

Korea ESS Market & its Future

(Energy Storage System)

Sep. 2018



- **Why do we need “Water Bottle or Storage” ???**
- **Store Energy(Electricity) to use when it is required !!!**



Water Storage



Energy Storage

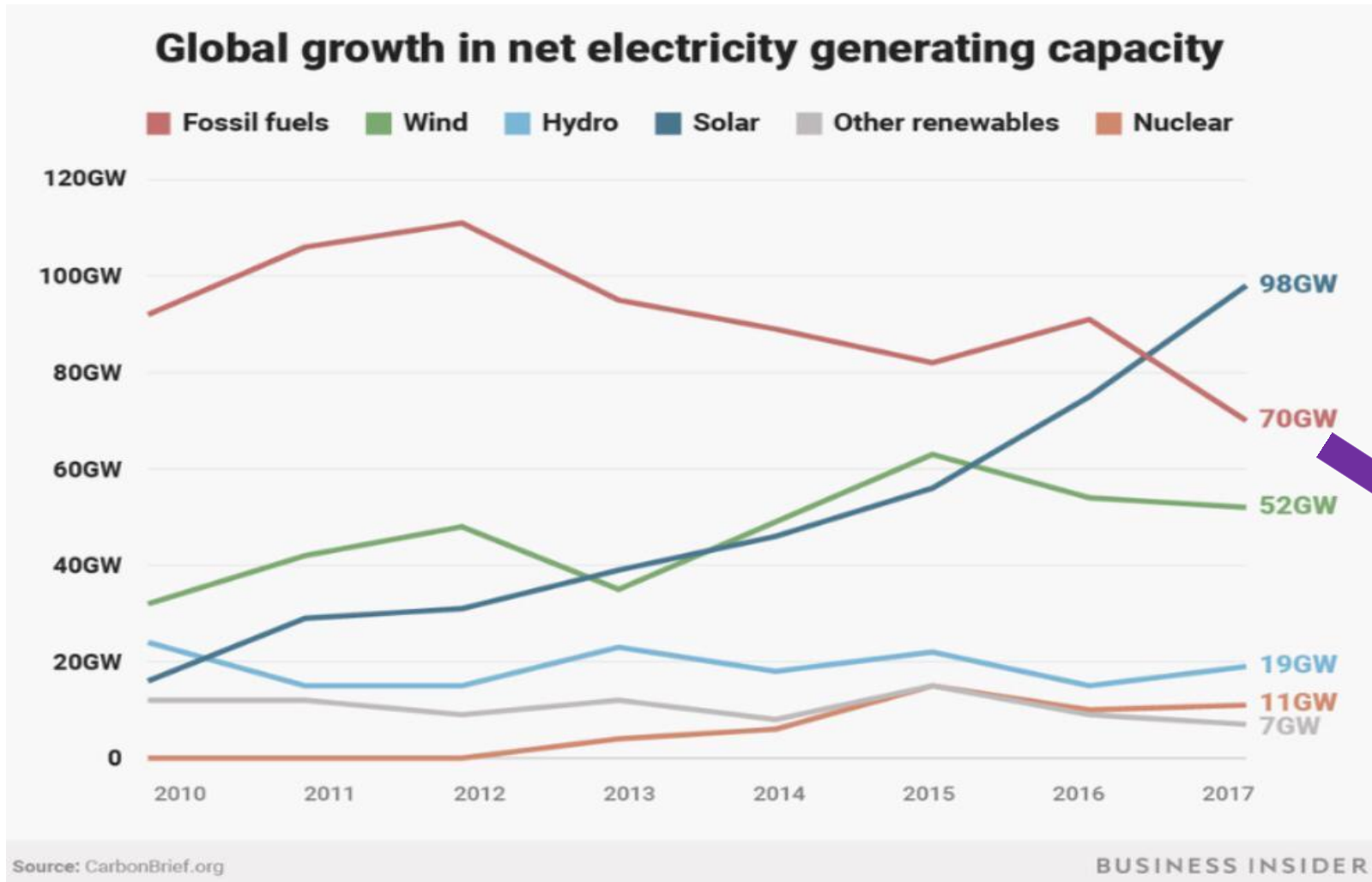
What Energy Storage will be in the FUTURE ?



“Holy Grail ”



- Time to say "Good Bye" to Fossil-based Generation !!!!

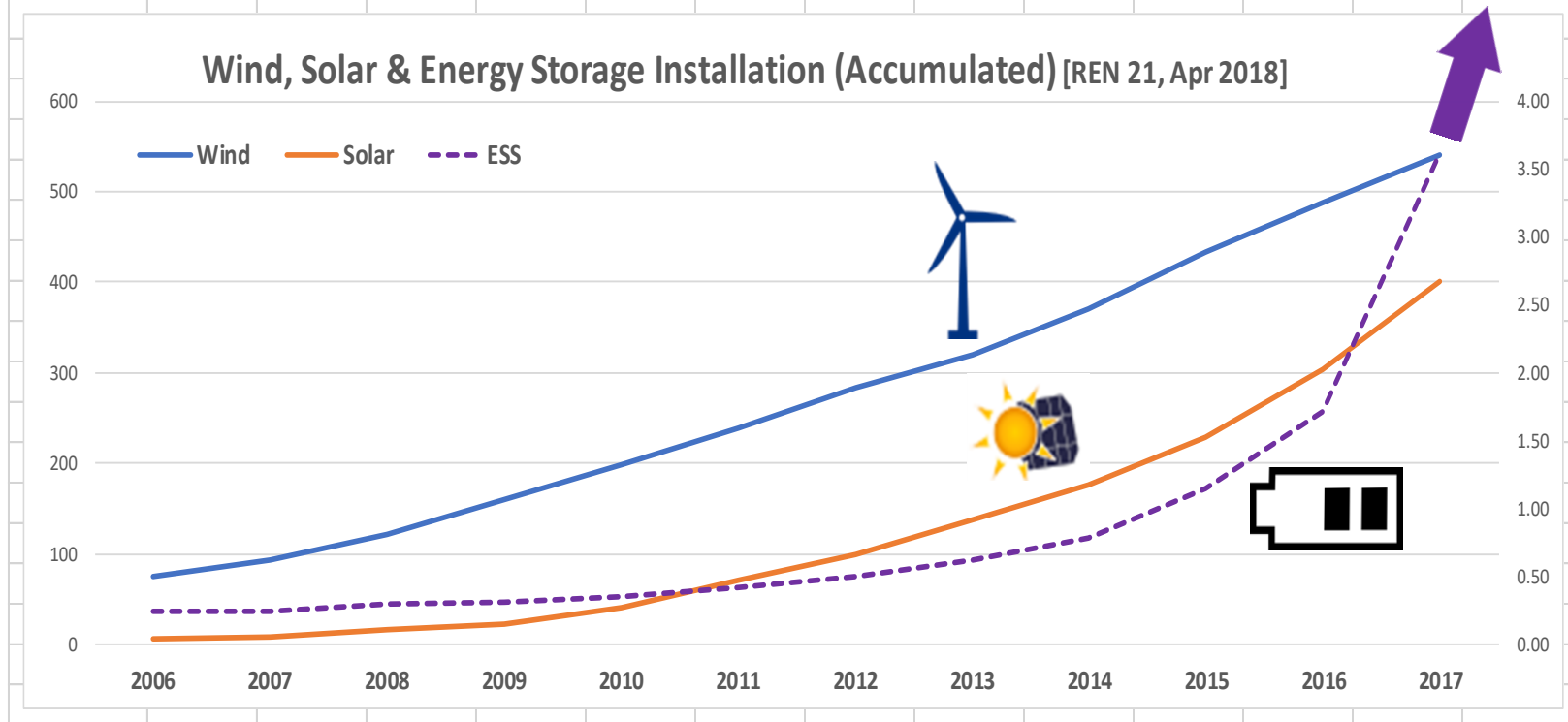


[Source : Carbon Brief]

- Energy Storage supports RE to be more installed as a solution of Green Energy & Distributed Energy Resources

Global Wind, Solar and Energy Storage Installation

	[Unit : GW]												
[GW]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	CAGR
Wind	74	94	121	159	198	238	283	319	370	433	487	540	18.0%
Solar	6	8	16	23	40	70	99	137	177	228	303	401	41.9%
ESS	0.25	0.25	0.29	0.31	0.35	0.42	0.50	0.62	0.79	1.15	1.72	3.62	25.2%



[Source : REN 21 & Destin Power]

- Energy Storage will be a essential component for Green World !!!

Grid Stabilization (Frequency Regulation)



Renewable Energy



Building/Factory Peak Cut



Microgrid/ Island/Rural Electrification

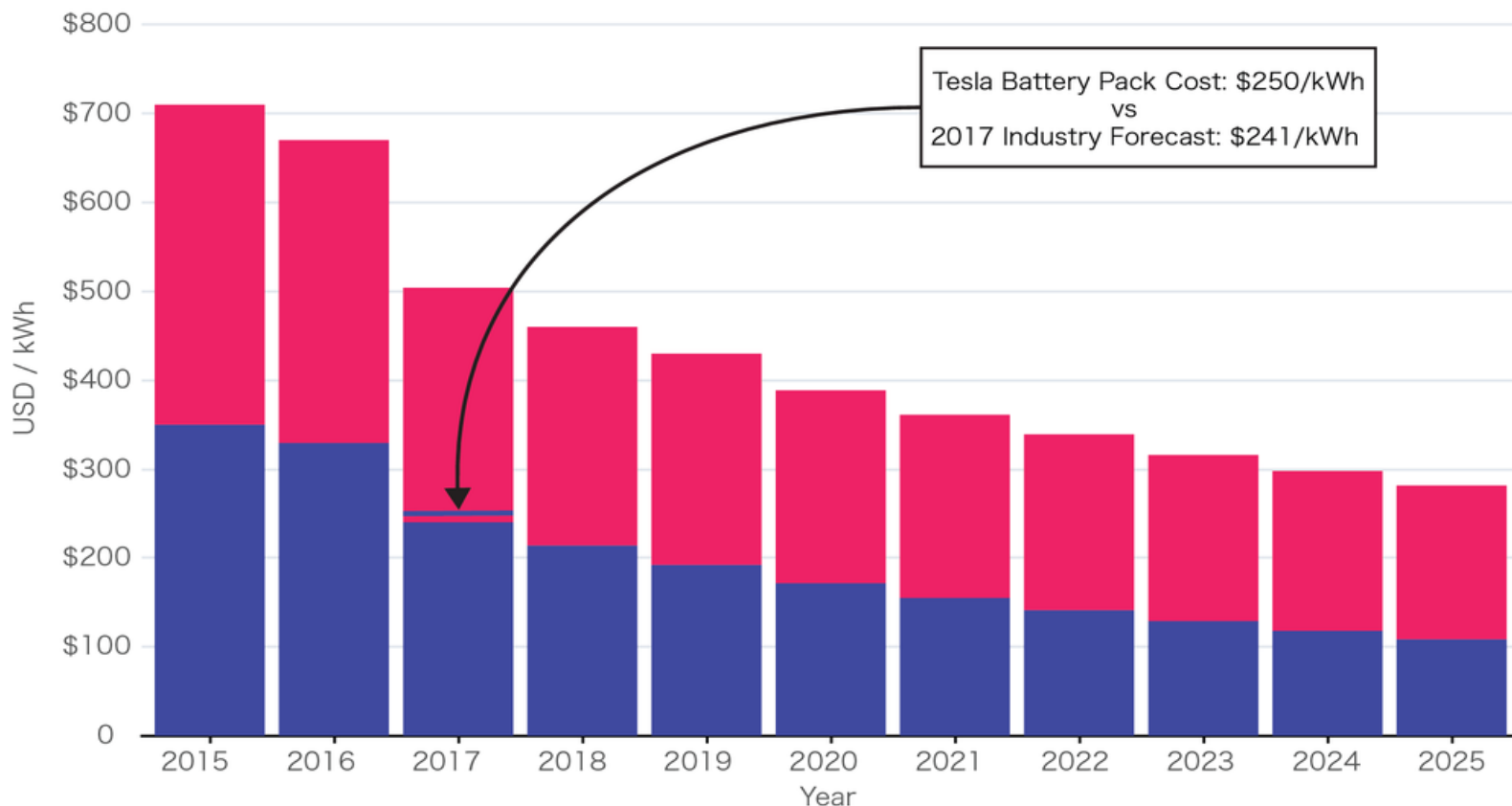


- Falling LIB Price derives more Market/Business Opportunities

Tumbling Price of Battery Storage

Tesla's Packs Are Cheap—But Not Exceptionally So

■ Battery Pack ■ Installation and Equipment Costs



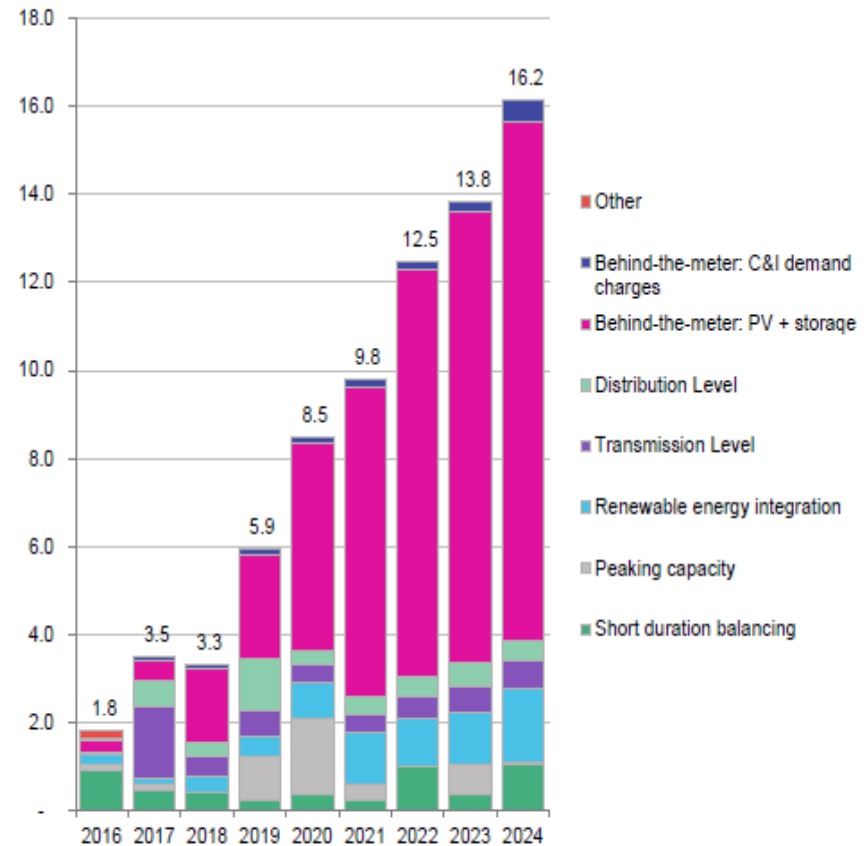
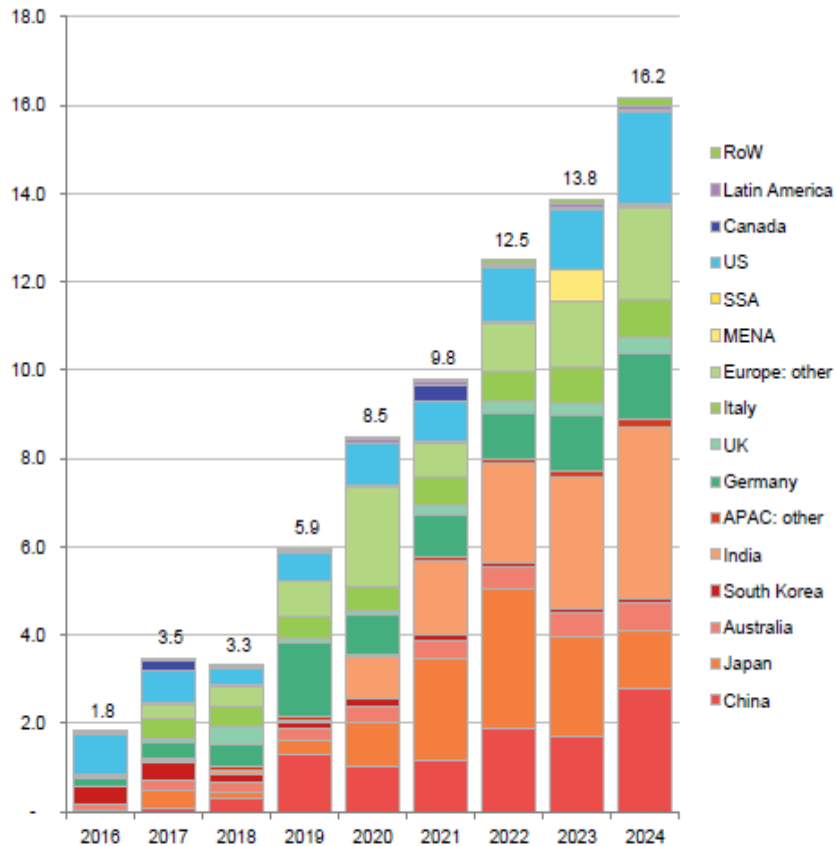
Tesla Battery Pack Cost: \$250/kWh
vs
2017 Industry Forecast: \$241/kWh

Sources: Bloomberg New Energy Finance, Tesla

NEW BUILD ENERGY STORAGE DEPLOYMENT BY GEOGRAPHY AND APPLICATION, 2016-24 (GWh)



- 3.5GWh/'17 (\$2.6Bn) → 8.5GWh/'20 (\$4.3Bn) → 16.2GWh/'24 (\$5.8Bn)

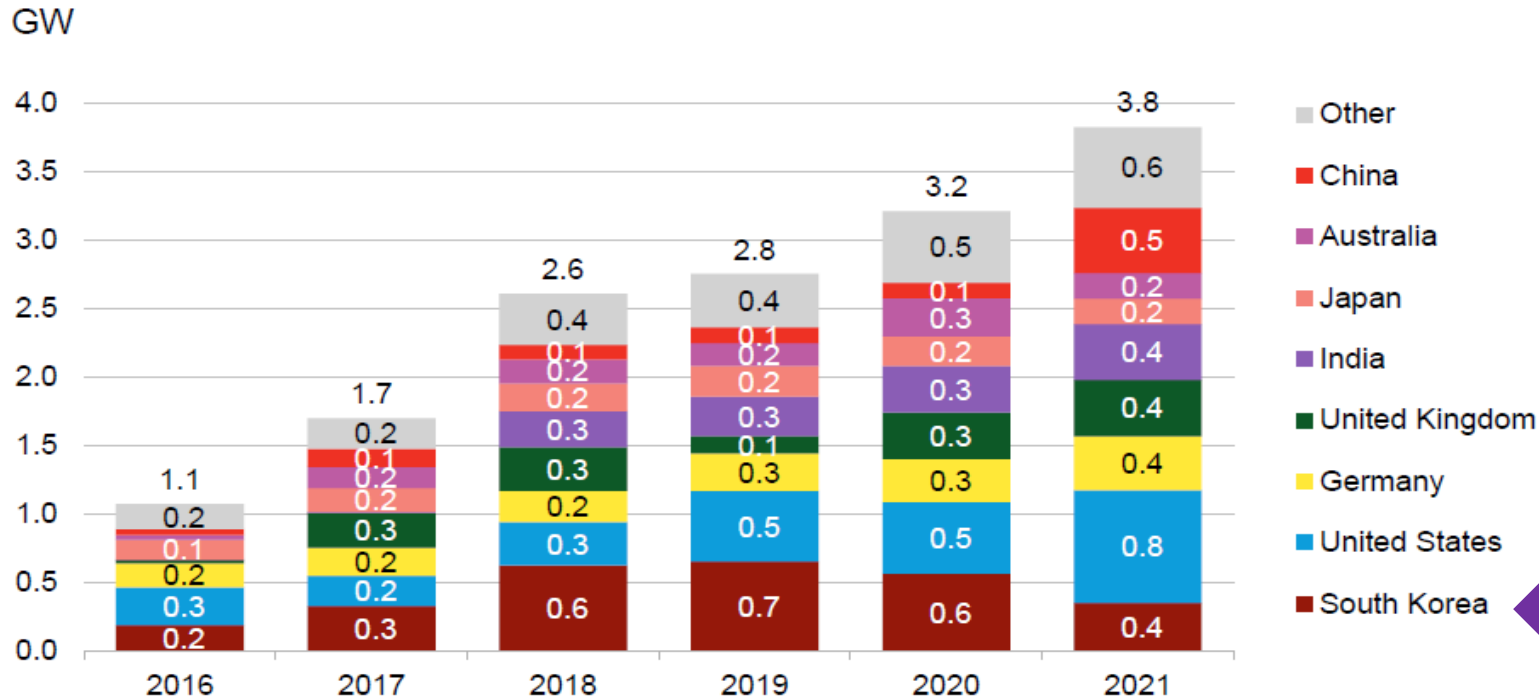


[Source : Bloomberg]

- Korea is leading Global ESS Market !!!!

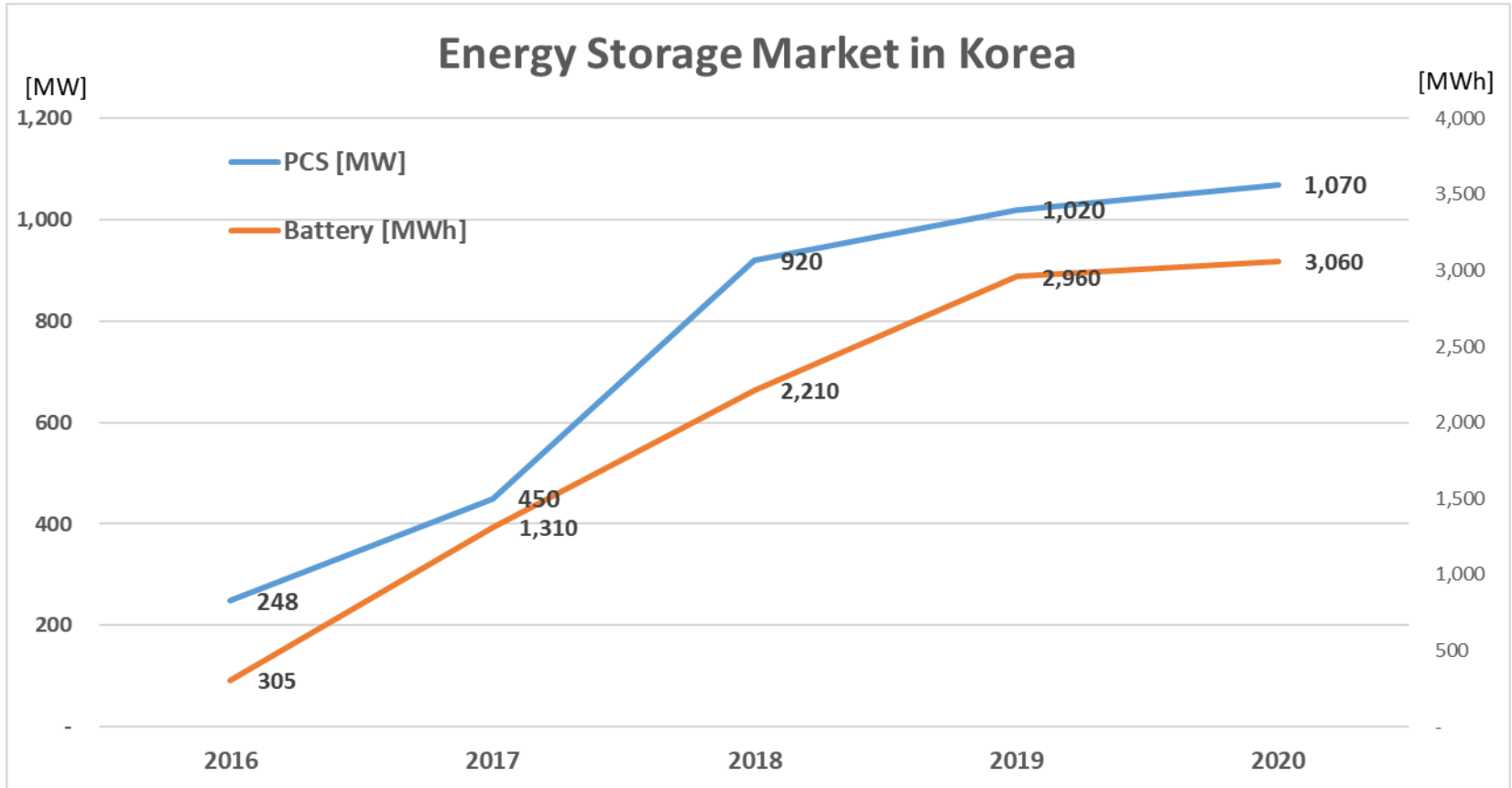
Near-term Outlook, 2016-21

Global annual storage deployments by country, based on power output



Source: Bloomberg New Energy Finance Note: Ordered in terms of cumulative deployments

[Source : Destin Power]



Market Drivers

KEPCO F/R ESS (376MW)

KEPCO Distribution ESS (204MW)

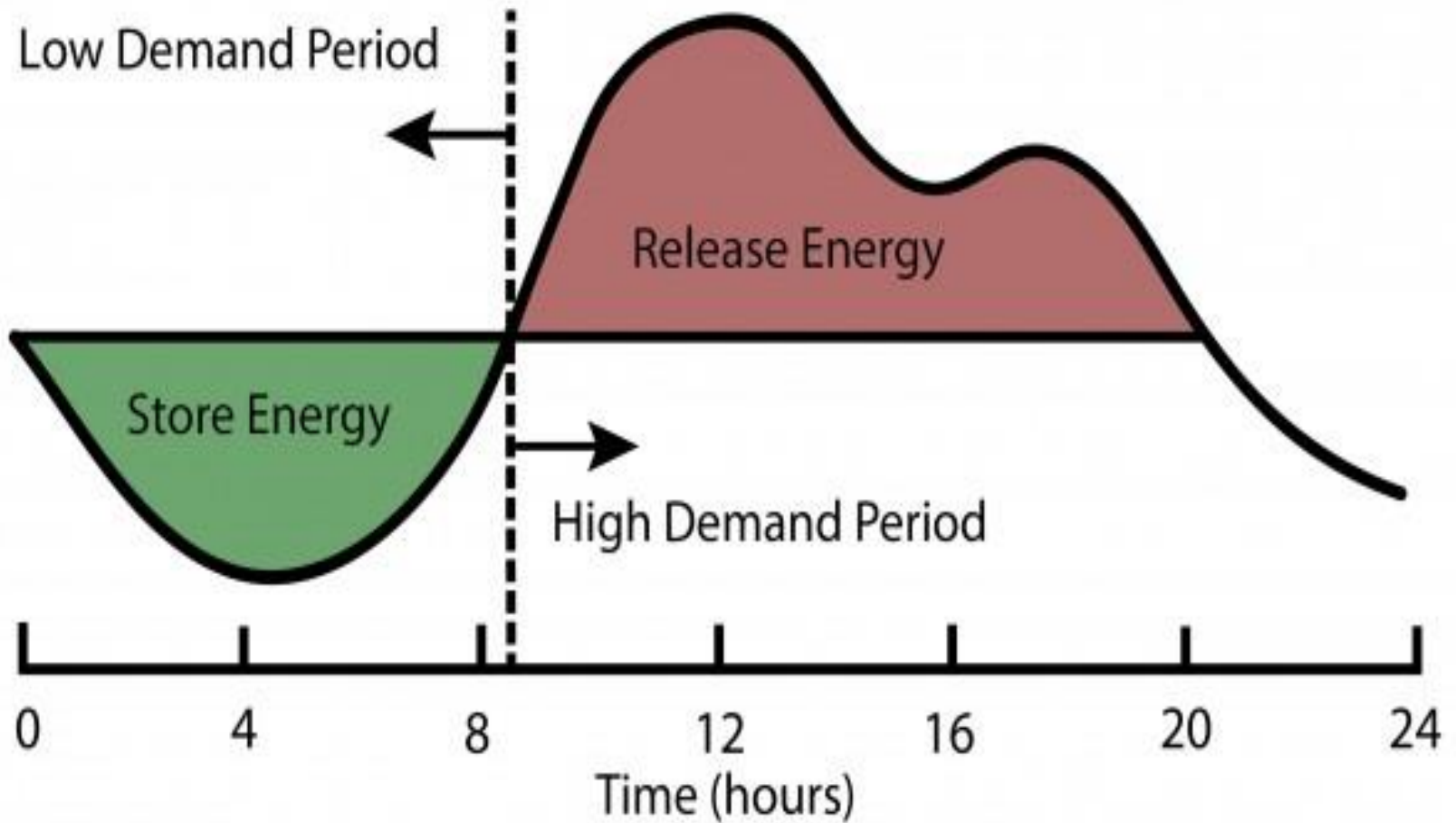
Public Building Mandate (5%)

Renewable Energy (Wind/PV) + ESS

Off-Peak Tariff Discount for ESS (KEPCO)

Emergency Back-up & Microgrid

- 50% discount on Off-peak Charging Electricity



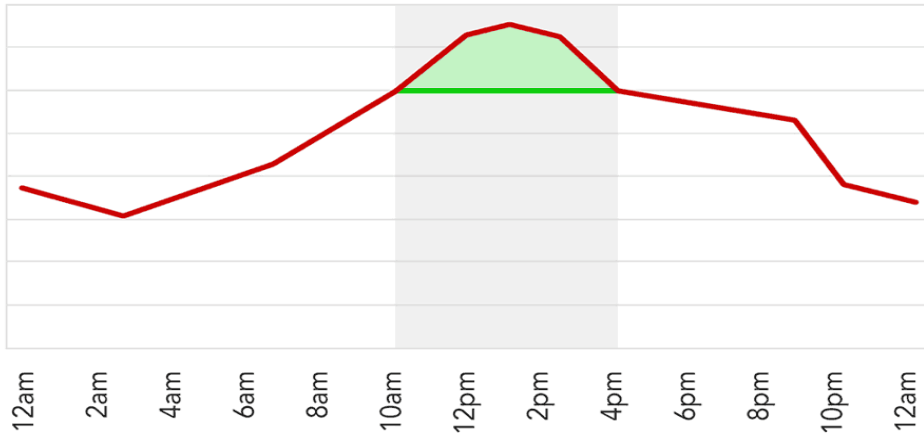


- End Customer : Korea Zinc Co
- ESS Size : 32.5MW / 150MWh
(PCS: Destin Power)
- COD : Jan 2018



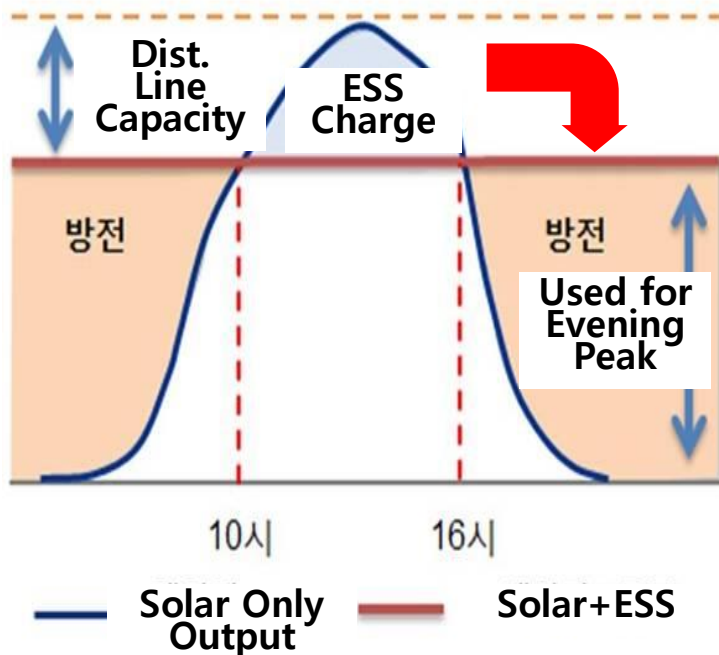
[Source : Hyundai Electric]

Electric Grid Demand Curve



- **Benefit of Time Shifting of PV+ESS**

- 1) More Solar Installation Available
- 2) Distribution Line Congestion Relief (Investment Deferral)
- 3) Less Fossil-powered Electricity for Evening Peak





- End Customer : GS E&R
- ESS Size : 16.8MW / 50.4MWh
(PCS: Destin Power)
- COD : Jan 2018

[Source : Destin Power]



- **Mandate for Government-owned Buildings to install ESS (5% of Peak Power)**
- **Office Buildings, Hospitals,**
- **Island Electrification Projects (24 Islands)**



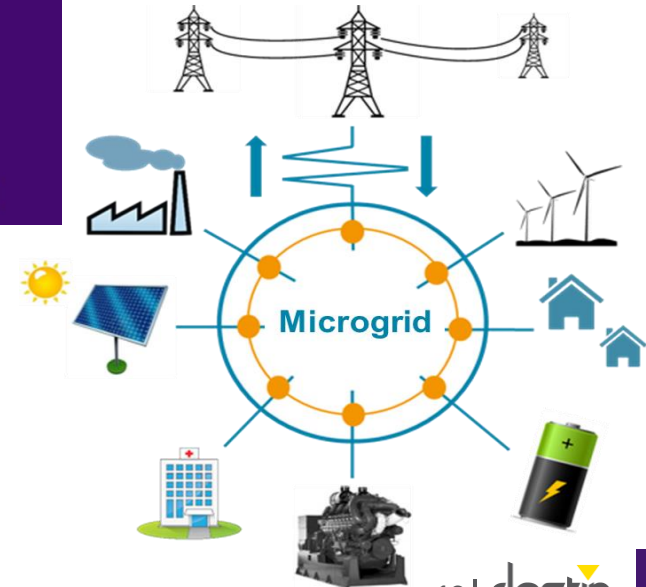
- **Continuous ESS Market Motivation will be available by**
 - 1. RE Target of 20% by 2030 (Current : 2%, OECD lowest)**
 - 2. Load Leveling Incentive by Dec. 2020**
 - 3. RE + ESS Incentive by 2020 or longer**
 - 4. New Applications**
 - 1) Emergency Backup Power
 - 2) Island Electrification (Jeju Island : Carbon Free Island by 2034)
 - 3) Mobile ESS
 - 4) Distribution Power Quality Support
 - 5) EV Infrastructure
 - 6) Others

- Energy Storage will be one of Key Components for Future Green World & Life !!!

Net Zero Energy House



Net Zero Energy Building



All-In-One Energy Storage



100kW/200kWh Outdoor



250kW/500kWh Outdoor
500kW/1,000kWh Outdoor



100kW/200kWh Indoor



1MW/2MWh Outdoor
2MW/4MWh Outdoor with
separated 2MW PCS

Contact Information

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SNS Network



The Facebook logo, consisting of the word "facebook" in a white, lowercase, sans-serif font, centered within a solid blue rectangular background.