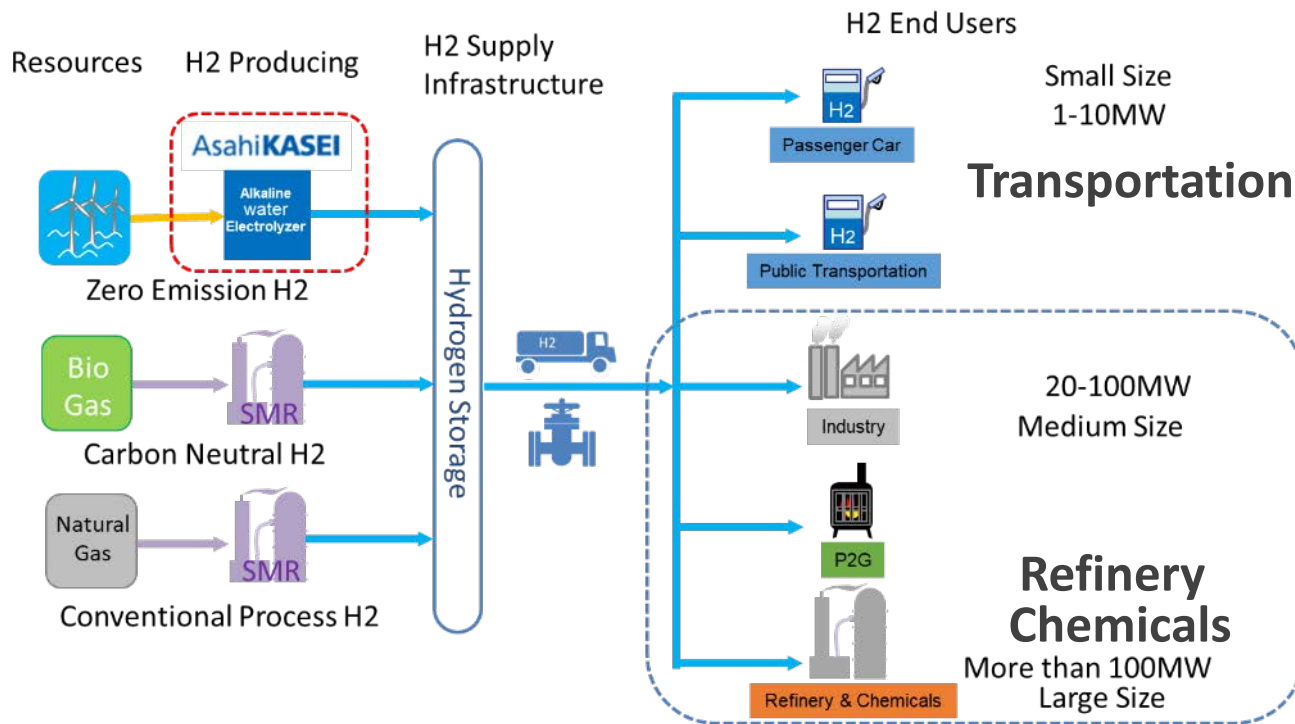


RED2: Renewable Energy Directive 2
targets 32% (all sectors) and 14%
(transportation) of renewable energy use
by 2030.

**MSR: Market Stability Reserve of
EU ETS** leads to higher CO₂ prices.
Rising from 5 € in 2016 to 25 € in 2019.

Decarbonized gas package
Will accelerate “Power to Gas” activities.
Targeting a legislation in 2022 -2023.
Huge demand for green H₂ in gas network.





Snapshot of possible green hydrogen demand by 2030, divided by market segments. Source: Hiniicio

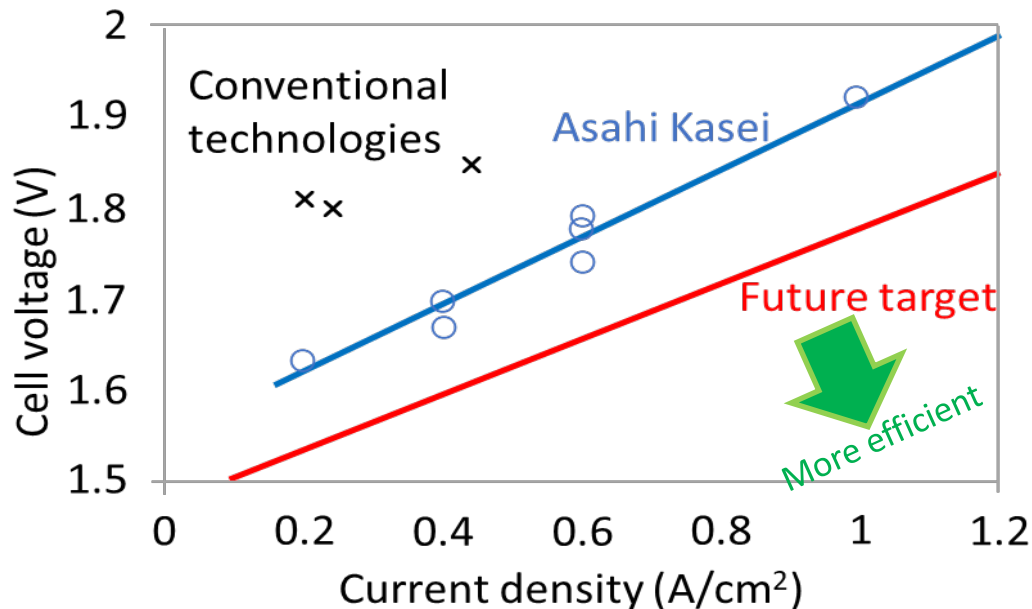
Expect Large Scale Markets

Total Solution Provider

- Size-adaptability for large-scale operations
- High electricity-to-hydrogen conversion efficiency
- High adaptability to renewable energy



- High efficiency with new electrodes
- Wide operating range comparing to conventional technology
- Stable long-term operation for 12,000 hours



STD	<i>Remote monitoring</i>	Monitor electrolyser and other equipment status
	<i>Planned maintenance</i>	Manage replacement of parts and time Order new parts
ADD	<i>Predictive maintenance</i>	Predict status of electrolyser and other equipment Recommend necessary actions for maintenance Update maintenance schedule
	<i>Production scheduling</i>	Plan optimized production schedule (based on predicted hydrogen demand and electricity trend)
	<i>Optimal control</i>	Control multiple electrolysers with different performance
	<i>Green certification management</i>	Manage data for green certification

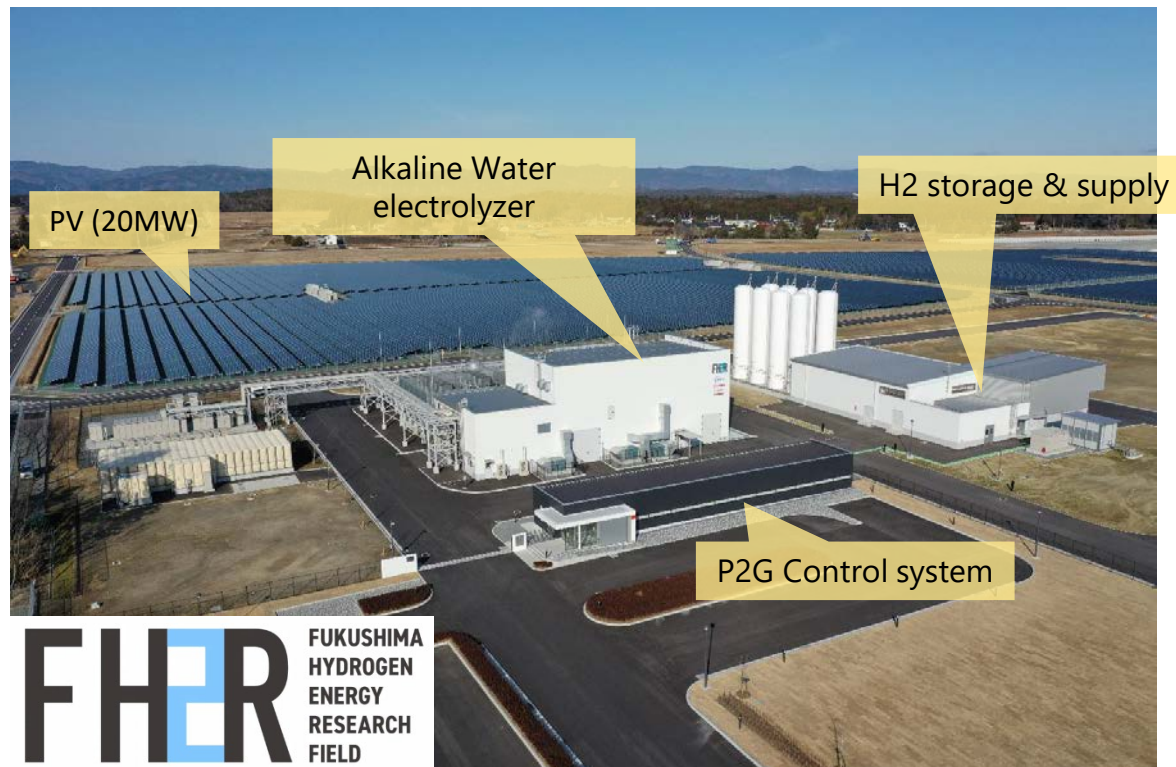
Ongoing Projects



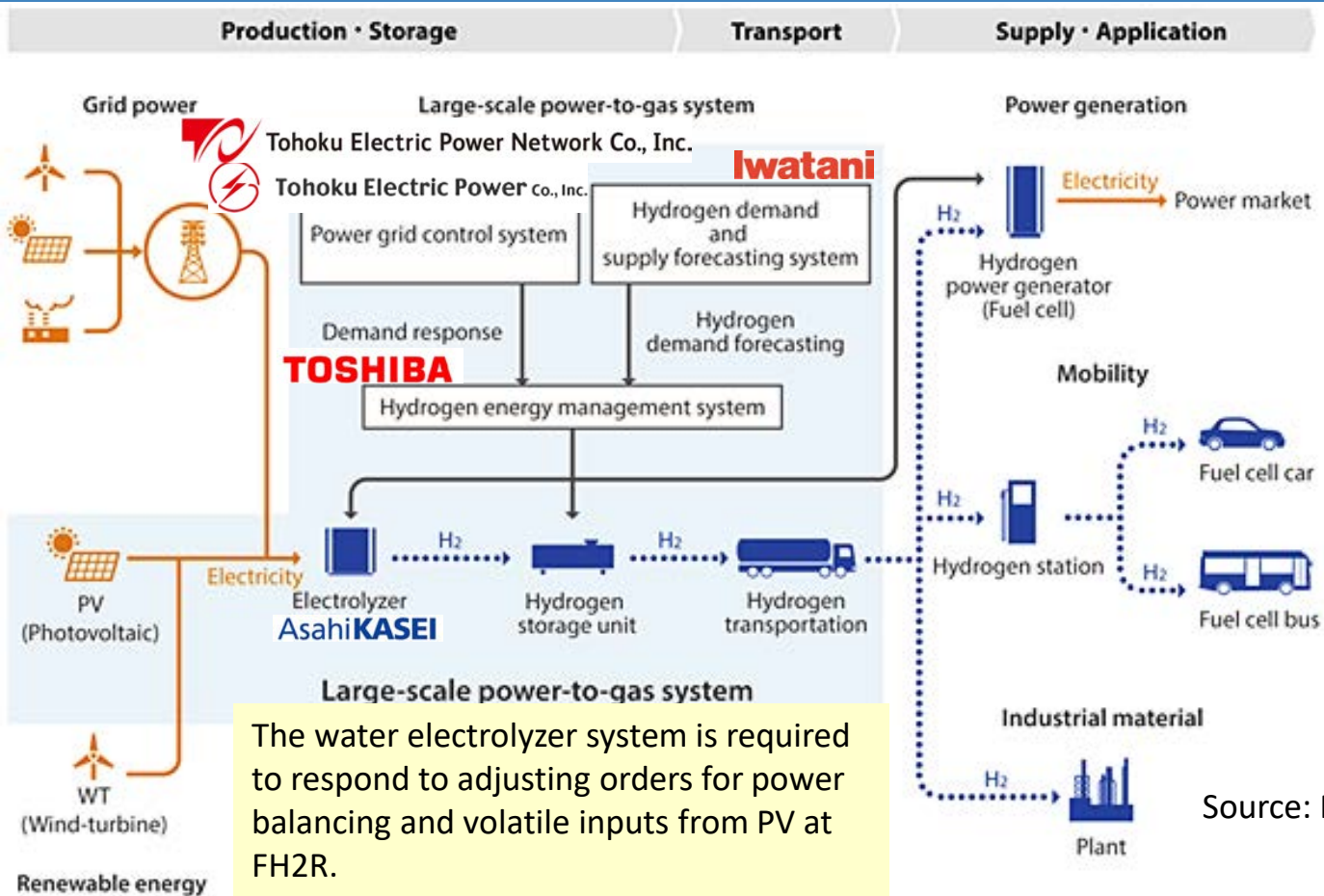
Namie town in Fukushima



- Large national project in Japan
- Hydrogen produced by using electricity from solar panels
- 10MW as a single unit
- Start of operation in 2020



Hydrogen production & supply flow at FH2R



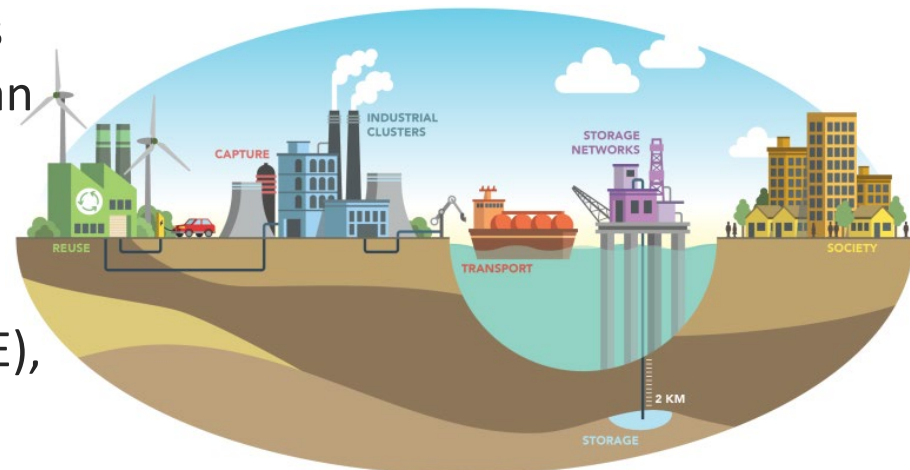
Source: NEDO



Output of rectifier : 10MW
Max. H₂ supply : 2000Nm³/h
(World's largest size as one unit)
Cell area : about 3m²/cell
Number of cells : 170cells

December in 2017	: Started design works for the 10MW of water electrolyzer system
January in 2019	: Started installation works at the site
November in 2019	: Produced Hydrogen gas,
March in 2020	: Held opening ceremony at the site
July in 2020	: Delivered the water electrolyzer system to the project

- 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.



WP1 CAPTURE

- Emission control
- Solvent management
- Dynamics and control
- Cost reduction

WP2 TRANSPORT

- CO₂ shipping
- Batch-wise injection
- CO₂ specifications
- Planning for flexible networks

WP3 STORAGE

- Standardizing storage readiness
- North sea storage appraisals
- Re-use of existing assets

WP4 RE-USE

- CCU demonstrator construction
- Engine adaption
- Operation and testing
- CCU integration and scale-up

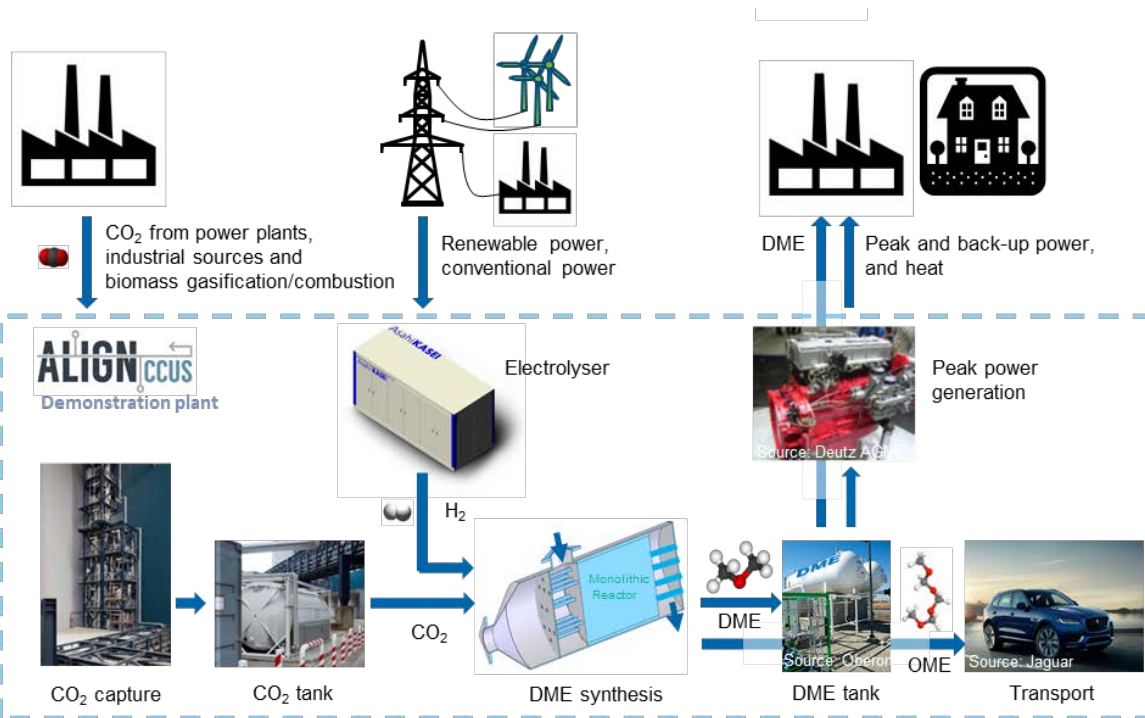
WP5 INDUSTRIAL CLUSTERS

- Teesside and Grangemouth (UK)
- Rotterdam (NL)
- North Rhine-Westphalia (DE)
- Grenland (NO)
- Oltenia region (RO)
- Commercial models for CCUS clusters

WP6 SOCIETY

- Assessing public opinion
- Compensation strategies
- Improving EU dialogue on CCUS

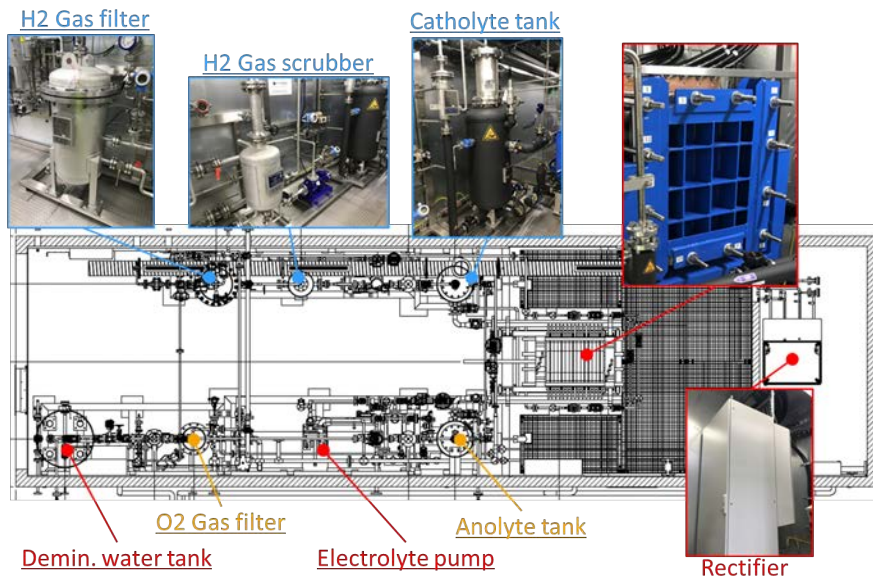
- Pilot plant at RWE's Coal Innovation Centre in Niederaussem
- Sector coupling and carbon recycling / synthetic fuels from CO₂ capturing
- Asahi Kasei provides electrolyser module to convert water into hydrogen



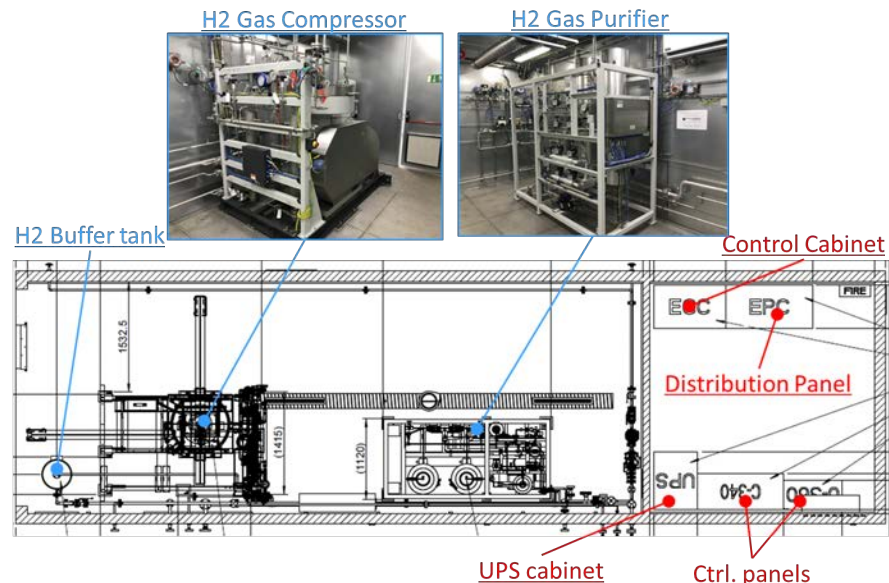
- Start of basic engineering for the project this January
- Placing of two-containers system at the power plant of RWE on 2nd of October
- Start of hydrogen production in the middle of November
- Demonstrate the total process to produce DME by the end of July in 2020



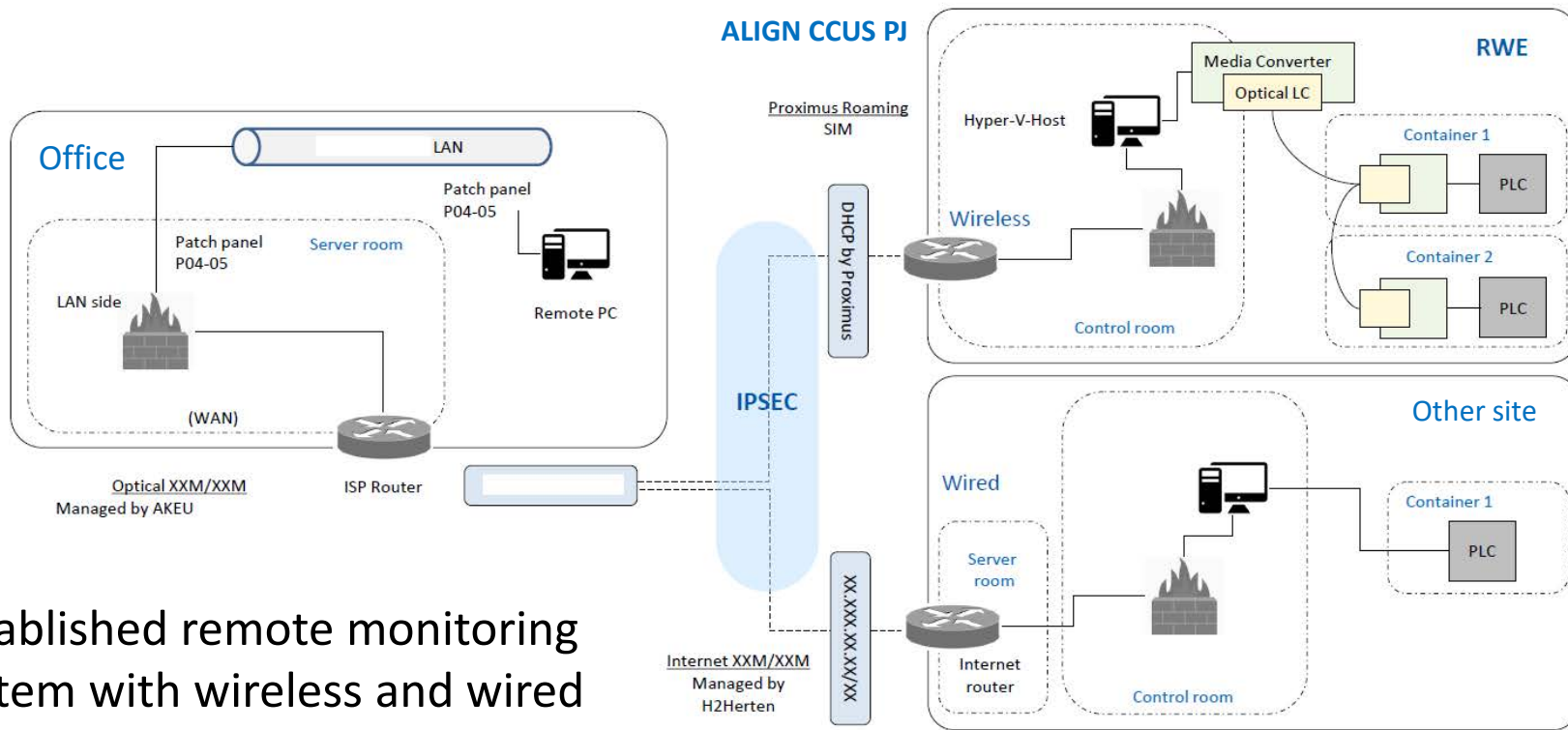
Container1: Electrolyzer stack



Container2: Accessories

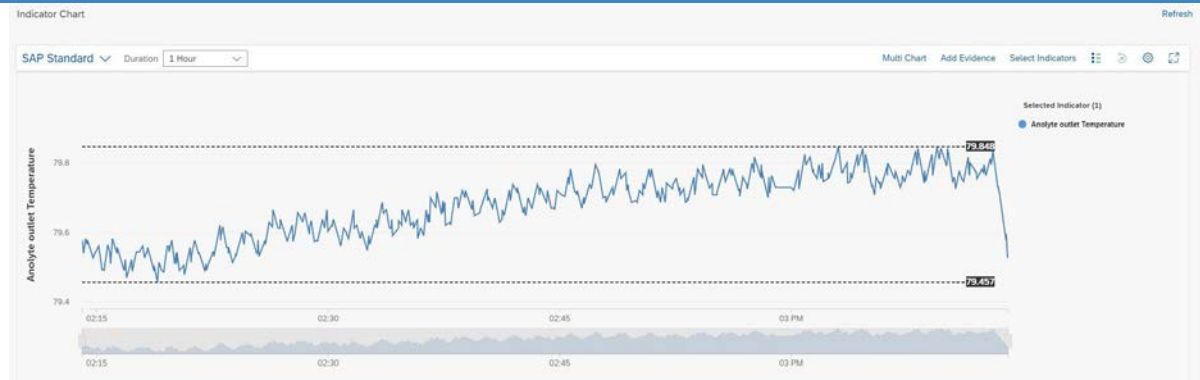


The all system is applied European and German standards and RWE internal safety rules.

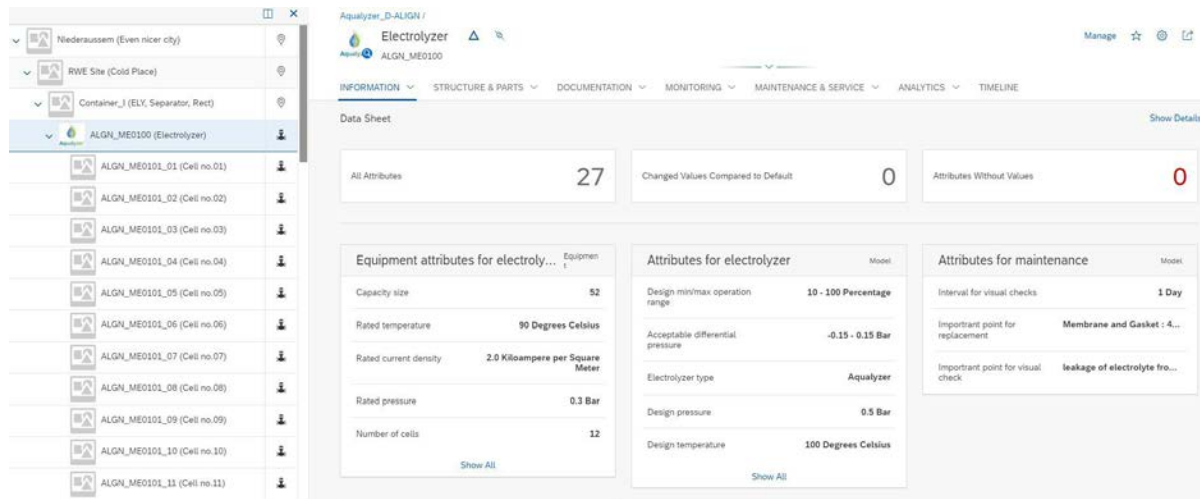


Established remote monitoring system with wireless and wired connect.

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...



Partner	Size	Operation	Cell area	Location
AIST	200kW	in 2013	Medium	Fukushima
NEDO	100kW	in 2014	Medium	Kawasaki, Kanagawa
NEDO	150kW	2014-2017	Large	Yokohama, Kanagawa
NEDO	150kW	in 2018	Large	Fukushima
NEDO	10MW	in 2020	Large	Fukushima

Partner	Size	Operation	Cell area	Location
h2herten	200kW	in 2018	Medium	Herten, NRW
ALIGN CCUS	100kW	in 2020	Medium	Niederaußem, NRW

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.”



AsahiKASEI