Investor Presentation

Doosan Corp's New Business Entry in Fuel Cells

2014.07.

DOOSAN

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Forecasts and projections contained in this material are based on current business environments and management strategies. Certain data in this material was obtained from various external data sources. They may differ from the actual results upon changes and unaccounted variables. We make no guarantees and assume no responsibility for the use of information provided.

We trust your decisions will be based on your own independent judgement.

1 Investment background and deal structure

2 Market outlook and plan for integration and growth

3 Projected performance and aspiration

Background of Doosan Corp's decision to enter in fuel cells

- Doosan Corp, an operating holding company, has a plan to generate over KRW 500 billion of annual operating profit to drive long-term sustainable growth

- To achieve this plan, DIP Holdings, a wholly-owned subsidiary of Doosan Corp, has made serial and successful divestitures of its non-core assets, including the recently announced sale of KFC

- With the cash generated from the asset sales, Doosan Corp has been exploring new business opportunities that will become Doosan Corp's major future growth engines

- Doosan Corp has identified fuel cells as an attractive investment opportunity and, specifically, FCP as an attractive target to acquire. Furthermore, potential synergies between FCP and CEP led us to the decision to acquire both companies

Deal structure

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"Fuel cell business entry"

ClearEdge POWER
Delivering Smart Energy Today™

- Location: U.S.
- Target market: Building, regulatory[1]

- Deal method: Asset transfer
- Deal value: Approx. USD 32.4 million
- To become the U.S. subsidiary of Doosan Corp's fuel cell business

FCP 퓨얼셀파워 FuelCellPower

- Location: Korea
- Target market: Residential

- Deal method: Small-scale merger
- Merger ratio at 1 : 0.115
  (FCP market cap: Approximately KRW 45.8 billion as of July 9)
- To become a new BG in Doosan Corp

1 Regulatory (for regulatory compliance): market created to meet government regulations, e.g., renewable energy quota

Overview of ClearEdge Power (CEP) and Fuel Cell Power (FCP)

ClearEdge POWER
Delivering Smart Energy Today™

- Established in 2003. Headquartered in California. Production facilities in Connecticut
- Revenue: KRW ~70 billion. Operating losses
- Manufactures fuel cells for (1) Korea's regulatory market and (2) U.S. building market
- A global leader in fuel cell technologies, with over 50 years of R&D experience and IP ownership of **ALL core fuel cell technologies**
- **Filed for Chapter 11 in May 2014**

FCP 퓨얼셀파워
FuelCellPower

- Established in 2001. Headquartered in Seongnam City, Gyonggi Province, Korea
- Revenue: KRW 17 billion. Operating profit: KRW 3.7 billion
- Manufactures fuel cells for residential market (80% m/s in Korea)
- A global leader in **residential fuel cell** technology
- Shareholders: **Shin Minam (President)** 40%, FI 55%, others 5% (listed on KONEX in 2013)

SOURCE: CEP, FCP

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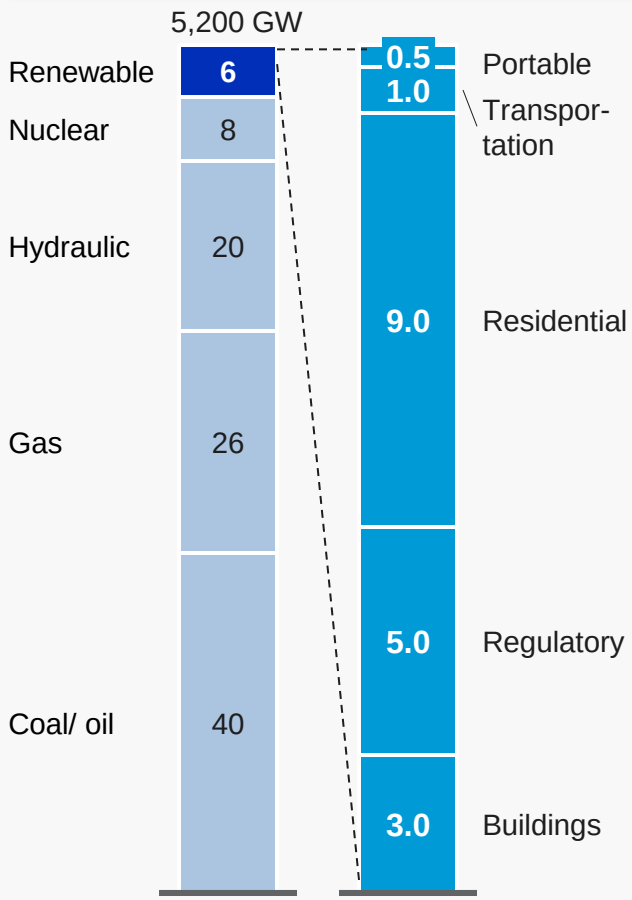
Fuel cells have five major commercial applications



Scope of this deal

Application segment	Description	Typical capacity	Key characteristics
Portable	• Portable unit for various devices (including auxiliary power)	• 5W ~ 20W	• Main usage in mobile charging, electronic device charging, and power generation for campers
Transport-ation	• Portable unit for transportation vehicles	• 1kW ~ 200kW	• Usage starting with special vehicles with range limits • Infrastructure building to expand usage to passenger cars
Residential	• Stationary unit (power and/or heat) for houses and small buildings	• 0.6kW ~ 1kW	• Mainly usage in residential houses and small/medium-sized buildings in Japan and Europe
Regulatory	• Stationary unit for power plants	• 400kW~	• Distributed generation market for renewable energy driven by government policies (RPS)
Buildings	• Stationary unit (power and/or heat) for large buildings	• 100kW ~ 400kW	• Large buildings and commercial complexes (e.g., hospital, hotel, campus)

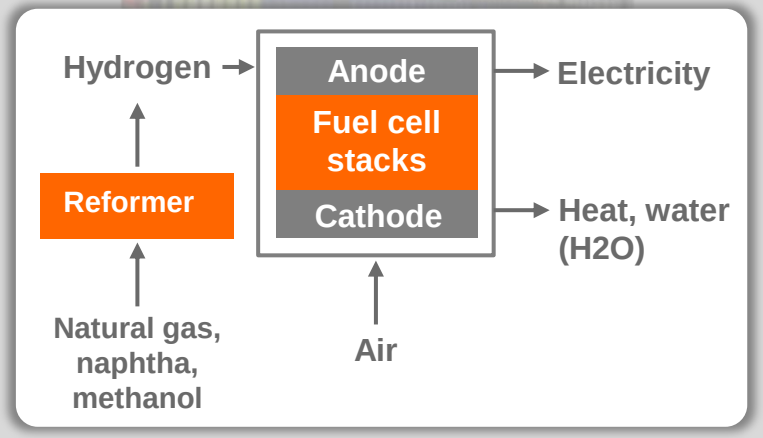
1 Global power generation capacity in as of 2010.
2 RPS(Renewable Portfolio Standard): government obligates power generation companies to fill specific percentage of power supply with renewable energy

SOURCE: WEO, Fuji Economic Research Institute, Navigant Report

Fuel cells generate power through electrochemical reaction and has advantages over other forms of power generation

How fuel cells work

- A fuel cell converts hydrogen (fuel) and oxygen into water and produces electricity and heat
- Hydrogen is supplied either in pure form or by converting natural gas (through a converter)



Key characteristics

- **Advantages of fuel cells vs. other forms of power generation**
  - **High efficiency**: electrochemical reaction vs. mechanical movement (turbine, engine)

	Fuel cell	Small gas turbine (below 10 MW)
Generation efficiency	37~55%	20~38%
Thermal efficiency	~45%	~45%
Total efficiency	~90%	65~83%

  - **Stable performance**: consistent level of efficiency achieved regardless of capacity
  - **Ease of operation**: No wear and tear from mechanical movements. Low noise/vibration. Low maintenance cost
  - **Eco-friendliness**: using pure hydrogen generates zero pollutants
- **Factors that will accelerate adoption**
  - Lower production cost achieved through mass production
  - Long-term performance validated through extensive testing and operation

SOURCE: FuelCellToday, Fuel Cell Technologies Market Report

Key highlights

1. Building/regulatory/residential applications are expected to grow at ~40% p.a.
2. U.S. leads adoption in the building application, while Korea leads adoption in the regulatory application
3. Fuel cells have a high barrier to entry. Core technologies are owned by few players only
4. Doosan Corp is entering fuel cells through acquisition and merge of the leading players – CEP and FCP
5. Fuel cells is a business that Doosan Corp is naturally positioned to own and win

1 Building, regulatory, and residential applications are expected to grow to KRW 39 trillion by 2023

Applications		Market size (KRW trillion) 2013	2018	2023	CAGR
Buildings[1]		0.3	2.3	18.3	51%
Regulatory		0.5	1.5	3.3	21%
Residential		0.9	1.3	17.0	34%
Total		1.7	5.1	38.6	37%

Key growth drivers

- Cheaper (e.g., shale gas) feedstock
- Rising electricity rates and greater need for reliability
- Increasing needs for distributed generation
- Improving production cost of fuel cells
- Renewable energy policies (RPS)

1 Includes all fuel cell markets for the installation at a single large building as well as at a specific large-scale complex (e.g., commercial complex, college campus)

SOURCE: Fuji Economic Research Institute, Navigant Report

2 U.S. leads the building application

Building application

Market trends and prospects

- Fuel cell adoption is increasing due to:
  - Need for greater energy reliability
  - Rising power rates
  - Government push for eco-friendliness
  - CSR and improved corporate reputation
- Building application is expected to grow to KRW ~25 trillion (cumulative)
  - 15% penetration into large buildings in the next 10 years

We're installing 6MW fuel cells. It's expected to increase the availability and reliability of our infrastructure

- eBay executive

출처: Database of State Incentives for Renewable Energy (DSIRE), Ventyx Energy Velocity

2 Case examples: fuel cell adoptions in the U.S.

Mounting costs of securing energy reliability

- **Blackouts** caused by natural disasters
  - 2013 Isabel: 4.3 M households
  - 2013 Nemo: 0.65 M households
  - 2012 Sandy: 8 M households
  - 2012 Derecho: 3.8 M households
  - 2012 Alfredo: 3.5 M households
- **Costs of corporation from blackouts are estimated at KRW 80 trillion per year**

> *Fuel cells at data centers … as a way to reduce reliance on utility grids, as a replacement for backup generators or as a more environmentally friendly alternative source of power.*
>
> *Microsoft executive*

Fuel cell adoption cases (CEP, Bloom Energy)

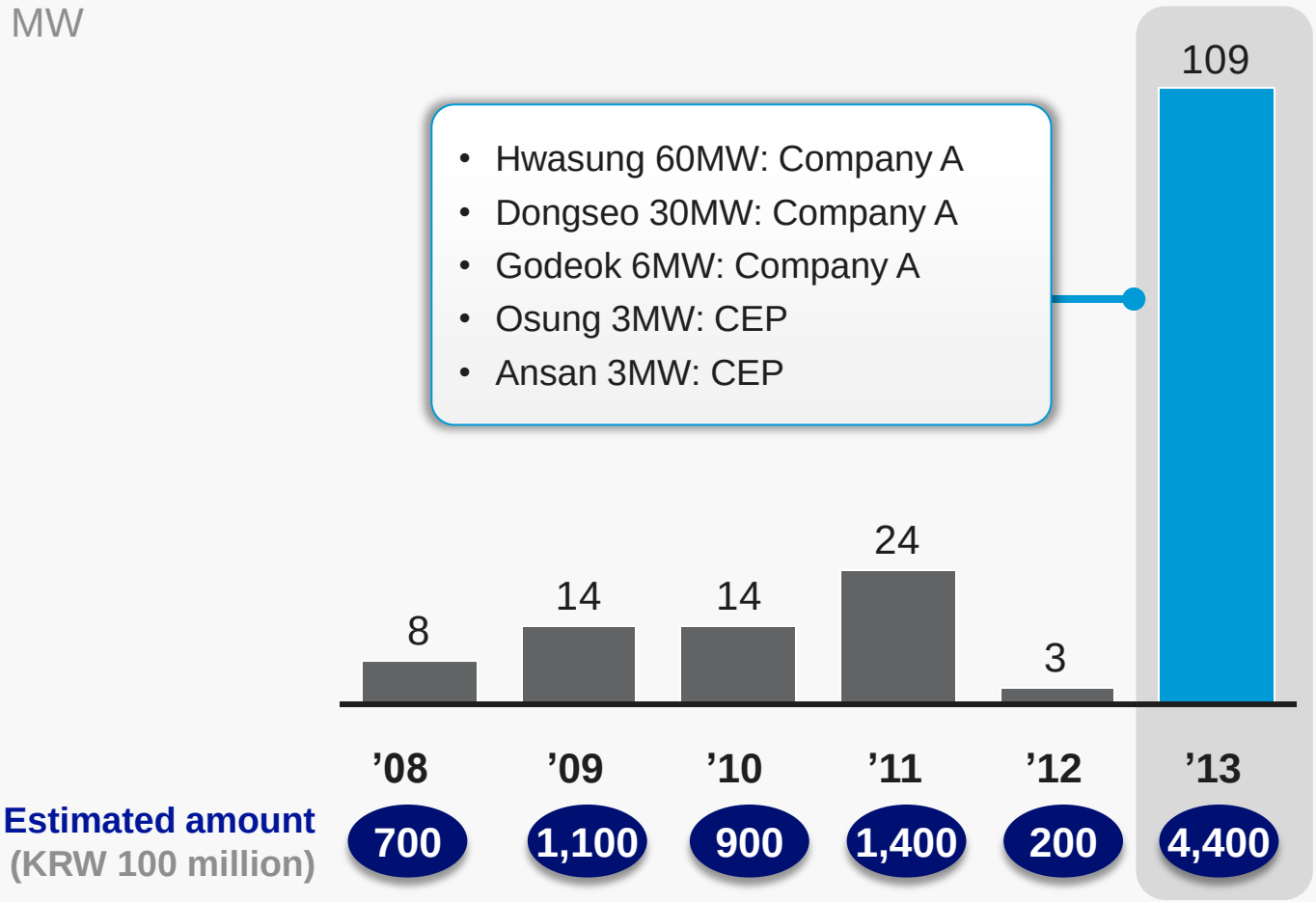
CEP customers

Operators	verizon, cox, at&t
F&B	Coca-Cola
Retailers	Whole Foods Market, Price Chopper, Stop&Shop, Walmart
Hospitals	Adventist Health, Saint Francis Care BestCare for a Lifetime
Universities	UCONN
Finance	Bank of America, Bentall Kennedy, Beacon Capital Partners
High tech	Google, ebay, Adobe, intuit, hp, Microsoft
Other	CalTech, FedEx, Staples, HONDA, CT Transit

SOURCE: Literature search, CEP/Bloom Energy websites

2 Korea leads the regulatory application

Regulatory application size in Korea (orders)



Korea's share of regulatory application in the world: 90% in 2013

Korea to lead regulatory development, followed by other countries such as the US

SOURCE: Market research, literature search, industry interview, Fuel Cell Technologies Market Report

2 Government policies such as RPS and the availability of LNG terminal BOG drive adoption in Korea

	Description	Market size
New/ renewable energy policies	• **RPS**: Large power producers (500MW and above) are mandated to use new/renewable energy sources • **RHO[1]:** Large new buildings (gross floor area of 10,000m^2 or above) are required to source 10% of its energy from new/renewable sources (effective 2016)	• **KRW ~3 trillion for next 5 years** (Assuming 10% RPS requirement by 2024 and a conservative estimate of 30% share of fuel cells) • Additional growth expected after introduction of RHO
LNG terminal BOG (Boil off gas)	• Boil off gas from LNG terminals is a low cost feedstock for fuel cells	• **KRW ~3 trillion for next 10 years** (760MW based on current LNG terminal capacity in Korea)

1 RHO(Renewable Heat Obligation) : Mandatory use of new, renewable, and thermal energy

SOURCE: Literature search, Ministry of Commerce, Industry and Energy of Korea, interview with industry experts

2 regulatory application in the US market to grow as well

Regulatory application (US example)

Market trends and prospects

- RPS currently implemented in 37 States. RPS target of 20% or more to be achieved by 2025
- Regulatory application is expected to grow to 3GW, KRW ~14 trillion (cumulative) [1]
- ~10 GW of new/renewable energy project construction expected in this period
- Of this, 30% penetration by fuel cell

Fuel cells have very high potential in the 10MW or below distributed generation market. If the prices can drop, they will replace other incumbent technologies in several markets

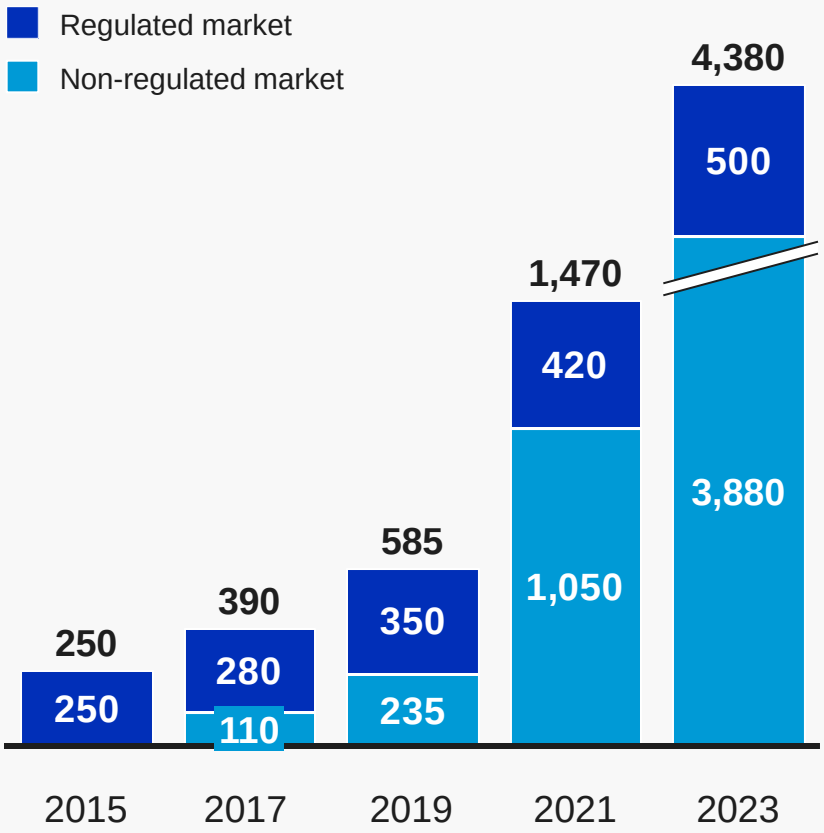
- An expert at distributed generation

1 Currently fuel cells are sold at KRW ~6 million per kW including all installation cost in the US. We assume this price will drop average 4% p.a. to reach KRW ~4.5 million per kW by 2023

SOURCE: Database of State Incentives for Renewable Energy (DSIRE), Ventyx Energy Velocity

2 Residential application in Korea is starting to grow from the regulation-driven market

Residential fuel cell market size in Korea
KRW 100 Millions



Key growth drivers

Regulatory market[1]

- **Mandatory use in public buildings**: Mandate for use of new/ renewable energy to increase from 12% to 30% by 2020
- **Special projects to support residential/buildings:** Subsidies for using new/ renewable energy
- **City of Seoul – Design standards for Green Buildings:** Mandate for use of new/renewable energy to increase from ~5% to10%

Non-regulatory market

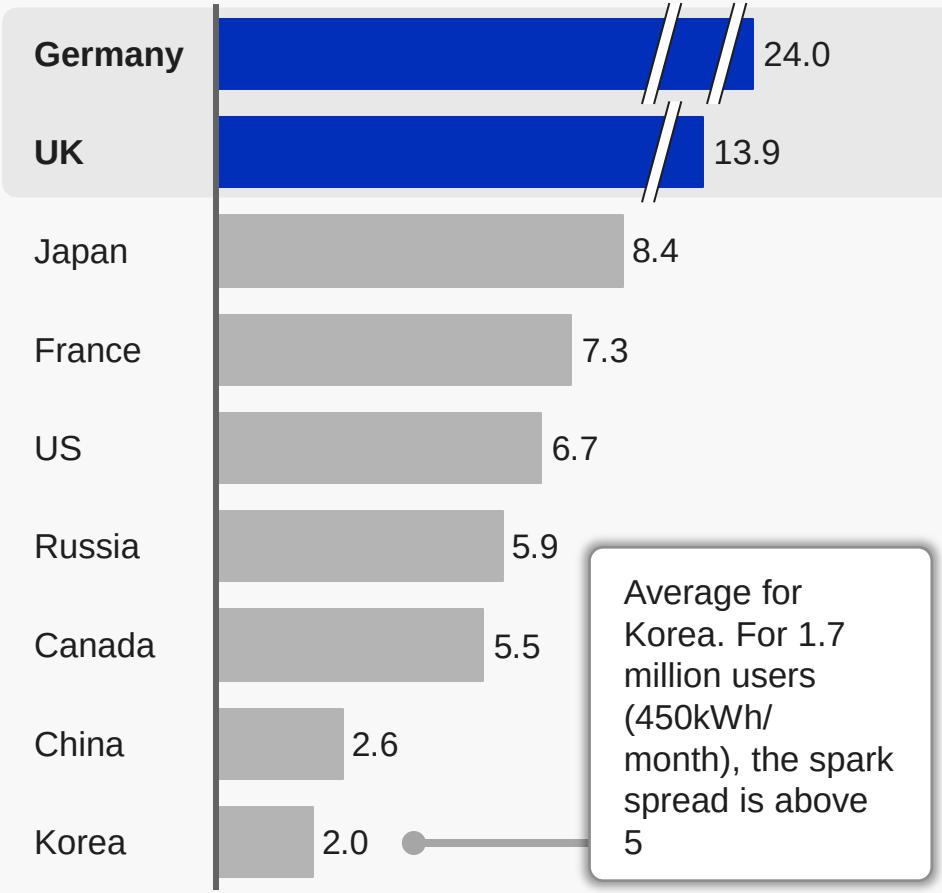
- As fuel cell prices drop, households with high energy usage[2] (e.g., high-rise multipurpose buildings) are likely to increase fuel cell adoption (8.5 thousand households expected to use fuel cells)

1 Based on 'Mandatory use in public buildings', 'Support projects to households/building', and 'City of Seoul – Design standards for Green Buildings'
2 Based on households with average power usage of over 450kWh per month, and average power usage in Korea at 300~350kWh

SOURCE: Fuji Economic Research Institute in Japan, Navigant Report, Seoul Metropolitan Government

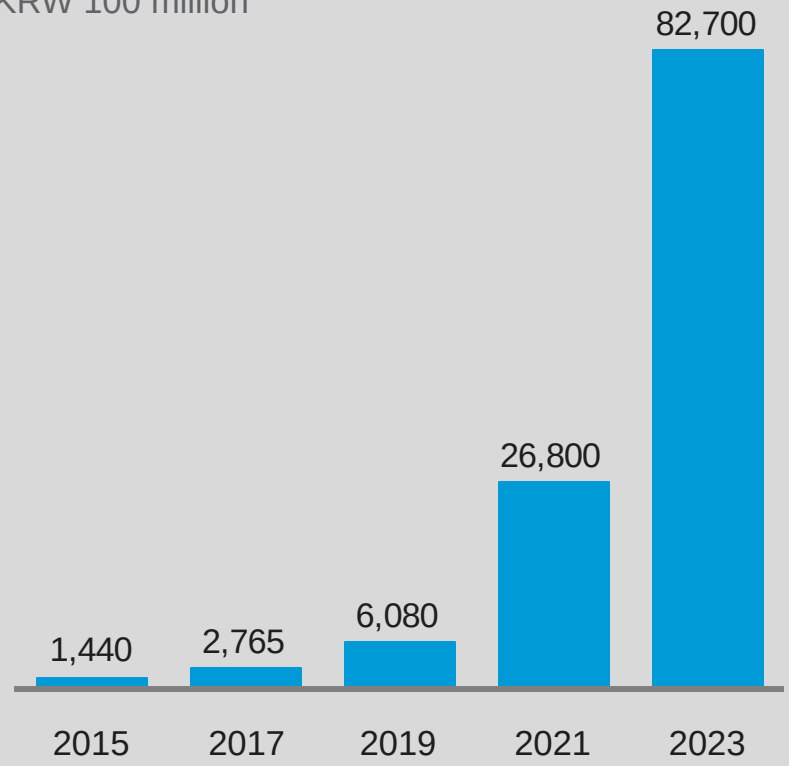
2 Residential application in overseas markets such as Western Europe and Japan where spark spreads are high

Spark spread[1] of major countries
Cent/kWh, 2013



Residential application in Germany and UK is estimated to reach KRW 8 trillion by 2023

Germany/UK market size projection
KRW 100 million



1 Spark spread is the gap between the retail gas price required for producing a certain amount of electricity and the retail price of electricity usage for the same amount of electricity

SOURCE: Fuji Economic Research Institute in Japan, Navigant Report, statistical office of each country

3 Only seven players own core fuel cell technologies for building, regulatory and residential applications

Key fuel cell players

Buildings/ regulatory

Residential

Transportation

Mobile

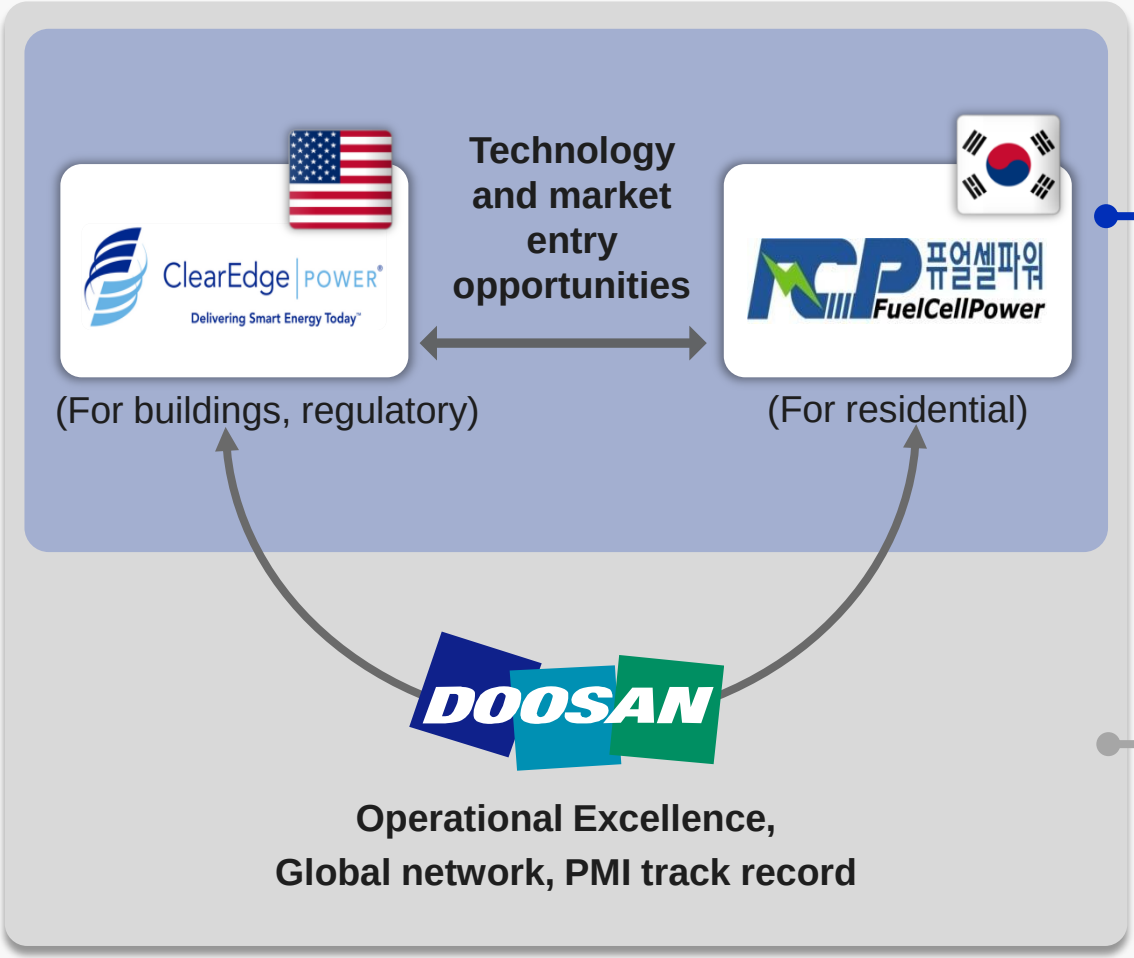
Technology type		Revenue KRW 100 mil, 2013	Business operations
CEP	PAFC	700	’66~
Fuelcell Energy	MCFC	2,000	’69~
Bloom Energy	SOFC	2,000	’01~
FCP	PEMFC	200	’01~
Toshiba	PEMFC	2,000	’01~
Panasonic	PEMFC	2,500	’99~
Altergy	PEMFC	300	’01~
Plug Power	PEMFC	400	’08~
Hydrogenics	PEMFC	350	’01~
Ballard	PEMFC	600	’83~
Horizon FC	PEMFC	100	’04~

Past failures of Korean companies to commercialize fuel cells

- Company A: After 10 years of effort, decided to invest in FuelCell Energy
- Company B: Pursued co-development with overseas company, now in suspension
- Company C: Suspended commercialization of its own small PEMFC technology

SOURCE: Fuji Economic Research Institute in Japan, Navigant Report, website of each company, literature search

4 Doosan Corp will become a global leader in fuel cells through CEP and FCP



- Maximize synergies by pursuing acquisition and merge of two companies with complementary strengths in products, regions and value chain
  - CEP can expand into Korean domestic market through FCP's sales network
  - FCP can reduce cost and improve quality beyond its current production scale limitations and secure residential sales network in the US through CEP

- Use Doosan Corp's existing capabilities such as operational excellence and global network to expand to key growth markets

5 Doosan Corp will inject capabilities to grow CEP and FCP into a global leader

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Operational Excellence

Expertise and capabilities built across a wide range of industrial manufacturing sectors

Cross-border PMI expertise

A leading Korean company with a series of successful cross-border M&A and PMI experiences

- Deep experience in capturing synergies (product line-up, regional sales)
- Example: Acquisition and integration of Bobcat by Doosan Infracore

Global network

Operating in 38 countries around the world with sales & marketing capabilities in both Korea and global markets

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Key highlights

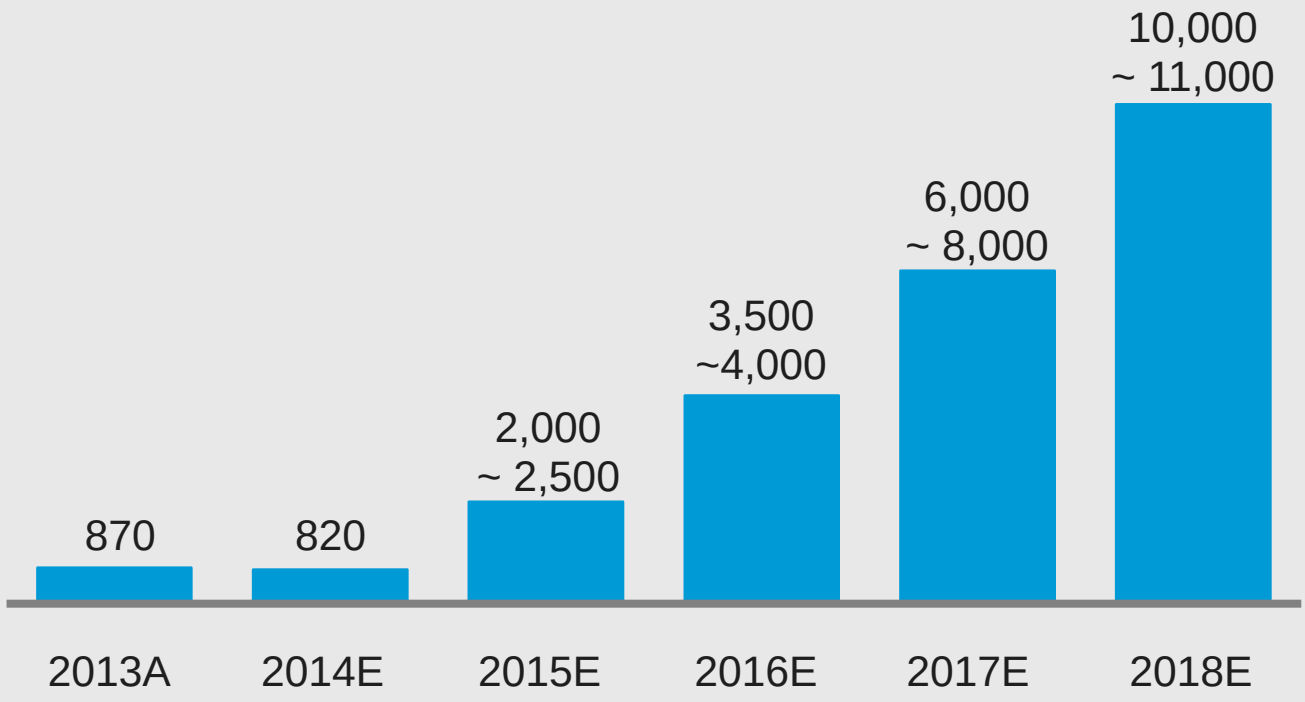
1. Doosan fuel cell business is expected to generate KRW 1 trillion revenue in 2018

2. Doosan Corp aspires to achieve and maintain global #1 position in the global building, regulatory and residential applications

1 Doosan fuel cell business is expected to generate KRW 1 trillion revenue in 2018

Projected Doosan fuel cell business revenues

KRW hundred million, %



- **By 2018, the building/regulatory and residential applications are estimated to reach KRW 5.1 trillion**
- **These projections are reasonable given only three players owns related technologies**

4 Doosan Corp aspires to achieve and maintain global #1 position in the global building, regulatory and residential applications

	'14~ Secure Korea as a platform market	'19~ Expand into global market	'23~ Become global #1 fuel cell player
	• **Become #1 in domestic fuel cell market through FCP/CEP acquisition**	• **Strengthen global position by building cost competitiveness**	• **Expand markets by improving technologies and diversifying product lines**
Regulatory	• Complete production infrastructure by actively addressing domestic regulatory market and reducing costs	• Make full entry to overseas regulatory market starting from the US opportunity	• Improve product competitiveness by making products smaller and more efficient • Expand markets by acquiring next-generation fuel cell technologies, offering various applications, and various sizes/capacities, etc.
Buildings	• Prepare to leap into global building market by entering US building market	• Lead the growth of global fuel cell market for buildings by continuous cost competitiveness	
Residential	• Drive domestic residential market growth by building scale-up production system in Korea	• Enter overseas market including Western Europe and the U.S. by attaining cost competitiveness	

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