

Doosan Fuel Cell

DOOSAN

IR Presentation

June 2023

Investor Relations



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Financial data in this presentation is on a IFRS separate basis.



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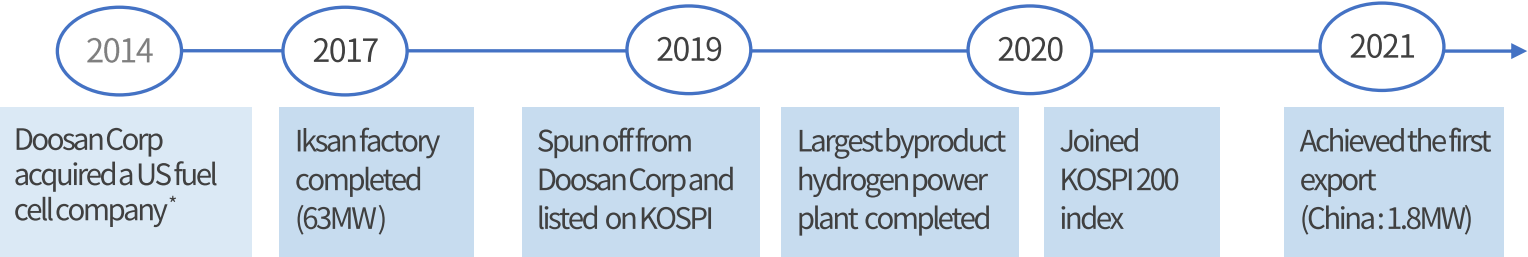
Company at a Glance

Overview

- Business : fuel cells, long-term service, H₂ generator installation & management, FCEV charging stations, mobility powerpack and fuel cells for eco-friendly vessels
- Assets : KRW 1 trillion
- Employees : 466

As at the end of March 2023

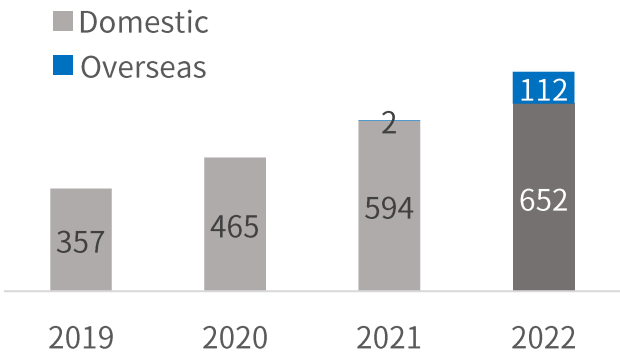
History



*Clear Edge Power

Performance

Accumulated Orders (MW)



Accumulated Installation in Korea

487MW installed (55% market share)

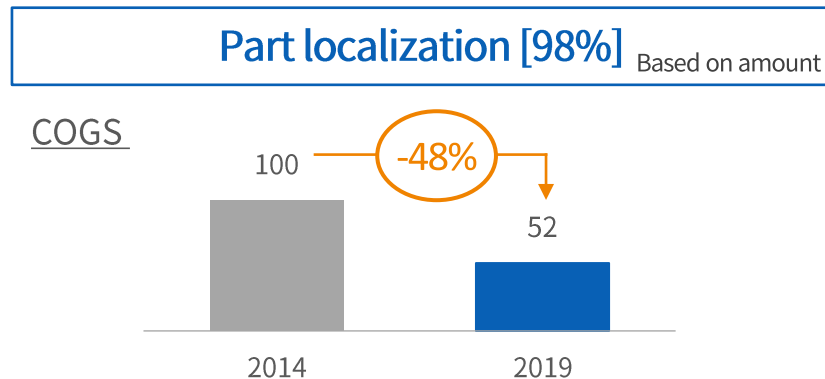


As at the end of March 2023

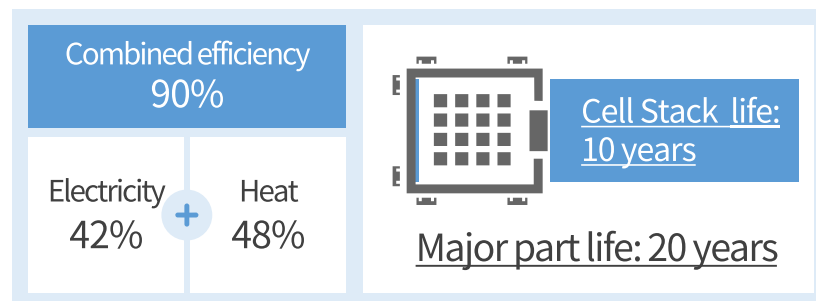
Key Advantages of PAFC Technology

(1) Higher localization rate, (2) Higher combined efficiency and first and only H₂ model, and (3) load following capability to **support government policy including CHPS(1)**

✓ High localization & combined efficiency

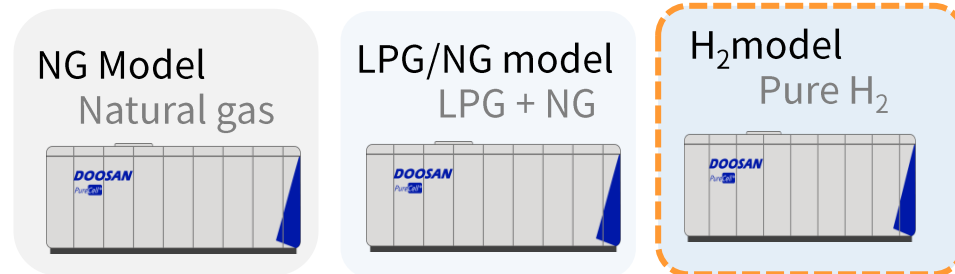


High combined efficiency & long lifespan



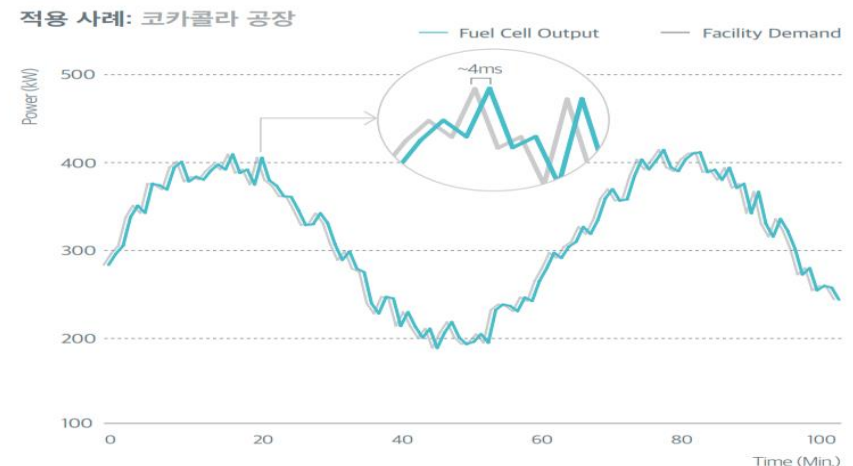
(1) CHPS: Clean Hydrogen Portfolio Standard

✓ Easy convert to H₂ model



✓ Road following capability

Case for the factory of CocaCola in the US





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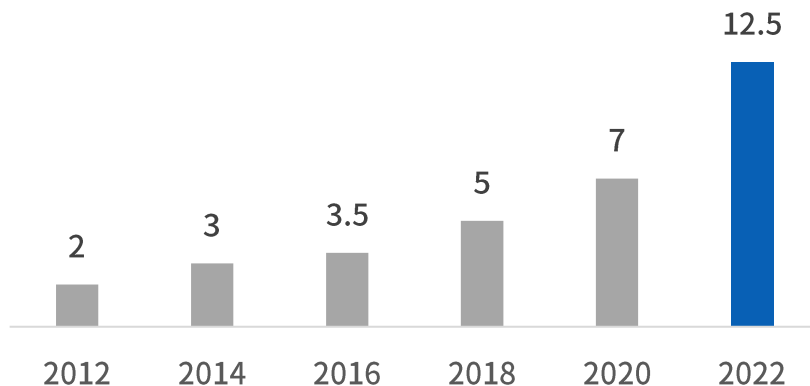
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Transition from the RPS⁽¹⁾ system, where competing with renewables, to CHPS⁽²⁾ that separates hydrogen power generation

RPS (Renewable Portfolio Standard)

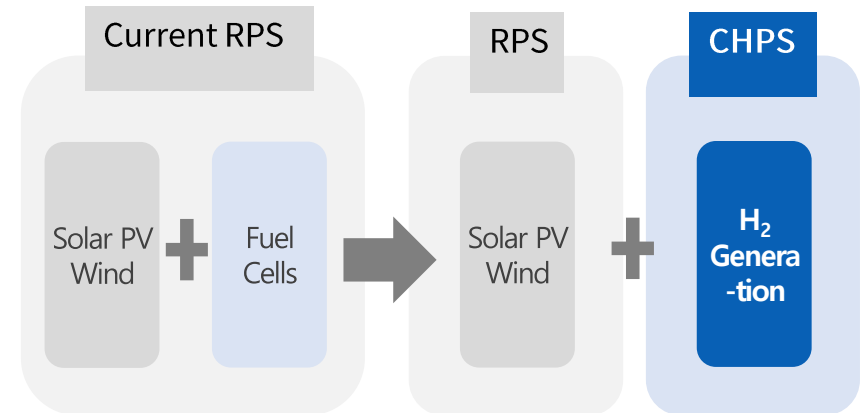
- Mandates utility company to generate a minimum proportion of electricity using new and renewable energy sources including Solar PV, wind and fuel cells

Obligatory Renewable Supply Ratio(%)



CHPS (Clean Hydrogen Portfolio Standard)

- Mandatory power generation with hydrogen
- Introduction of the bidding market for hydrogen power generation
- Step-by-step expansion of clean hydrogen use



Aims to win bids through product development in line with CHPS policy, improvement of localization rate, and business model development

CHPS Policy Update



- '23.5 • Introduce CHPS operating rules (Bidding volume confirmed)
- '23.6 • Launch general H₂ Power bid market
- '23.8 • Announcement of winning bidder for the 1st round bidding

⋮

Bidding Volume

2023		2024		2025	
Commercial operation	Volume (GWh)	Commercial operation	Volume (GWh)	Commercial operation	Volume (GWh)
2025	1,300 ⁽¹⁾	2026	1,300 ⁽¹⁾	2027	1,300 ⁽¹⁾

(1) 200MW in terms of capacity

General H₂ Bid Evaluation Factors

- Quantitative
 - Power generation cost (LCOE⁽¹⁾)
- Qualitative
 - General evaluation: industrial & environmental contribution, etc.
 - System evaluation: generator performance, transmission and distribution linkage

Company Strategy

- ✓ **Developing products in line with policies**
 - Strengthening of H₂ model competitiveness: utilizing by-product H₂ and biogas to meet NDC⁽²⁾
 - Load following capabilities: help relieving grid strain
 - Contribution to the domestic economy
- ✓ **Biz model development**
 - Turning unpleasant facilities into eco-friendly facilities
 - Local job creation
- ✓ **Building mid- to long-term partnership**
 - Securing a stable and competitive order pool through mid- to long-term partnerships with major companies

(1) LCOE(Levelized cost of energy): Power generating cost

(2) NDC(Nationally Determined Contribution): National GHG Reduction Target

[Back-up] Future Direction of Fuel Cell Market

Additional business opportunities under the Clean Hydrogen Power Bid Market and Special Act on Revitalizing Distributed Energy

Clean Hydrogen Power Bid Market

① Utilization of Clean Hydrogen

- Policy in place with 2024 launch target
- Definition of Clean H₂: method of emission⁽¹⁾ calculations under discussion

② Bidding volume

2023		2024		2025	
Commercial operation	Volume (GWh)	Commercial operation	Volume (GWh)	Commercial operation	Volume (GWh)
-	-	2027	3,500	2028	3,000

[Implications]

- ✓ Tech neutrality: fuel cell, H₂ turbine, Ammonia-Coal co-firing, etc.
- ✓ Securing competitiveness with proven H₂ model

(1) Suggested Greenhouse gas emission standards at 4kgCO₂eq/kgH₂ in the briefing session on Clean H₂ certification (April 23, 2023)

Special Act on Revitalizing Distributed Energy

① Fuel cell and H₂ power generation are included in the distributed energy

② Mandatory use of distributed energy

- Certain portion of energy use must be fulfilled by distributed energy

③ Establish an annual implementation plan every 5 years

⋮

[Implications]

- ✓ Mission Critical (Hospital, data center, etc.)
- ✓ Energy super station⁽²⁾
- ✓ Establishment of grounds for PPA and differential electricity rates by region, etc.

(2) As the transportation sector shifts to electric and hydrogen vehicles, distributed power sources such as solar and fuel cells are installed at or near gas stations to create a complex charging station capable of charging electric and hydrogen vehicles and self-generation

Global H₂ Policy Trend

US

- IRA
 - Tax credit for up to USD 3/kg for H₂ production from 2023
 - Extension of fuel cell investment tax credit period and increase in deduction rate

EU

- REPowerEU: Suggested production target of 10 million tons of renewable H₂ by 2030
- Announcement of introduction of European IRA

China

- Central government H₂ plan announced in 2022
- Each local government combined, fuel cell market for power generation up to 6GW

Middle East

- Energy diversification strategy as part of achieving Vision 2030
- Large-scale green H₂ project in progress

Australia

- Establish clean H₂ infrastructure based on abundant renewable energy
- Large-scale electrolysis/ H₂ power generation/storage facility build plans

South East Asia

- Fuel cell project for power generation using byproduct H₂ is underway

Korean

- H₂ economy roadmap 8GW local and 7GW export target by 2040
 - Establishing details for CHPS bid evaluation criteria
- The 5th H₂ Economy Committee ('22.11) Aimed to “Establish a clean H₂ supply chain and the world's No. 1 H₂ industry”
- ‘Special Act on Vitalization of Distributed Energy’(bipartisan)

While expanding **Chinese market**, discussing business development with clients in **Australia and the Middle East**

Progress

China

- **Mid- to long-term large-scale supply to ZKRG in Guangdong**
 - Scale: 105MW (NG & H₂ model)
 - Period: - end of 2026
- **H₂ model supply to BEISEN in Zhejiang**
 - Scale: 4.8MW (H₂ model)
 - Project for green H₂ model linked to electrolyzer

Plan & Strategy

- **Expansion of Chinese market**
 - Diversifying cooperative partnerships (using Distributor/Agent as well as JV)
 - Securing sales opportunities by expanding sales coverage
- **Targeting existing cooperation partners**
 - Facilitating progress on existing projects
 - Discussion on additional volume expansion including expansion of responsible regions

Australia

- **MoU with South Australian government**
 - Green H₂ infrastructure build
 - Joining South Australian H₂ power generation tender (H₂ model)

- **Expansion of local partners**
 - For energy and developer companies
 - Development of a power generation project using green H₂ in Australia

Middle East

- **Business model review in the Middle East**
 - Forming a regional value chain as part of achieving Vision 2030
 - Large-scale green H₂ project underway → Demand expected mainly arising from H₂ model



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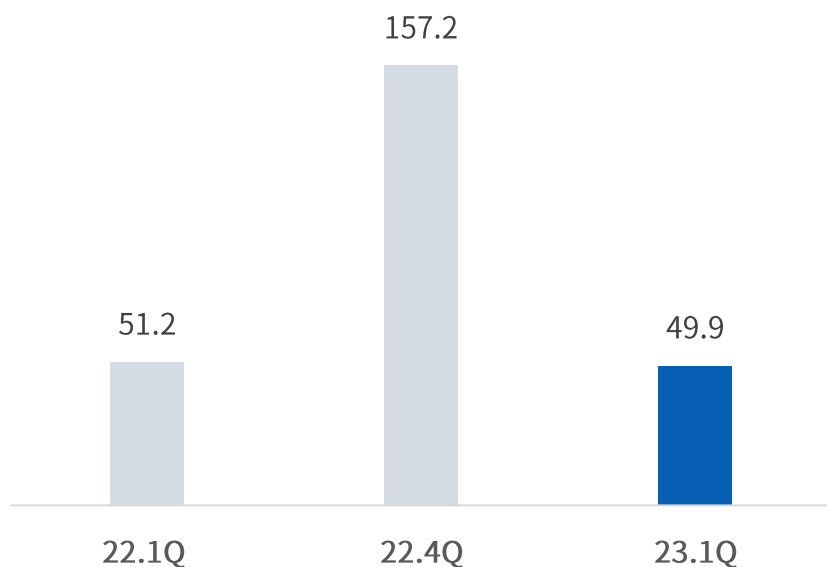
1Q 2023 Earnings

Recorded Sales revenue 49.9bn won, Operating income 3.2bn won, Operating margin 6.4%

- Sales revenue: slightly declined year-on-year
- Operating income: one-time expense⁽¹⁾ decline and LTSA⁽²⁾ profitability improvement year-on-year turned operating income to positive

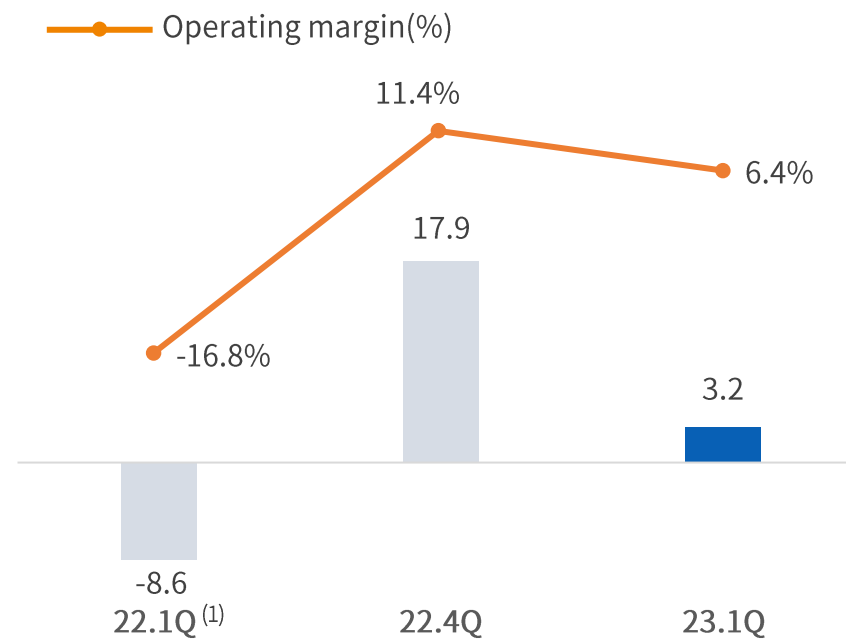
Sales Revenue

(Unit: KRW in billions)



Operating Income

(Unit: KRW in billions)



(1) Recognition of one-off severance allowance of KRW 1.56 bn in 2022 Q1

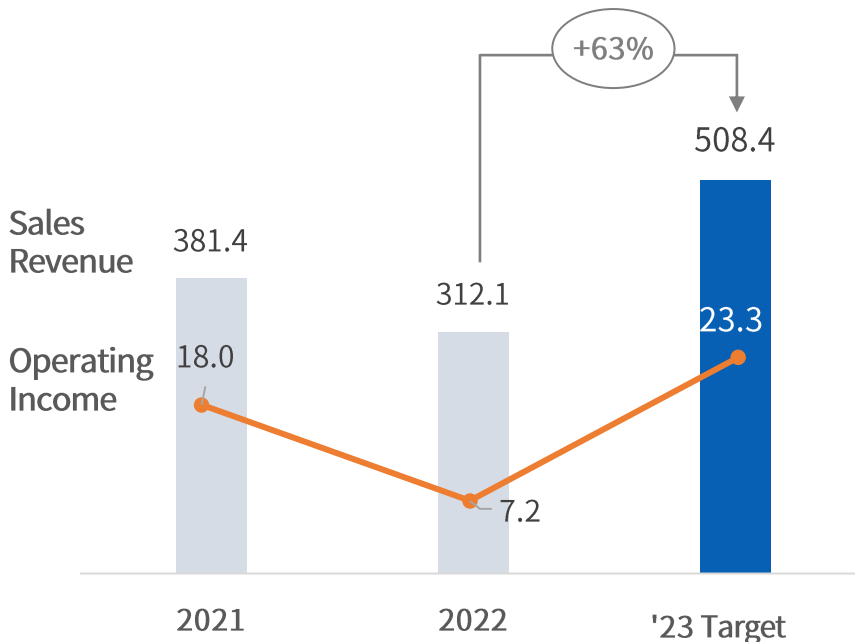
(2) LTSA: Long-term Service Agreement

2023 Business Plan

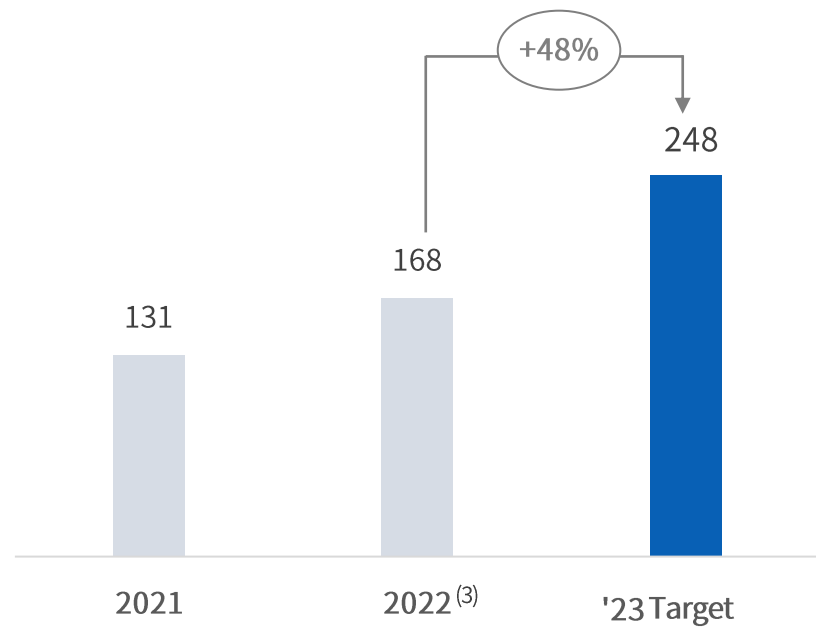
Sales revenue: KRW 508.4 bn, Operating income: KRW 23.3 bn, New orders: 248MW

- To achieve Sales revenue and Operating income target through sales recognition for existing and new orders received this year
- Aim to promote orders by winning orders related to RPS⁽¹⁾ and CHPS⁽²⁾, diversifying applications, and expanding overseas markets

Earnings Target (Unit: KRW in billions)



New Order Target (Unit: MW)



(1) RPS (Renewable Portfolio Standard)
(2) CHPS (Clean Hydrogen Portfolio Standard)

(3) 2022: 297MW including conditional orders

Q&A Session

IR Contacts

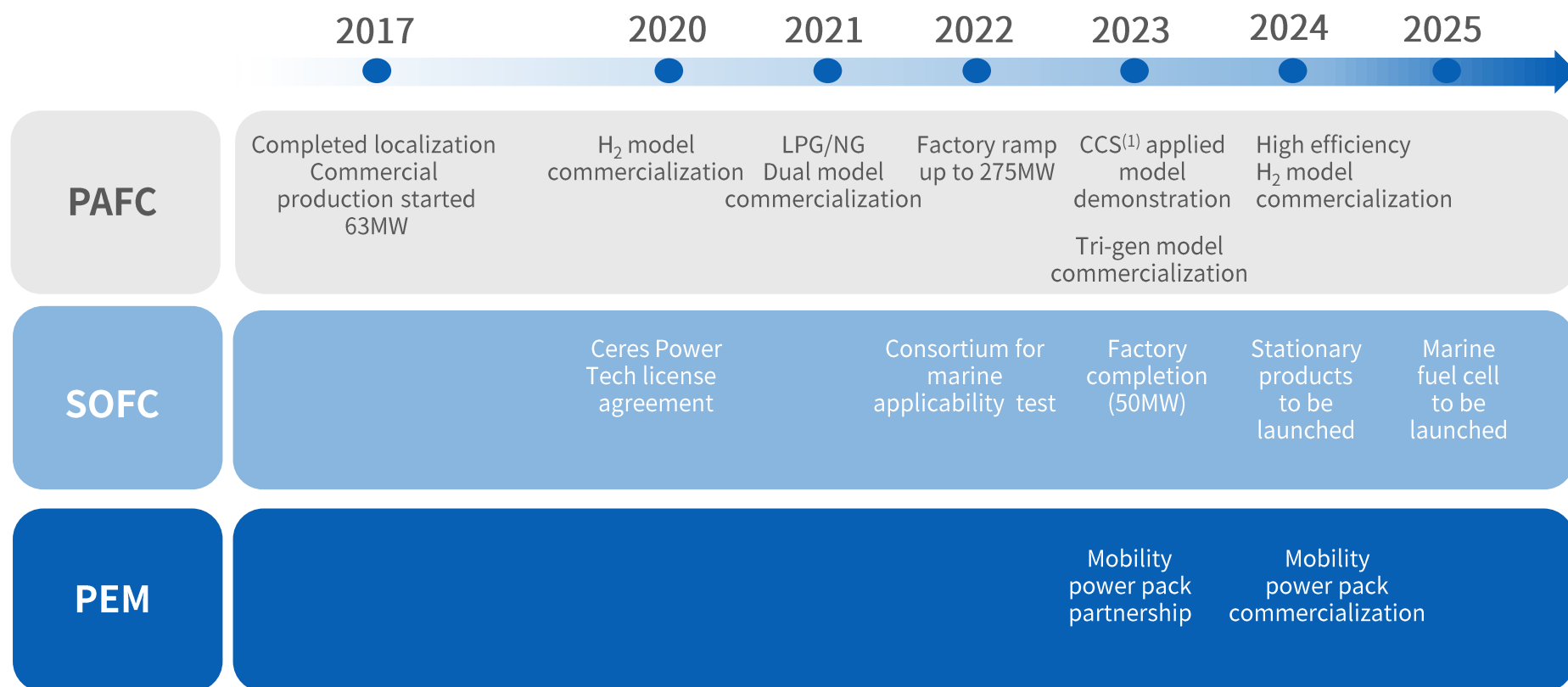
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Appendix. New Business Roadmap

Utilizing various technologies to build new growth engine

- PAFC ramp up and SOFC new factory construction in 2023 will expand our business horizon
- Mobility powerpack partnership and other opportunities secures new growth engine
- Reinforcing competitiveness of PAFC H₂ model, development of ammonia fueled SOFC and CCS applied model to achieve Carbon Neutrality



(1) CCS: Carbon Capture Storage

Appendix. Summary of Financial Position

(Unit: KRW in billions)	22.Q1	22.Q4	23.Q1	YoY	QoQ
Total Assets	736.7	1,026.9	1,011.9	275.2	-15.0
Current Assets	516.1	675.7	635.9	119.8	-39.8
Non-current Assets	220.6	351.2	376.0	155.3	24.8
Total Liabilities	221.4	503.9	486.5	265.1	-17.3
Current Liabilities	112.6	312.7	294.8	182.2	-17.9
Advanced Received	18.0	10.4	16.2	-1.8	5.7
Non-current Liabilities	108.8	191.2	191.7	82.9	0.5
Shareholder's Equity	515.3	523.1	525.4	10.1	2.3
Total Liabilities and Equity	736.7	1,026.9	1,011.9	275.2	-15.0
Leverage Ratio	43%	96%	93%		
Debt	75.0	269.0	309.0	234.0	40.0
Cash and Cash Equivalents⁽¹⁾	162.4	50.7	24.9	-137.5	-25.9
Net Debt⁽²⁾	-87.4	218.3	284.1	371.5	65.9

(1) Cash and cash equivalents + ST financial instruments + ST financial assets

(2) Debt- Cash and cash equivalents etc.

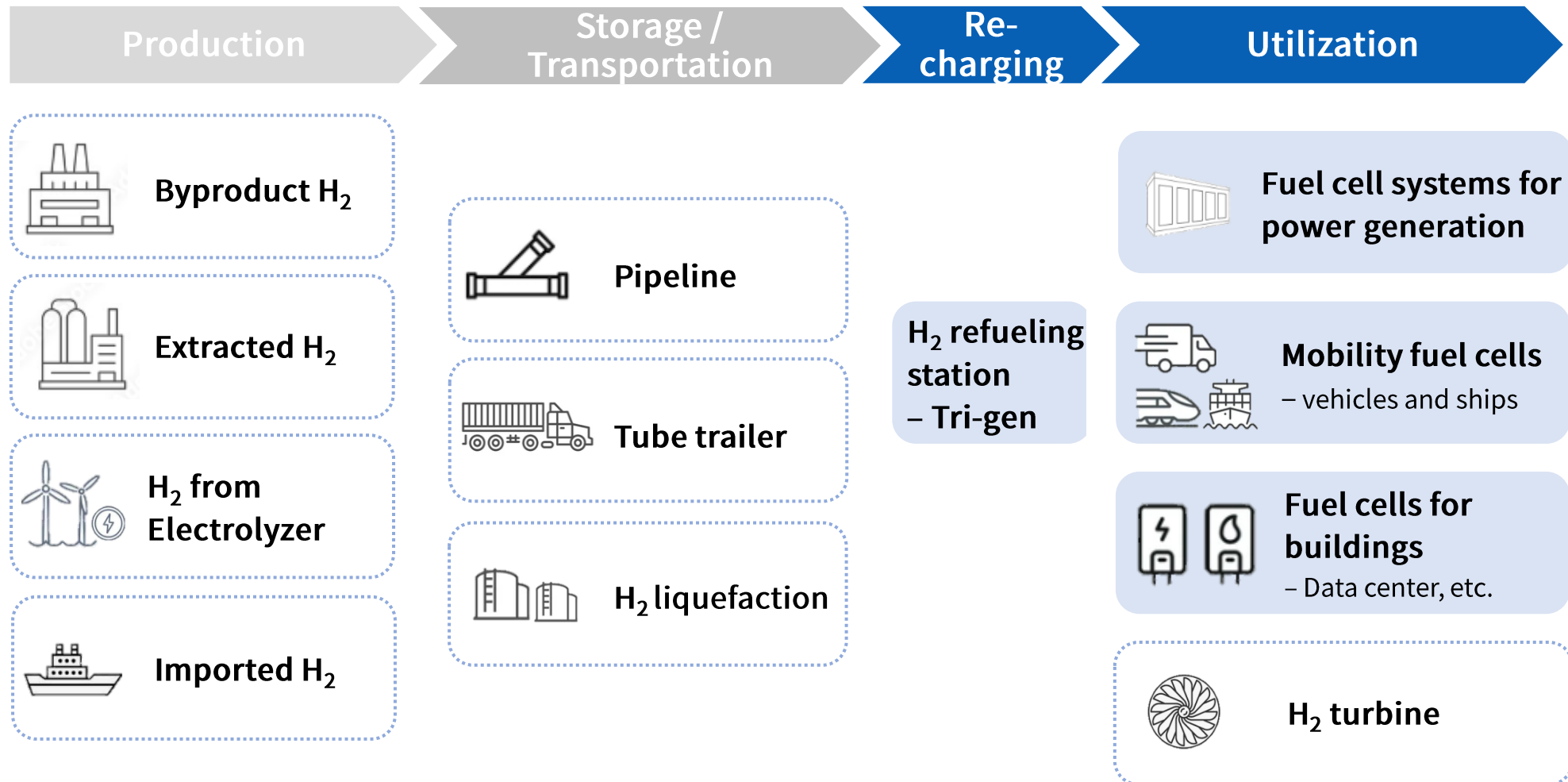
Appendix. Summary of Income Statement

(KRW in billions)	22.1Q	22.4Q	23.1Q	YoY	QoQ
Sales Revenue	51.2	157.2	49.9	-3%	-68%
Operating Income	-8.6	17.9	3.2		-82%
Margin(%)	-16.8%	11.4%	6.4%		
EBITDA	-5.9	21.9	7.0	Turned to profit	-68%
Margin(%)	-11.5%	13.9%	13.9%		
Income before Tax	-4.3	7.9	1.8		-77%
Net Income	-2.9	5.6	1.9		-67%

Appendix. Doosan Fuel Cell's Role in H₂ Economy

Manufacturing and supplying **fuel cell equipment**, the core of H₂ use

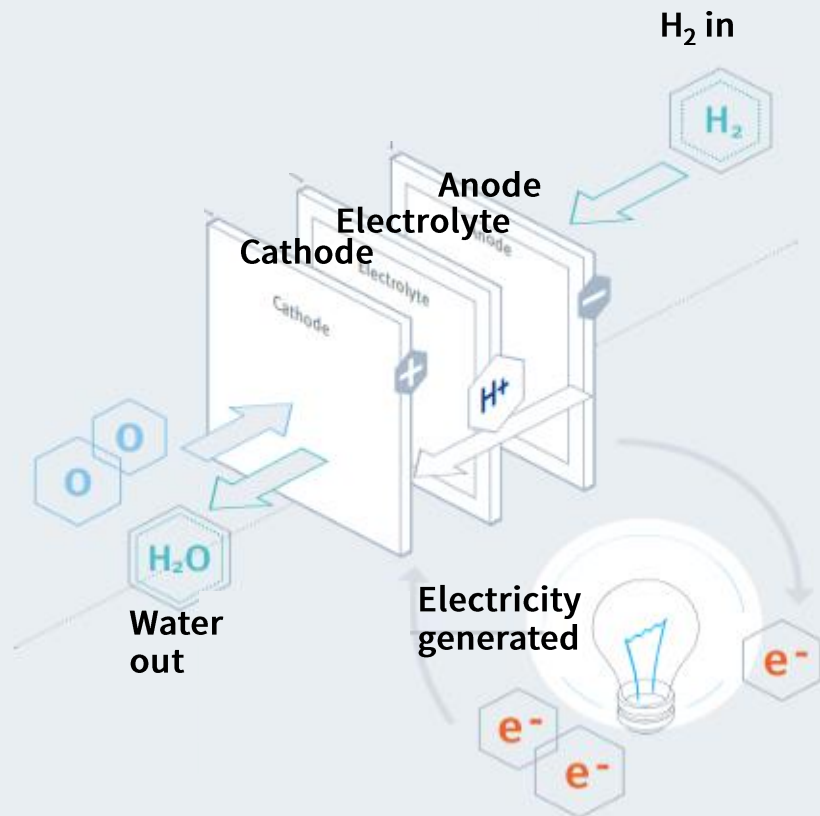
Doosan Fuel Cell Biz area




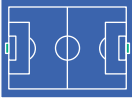



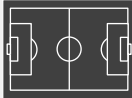
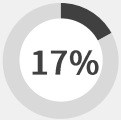
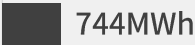
Appendix. How Fuel Cell Works and Benefit

Fuel cell is an eco-friendly distributed energy source with high capacity factor and load following capability

How it works



Benefits

	Footprint	Capacity factor	Generation per year
 Fuel Cell	 88 MW	 95%	 732,336MWh
 Solar PV	 0.5 MW	 17%	 744MWh

- Solution to complement intermittent renewable energy
- Easy siting with high efficiency and high output, reducing transmission and distribution network costs
- Increased importance of energy security due to climate change, war, and increased data usage

Appendix. Fuel Cell Structure and Principles

1

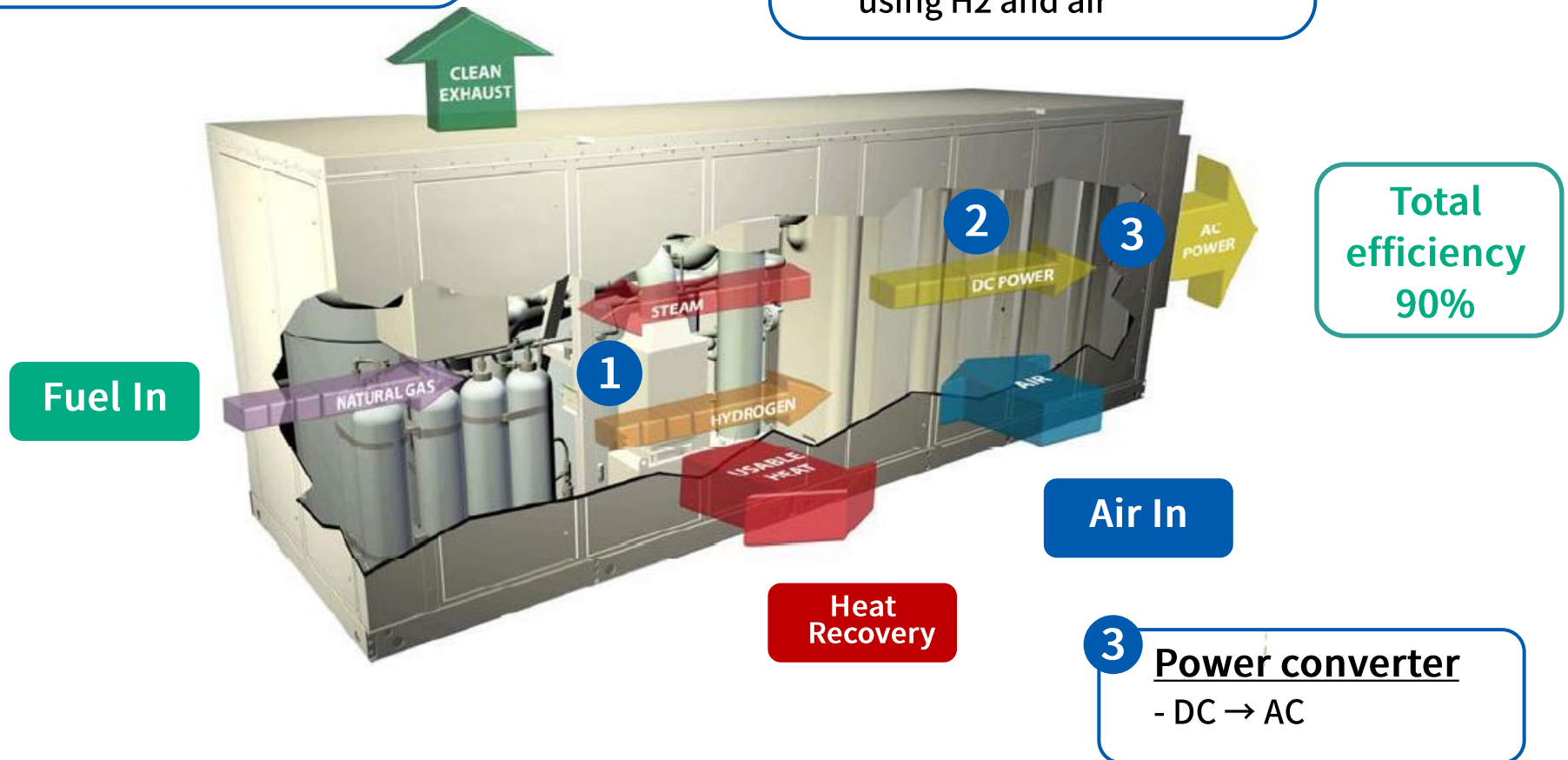
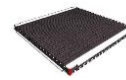
Reformer

- Convert natural gas or LPG to H_2 (NG model and NG/LPG dual model)

2

Stack (Cell Stack)

- Direct current generation using H_2 and air



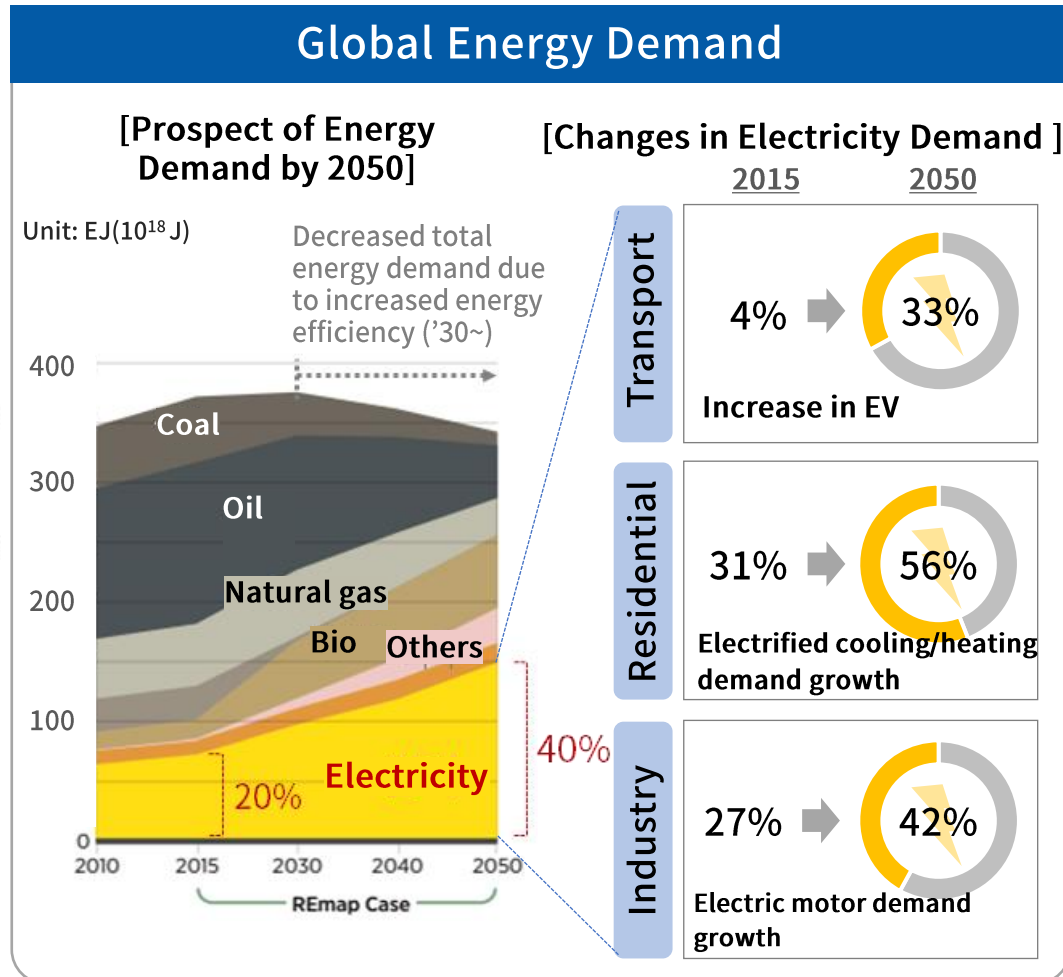
3

Power converter

- DC \rightarrow AC

Appendix. Necessity of Fuel Cell

Increase in global electricity demand, limitations in transmission and distribution networks → **The only clean distributed power solution**



Source: IRENA_Global Energy Transformation

*REmap : Renewable energy roadmap predicted by IRENA

- Significant electricity demand growth for electrification for achieving carbon neutral, demand increase of constant power supply
 - However, the expansion of large-scale transmission and distribution networks are limited due to economic/social cost.
- As a result, the importance and policies of small-scale distributed/independent power generation are expanding.
 - The distributed fuel cell market is divided into ① power generation and ② mobility.