Solutions for Demand Response Energy Storage

May 2018

ABOUT US

Gridwiz

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Mission

We REDEFINE your energy

Gridwiz provides a suite of smart grid solutions powered by big data, ultimately optimizing energy production, transmission, and use. Our services includes;

- Demand response solution
- Energy storage solution
- Renewable management solution
- Energy efficiency solution
- EV charging solution

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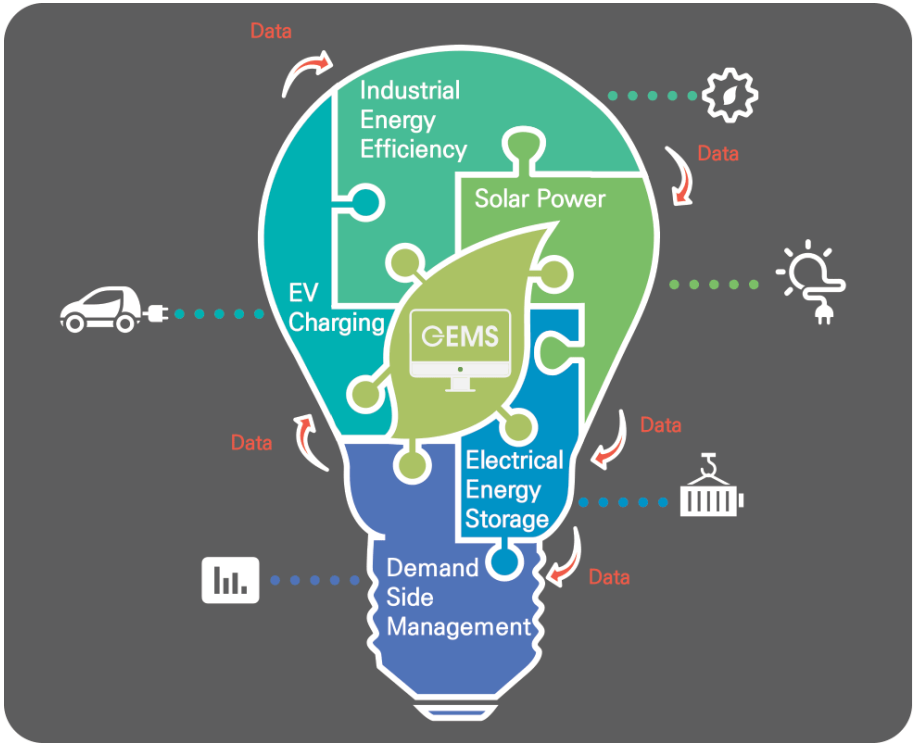
Mission

Transforming the way electricity is supplied and consume **through DATA DRIVE DECISION** from DER recourses



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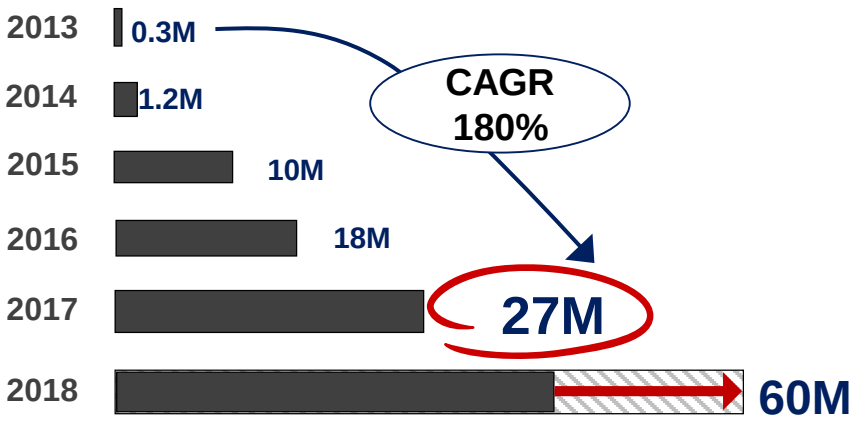
GRIDWIZ today

Founded **2013**

Headquarter **Korea**

Sales **27M USD**

Employees **70+**



Assets **20.5M USD**

Customers **400+**

As of April, 2018

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GRIDWIZ today

Demand Response

Aggregated DR Service
+ 220 GWh
+ 406 Customers

Energy Storage

Solutions provided for
70 MWh (2017)
1,000 MWh (2018)

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Market Share
80% (Korea)
30% (Global)

EV Charging Modem

Solar PV installed
1.2 MWh (2017)
10 MWh (2018)

Renewable

Energy Saving
1.5~3.0%
Cost Saving*
$850,000

Energy Efficiency

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DEMAND RESPONSE

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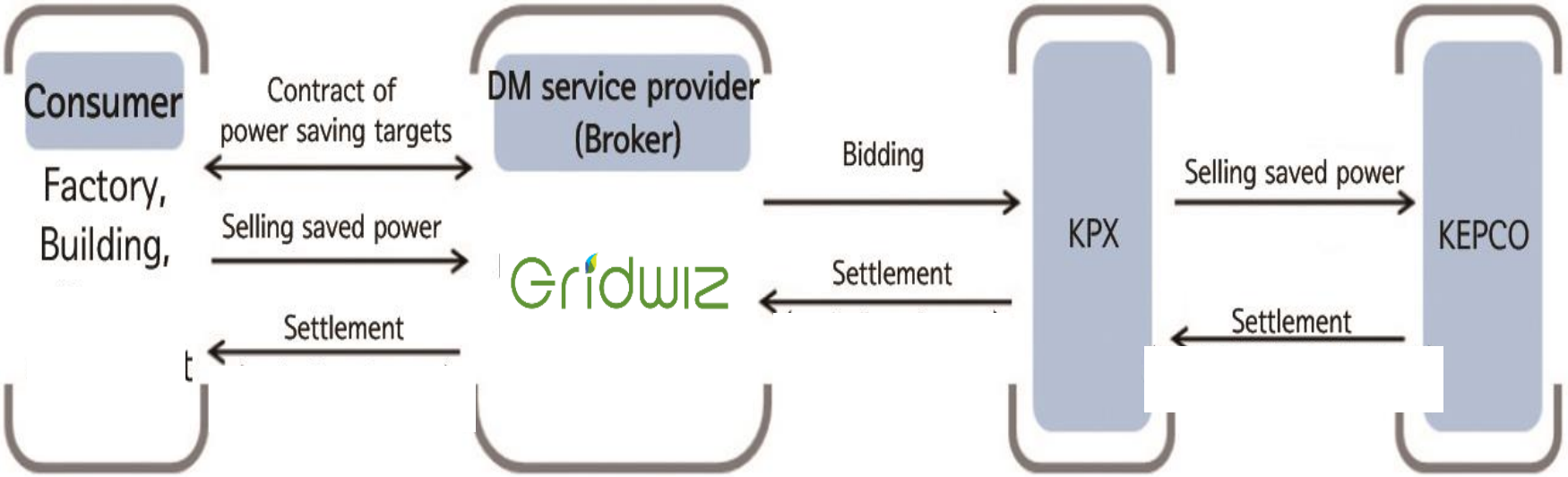
Demand Response Policy

In April 2014, government allows demand response resources to participate in wholesale capacity market



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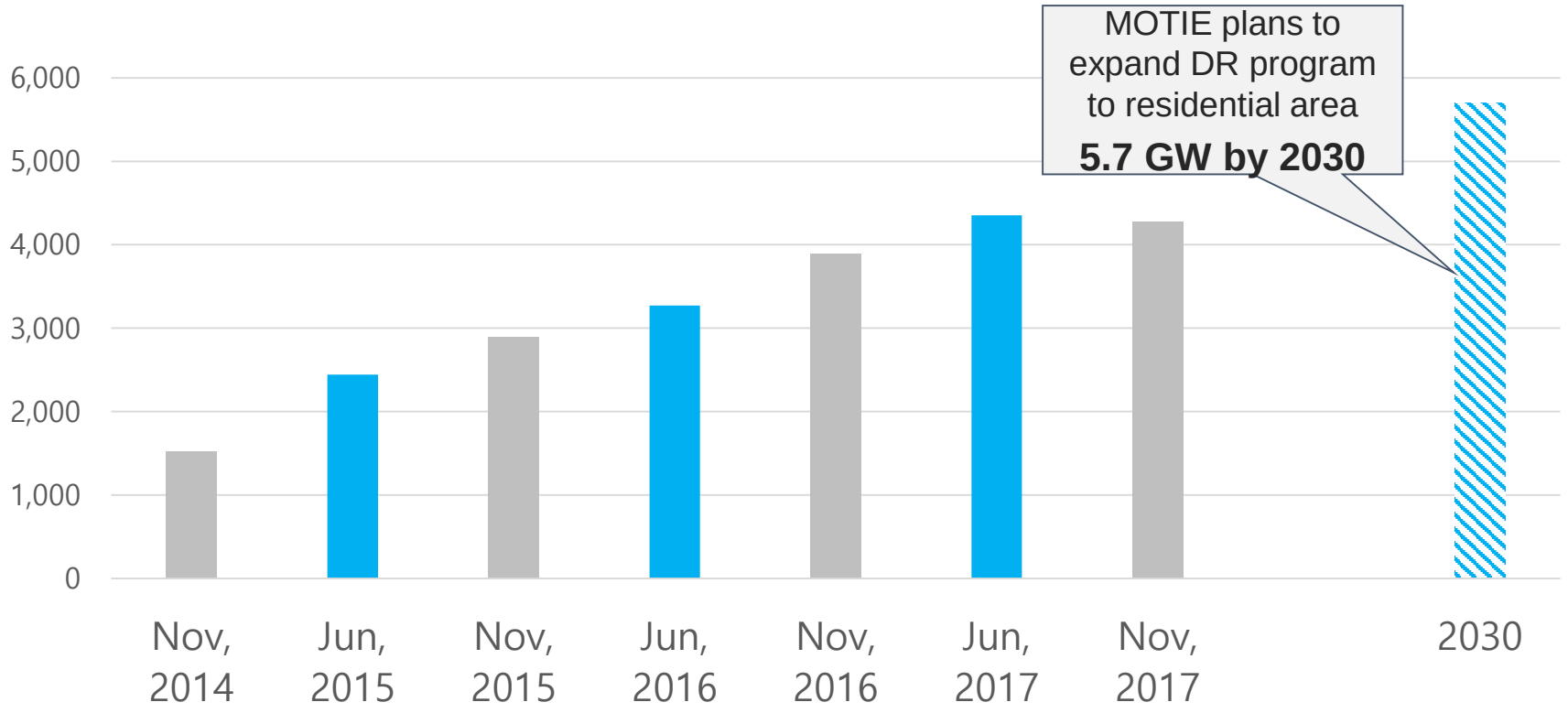
Demand Response Market

Since 2014, the DR consumers has increased by 4.2 times and the capacity has reached 4.3GW (Equivalent of Four 1MW nuclear plants)



Source: KPX & MOTIE, The 8th Basic Plan of Long-Term Electricity Supply and Demand (2017-2031)

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Our Solution

GEMS

enables a DR aggregator to manage all aspects of their DR programs through an integrated system

- designed to be compatible with other utility systems by using open standard, **OpenADR**
- collects a real time data from **THYME**, smart meter, providing a reliable measurement of energy consumption on 1 min-interval

TRACK RECORDS

220 GWh
Aggregated DR service provided

400+ Customers

#1 DR resource utilization rate in Korea

* GEMS : Gridwiz Energy Management System

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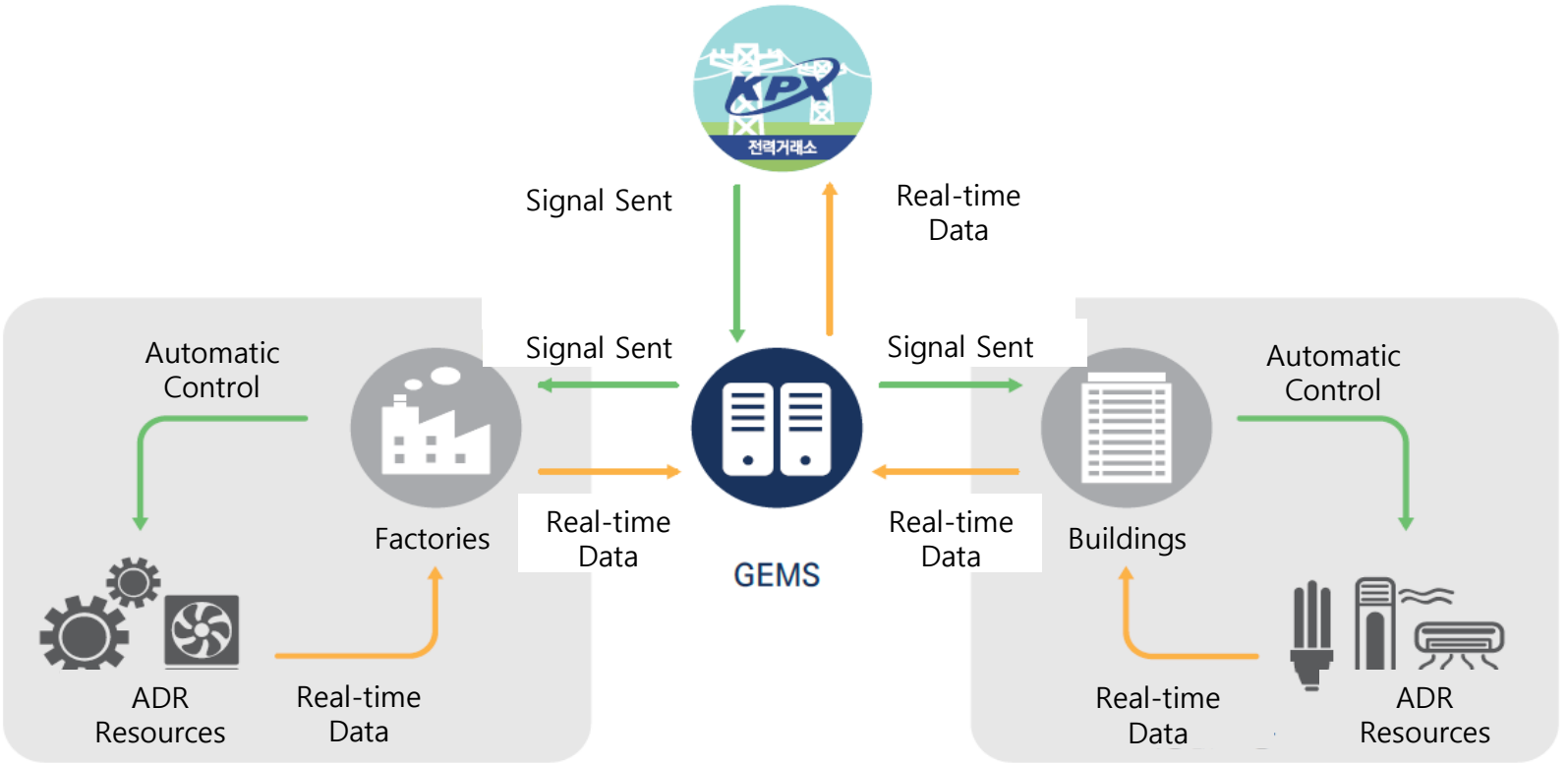
Our Solution

GEMS



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Our Solution

Open ADR

- GEMS is designed to be compatible with other utility systems by using open standard, OpenADR (Open Automated Demand Response)
- **OpenADR**
  - standardized DR interface
  - allows electricity providers to communicate DR signals directly to existing customers using a common language and existing communications

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ENERGY STORAGE

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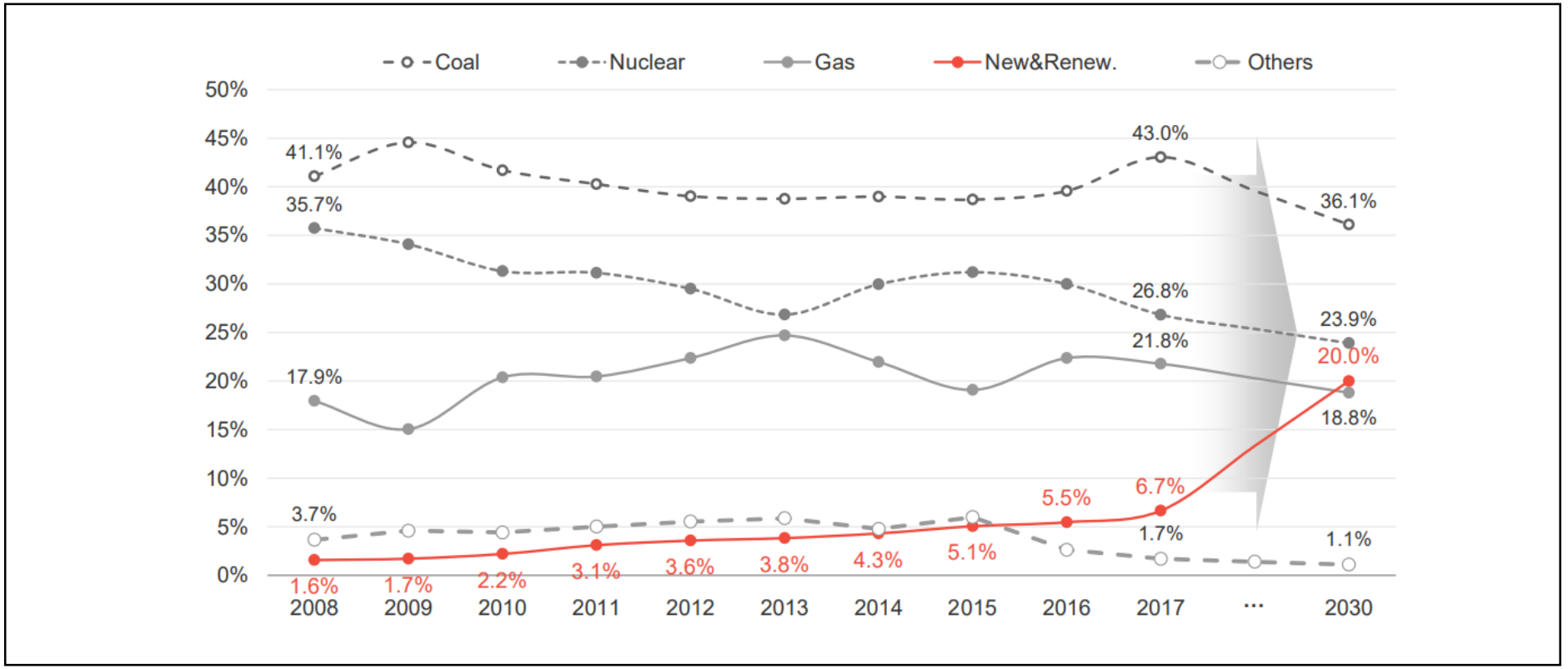
RE Market

‘Renewable Energy 3020 has put ambitious target to increase RE share to 20% by 2030

Korea’s Generation Mix



Source: EY(2018), Korea’s Energy Landscape

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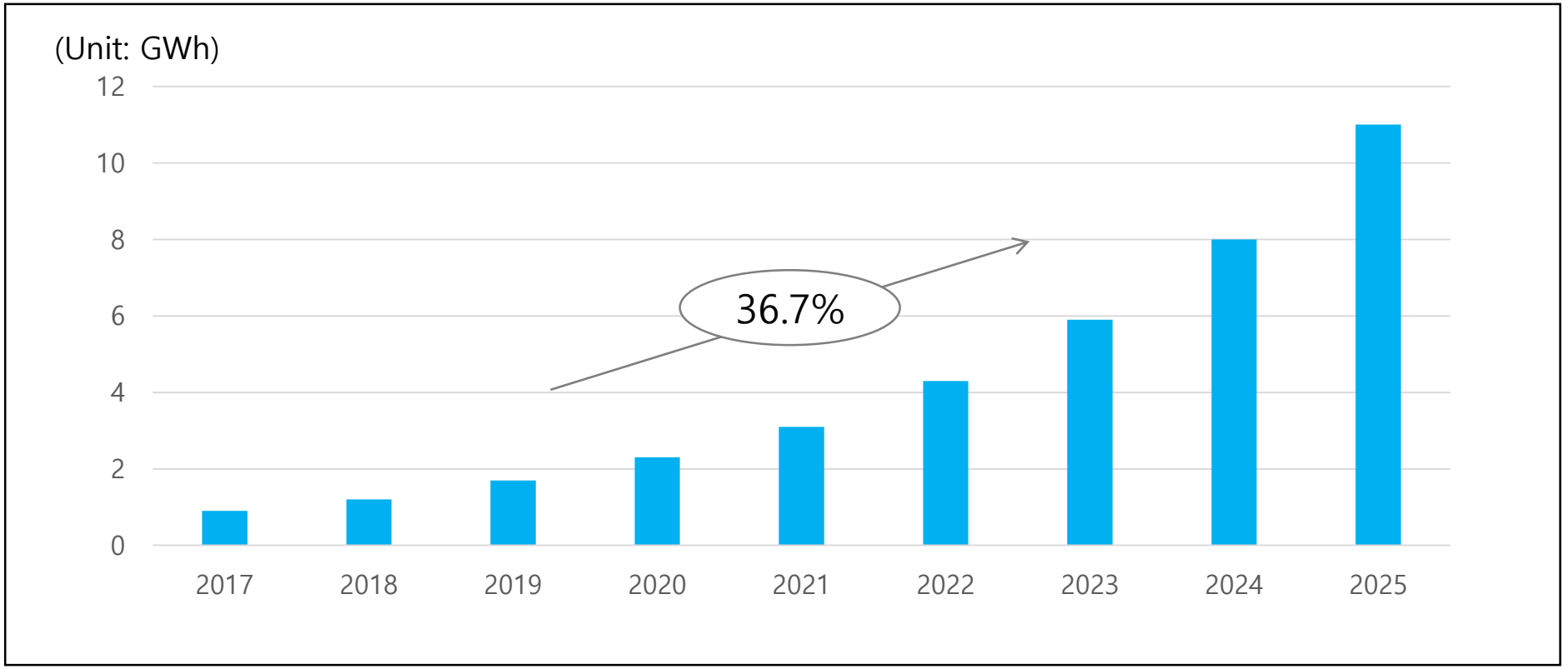
Energy Storage Market

Energy storage capacity in Korea will reach up to 11 Gwh by 2025

Energy Storage Market in Korea



Source: E2 news, Samsung SDI

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RE & Energy Storage Policy

REC weight is set to provide strong incentive for renewable and energy storage

REC weigh for solar PV

Installation type	Details	REC weights
Install on general site	Under 100kW	1.2
	100kW~ under 3,000kW	1.0
	Over 3,000kW	0.7
Install in existing facility	Under 3,000kW	1.5
	3,000kW and over	1.0
Floating system installed on water		1.5
On-site generation connected to grid		1.0
Solar + ESS	Effective in '16&'17	5.0

Korea's Generation Mix

Installation type	Details	REC weights
IGCC, By-product gas		1.2
Waste, Land fill gas		0.5
Hydro, On-shore wind, RDF, Waste Gasification, Marine tidal, on-site generation connected to grid		1.0
Wood biomass, Off-shore wind (~5km of connection distance), Hydrothermal		1.5
Fuel cell, Ocean energy		2.0
Off-shore wind(over 5km of connection distance), Geothermal, Marine tidal	Fixed	2.0
	variable	1.0-2.5
Wind+ESS	'15	5.5
	'16	5.0
	'17	4.5

Source: EY(2018), Korea's Energy Landscape

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Our Solution

PMS*

manages the daily operations of charge/discharge patterns, determining the most economic operations for market conditions (up to 64 operation algorithms)

EMS*

provides real-time data reporting and alerts if projects are tracking to projected metrics, of if any technical issues need to be addressed

SIMULATOR

provides virtual simulation of energy storage project providing data for system selection, operation analysis, and financial projection

TRACK RECORDS

#1 Energy Storage Solution Provider in Korea

70 MWh (2017)

1,000 MWh (2018)

# of battery modules managed

9,292 (2017)

100,000+ (2018)

* PMS : Power Management System
* EMS : Energy Management System

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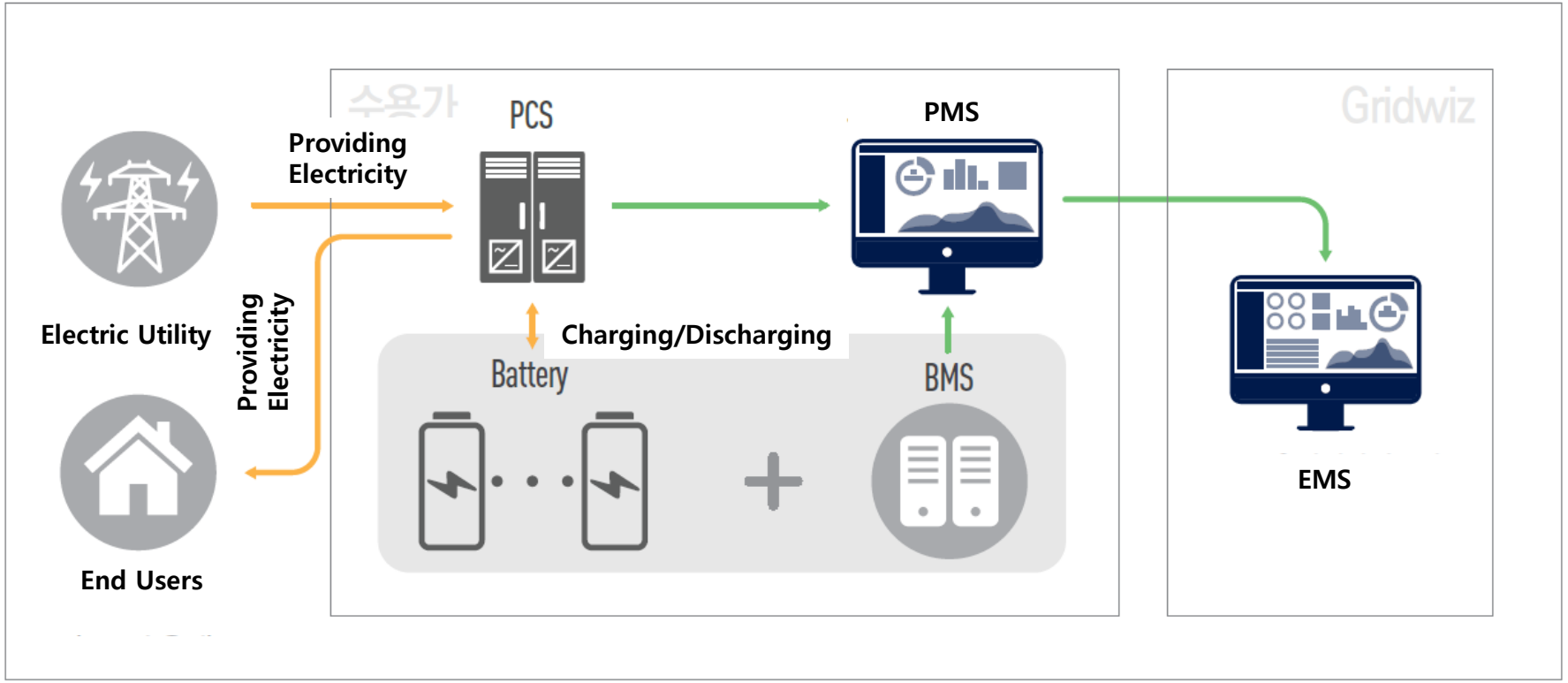
Our Solution

Energy Storage Solution



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Our Solution

Energy Storage Solution

PMS (Power Management System)

EMS (Energy Management System)

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REFERENCES

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Energy Storage Solution, Demand Response Solution

Client

- Polyester fibers and other petrochemical products producing company
- Consumes 184,100 MWh/year
- Max demand is 25MW/year

Solutions

- **EPC service** for;
  - Battery : 25.9 MWh
  - PCS : 6.5 MW
  - Container (40ft) : 6 Battery rooms, 2 PCS room
- **EMS & PMS and O&M service** for 15 years
- **DR reduction**;
  - Customer facility reduction : 8.2 MW
  - Utilizing energy storage : 2.2 MW

Key Benefits

- Average Cost savings of close to US $1.4M a year for 15years

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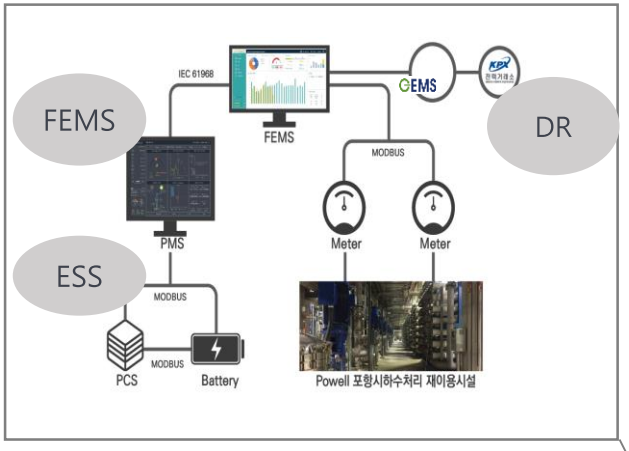
Selected References (2/2)

Energy Storage System
Demand Response Solution
FEMS*



* FEMS: Factory Energy Management System

Client

- Water Management Facility(a filtration plant, a waste water-disposal plant)
- Consumes 38,827 MWh/year
- Max demand is 5.7 MW/year

Solutions

- **EPC service** for;
  - Battery : 1.7 MWh
  - PCS : 250 kW
- **EMS & PMS and O&M service** for 24 years
  - Optimized operation of Demand Response
  - Real-time analysis of ESS operation
  - Emergency management of ESS operation

* Operation hours : 7,200 hours/year
* Operation days : 300 days/year

Key Benefits

- Cost savings up to US $200,000 a year
- Up to 200kW peak reducing

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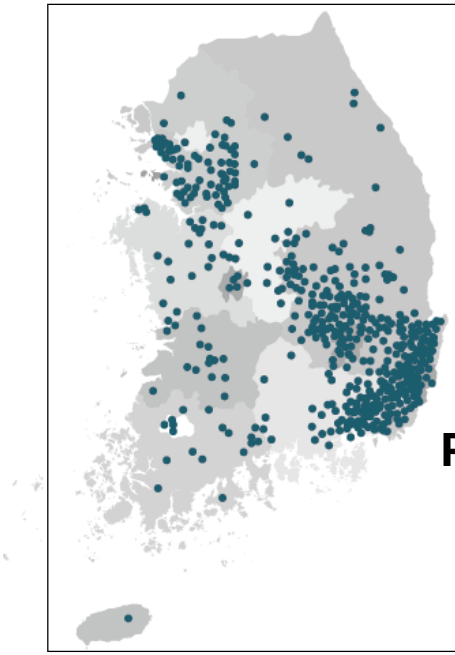
Customers - Korea (1/2)

Total Customers in Korea



“ +400 customer

From Industrial Sector

10+ included in Fortune’s 500*

SAMSUNG ELECTRONICS
LG Innotek
GM KOREA
LS Metal
Hanwha
TOTAL
HYUNDAI
posco
VOLVO
SK chemicals
SK energy
SAMSUNG HEAVY INDUSTRIES
HANKOOK driving emotion
CORNING
DAELIM
MOORIM

* Fortune’s 500 in 2017

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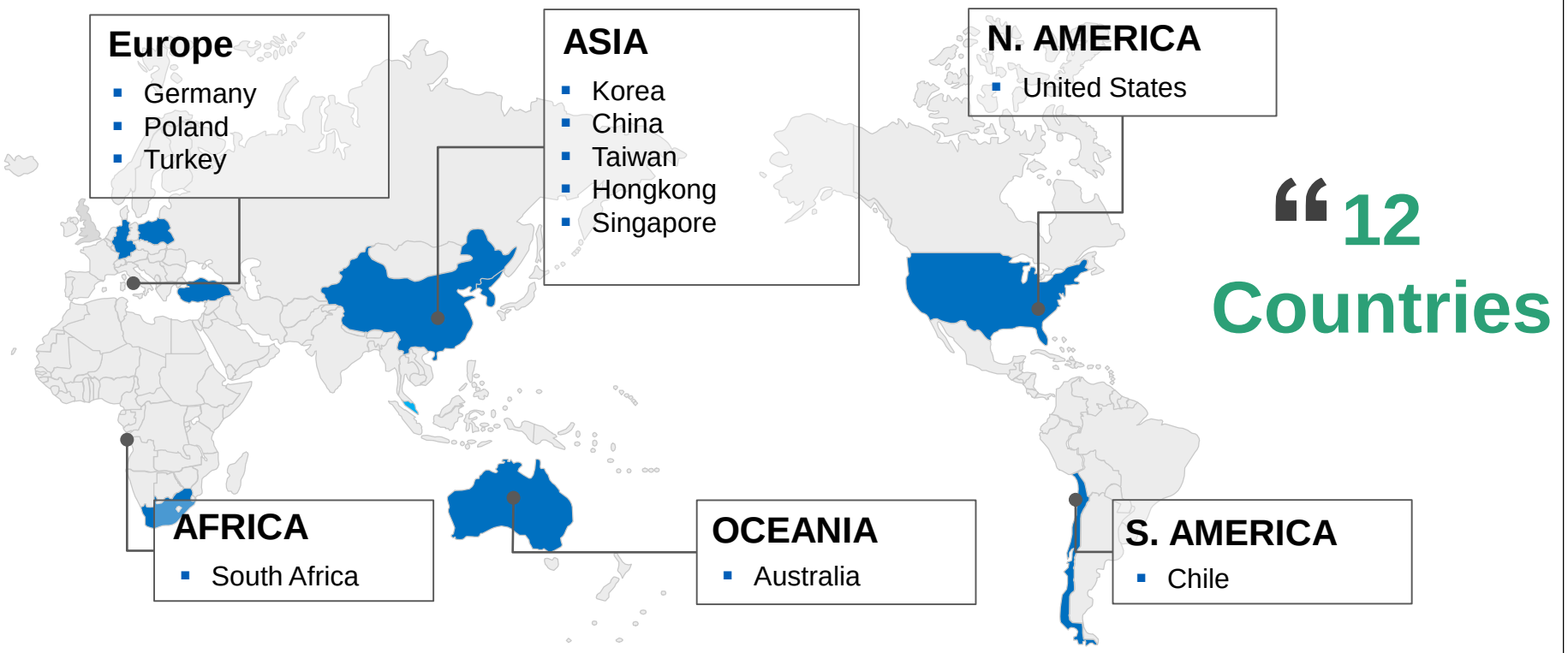
Customers - Global (2/2)

GRIDWIZ's Global Customer Presence



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Contact Us

Rayeon Park
Strategic Planning Manager
rayeonpark@gridwiz.com
+82-10-4127-8333

www.gridwiz.com