

# The effect of Energy Storage System in electricity market and the Suggestions for ESS industry development

2016. 06. 28

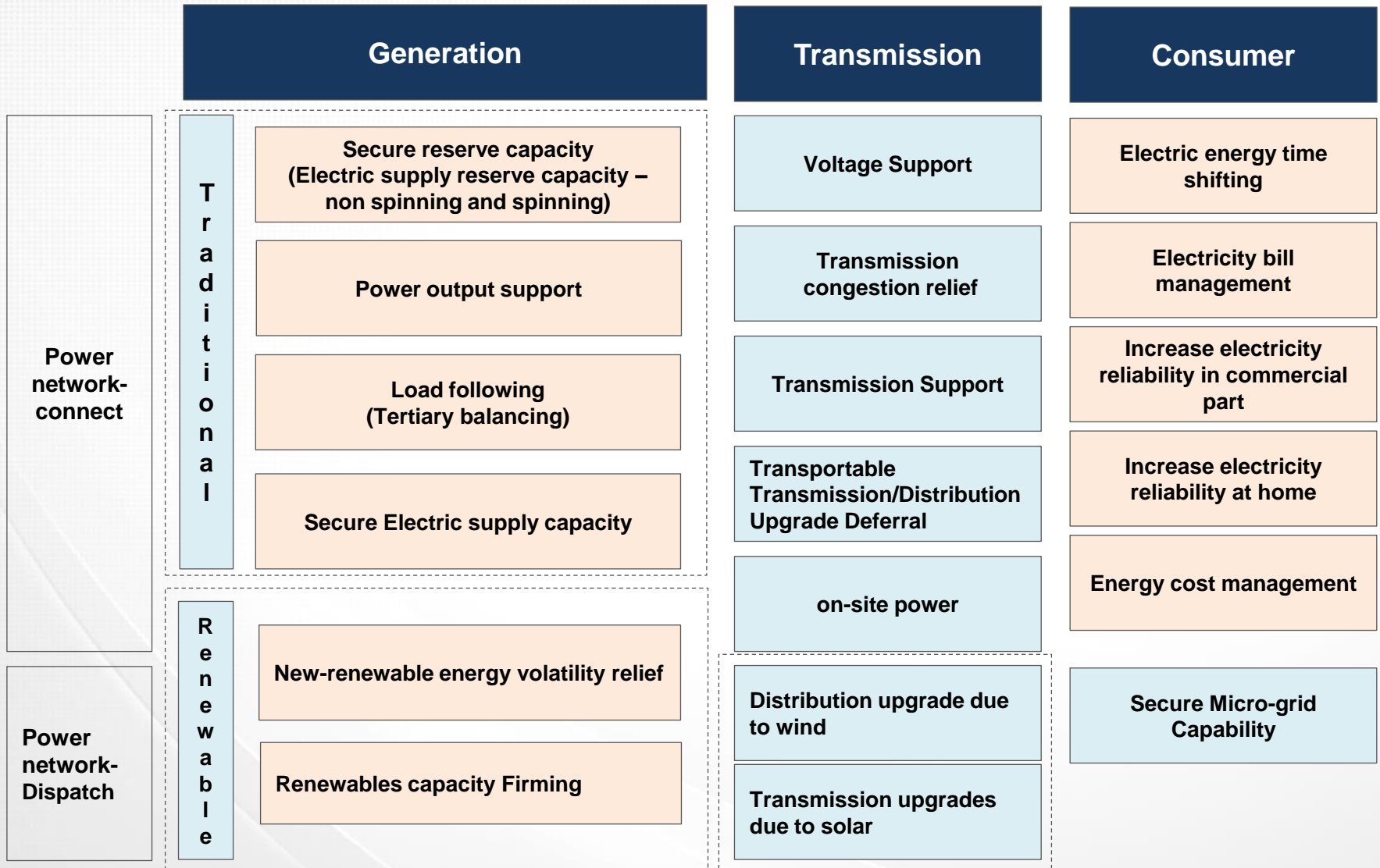


# Energy Storage system

## ● What is Energy Storage System?

- Energy storage system (ESS) is accomplished by devices that store electricity to perform useful processes at a peak time.
- These devices help to maintain electricity network stability and raise efficiency of energy supply.
- In addition, ESS lessons the fundamental problems in the electricity system caused by the inefficiency of energy consumption, production and transmission.
- ESS is categorized by battery technology (Lithium-ion Batteries, Redox Flow Batteries, Sodium-Sulfuide Batteries, capacitor and Fly wheel).

# How to use?



# What is the advantage of ESS?

## ● ESS is a key component for Low Carbon Generation

- With rapidly increasing Solar and Wind generation, ESS can help enhancing reliability of the power system by mitigating variability of RE.
- ESS can improve the efficiency of RE by minimizing curtailment.

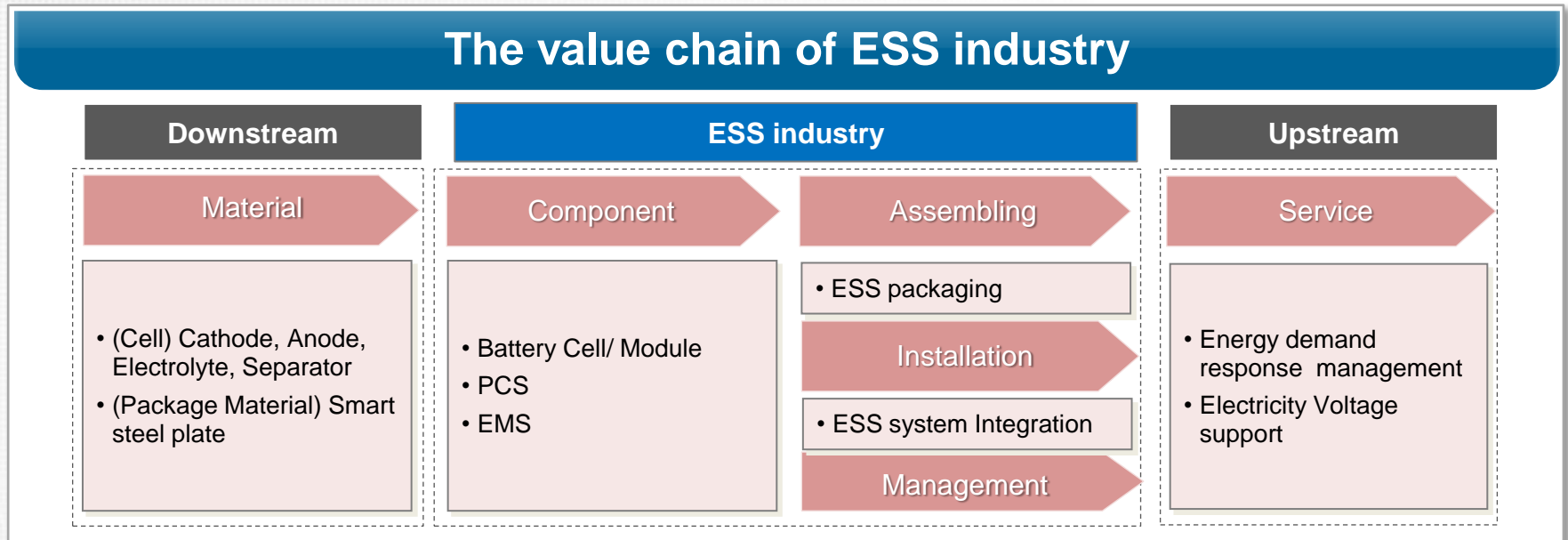
## ● ESS can enhance the efficiency of power system

- Reduces Energy Cost by shifting demand from expensive peak periods to less expensive off-peak periods.
- Reduces Reserve Cost by providing ramping services to mitigate the variability of RE.
- Reduces Capacity Cost by reducing the amount of installed peaking capacity needed for System Adequacy and the associated capital costs.

## ● ESS reduce the cost of upgrading transmission network

- Store energy at off-peak time and reduce the stress of line at peak hours.
- Enables more efficient local peak management.

# The status of ESS Industry in Korea



## ● The status of ESS Industry in Korea

- According to B3(2014), the market share of Korea's Lithium-ion Batteries at third quarter in 2014 is 43.6%(Samsung SDI 23.6%, LG chemical 20.0%).
- In case of Lithium-ion Batteries and Capacitor, the mass production is implemented in Korea. Other technologies are in the technology development stage.

# The Benefit-Cost analysis result in Korea's ESS industry

- **The cost of ESS business is higher than the benefit.**
  - Under the high wind power penetration scenario, the ESS benefit is the highest in winter (In Korea, the peak load occurs in winter).
  - Even though in this case, the ESS benefit is only 76% of the cost.

## The result of BC analysis in Korea's ESS industry

|      |                                       | Summer | Winter |
|------|---------------------------------------|--------|--------|
| Wind | Total daily benefit<br>(10,000won/MW) | 26.3   | 36.4   |
|      | Total benefit/Total cost              | 0.54   | 0.76   |
| PV   | Total daily benefit<br>(10,000won/MW) | 24.8   | 33.4   |
|      | Total benefit/Total cost              | 0.52   | 0.70   |

# Suggestions for ESS industry development

|                                    | <b>Policies for ESS industry development</b>                   |
|------------------------------------|--|
| <b>New demand creation</b>         | <b>The introduction of ESS installation obligation regime</b>  |
|                                    | <b>ESS lease project connecting with new renewable energy</b>  |
|                                    | <b>ODA energy supply support project with ESS installation</b> |
|                                    | <b>International ESS research institutions establishment</b>   |
| <b>Incentives for installation</b> | <b>ESS installation subsidy and tax credit policy</b>          |
| <b>Electricity price regime</b>    | <b>Redesign the domestic Adjust Frequency Service(AS).</b>     |
|                                    | <b>Redesign the electricity price system</b>                   |



# Thank you