

Where ESS Industry Moving Forwards?

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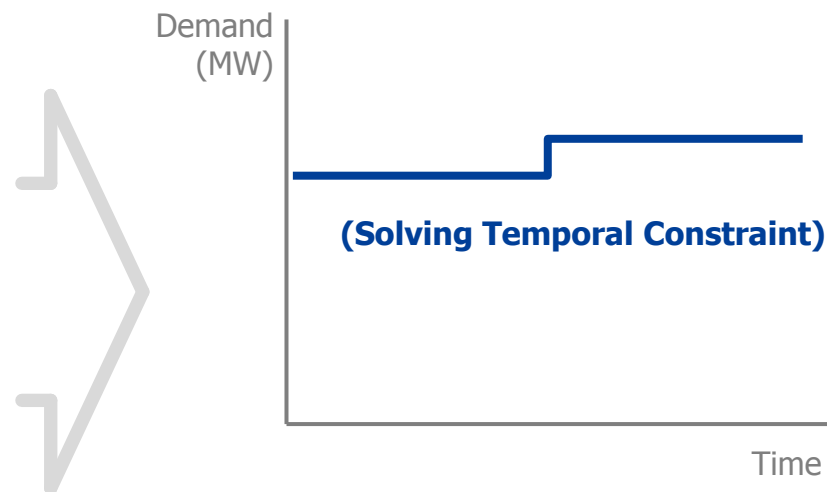
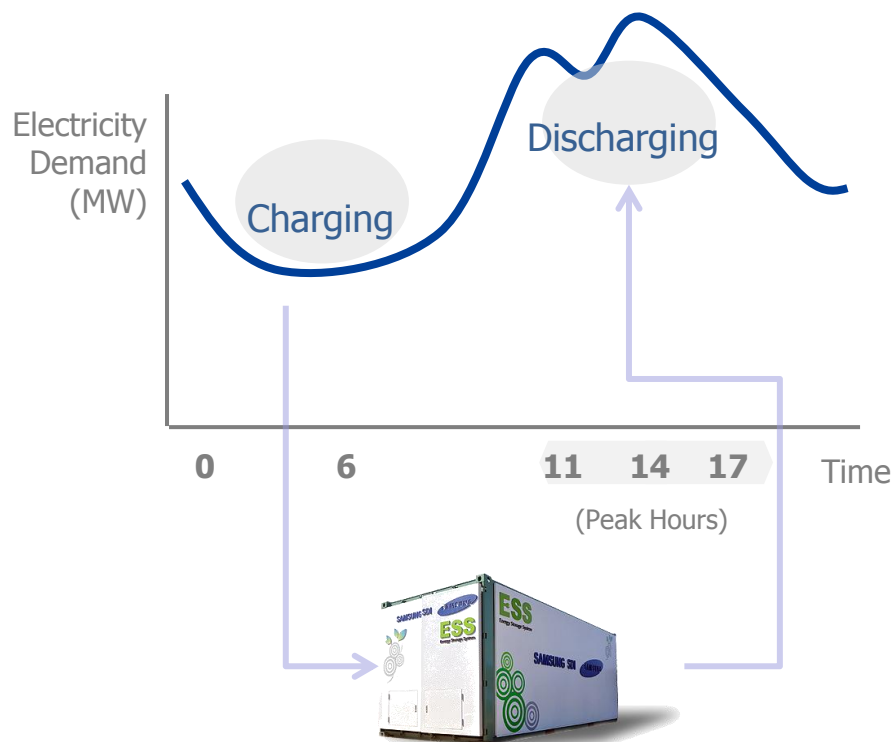


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ESS, Innovation in Electricity History

Energy storage commoditizes electricity energy, which is the most innovative in the history of electricity use.





What Drives The Growth of ESS Industry?

Though there may be many, three aspects today help the ESS industry grow quicker than ever.





The issues of climate change and corresponding demand on clean energy sources position the ESS industry very positive and optimistic.

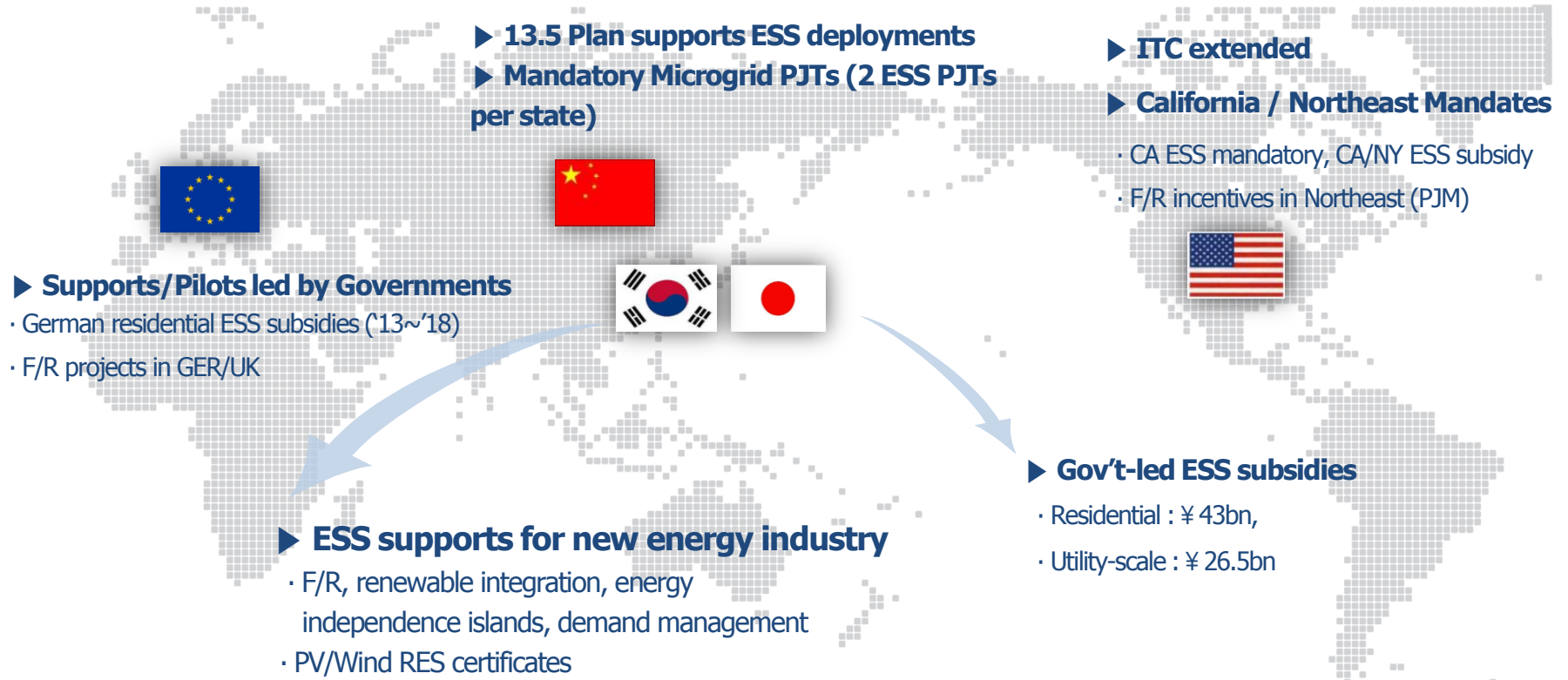
- ✓ **COP21 climate change summit reaches a deal to keep temperature rise below 2℃ by 2050 [December, 2015].**
- ✓ **President Obama announced historic carbon pollution standards for power plants [August, 2015].**
- ✓ **China urged to make deeper cuts in coal use for climate pledge [July, 2015].**
- ✓ **Germany pledges to shut down all of its nuclear plants by 2022 following Fukushima nuclear power plant disaster [May, 2011] .**
- ✓ **And more**



Source :
www.being.com/images/



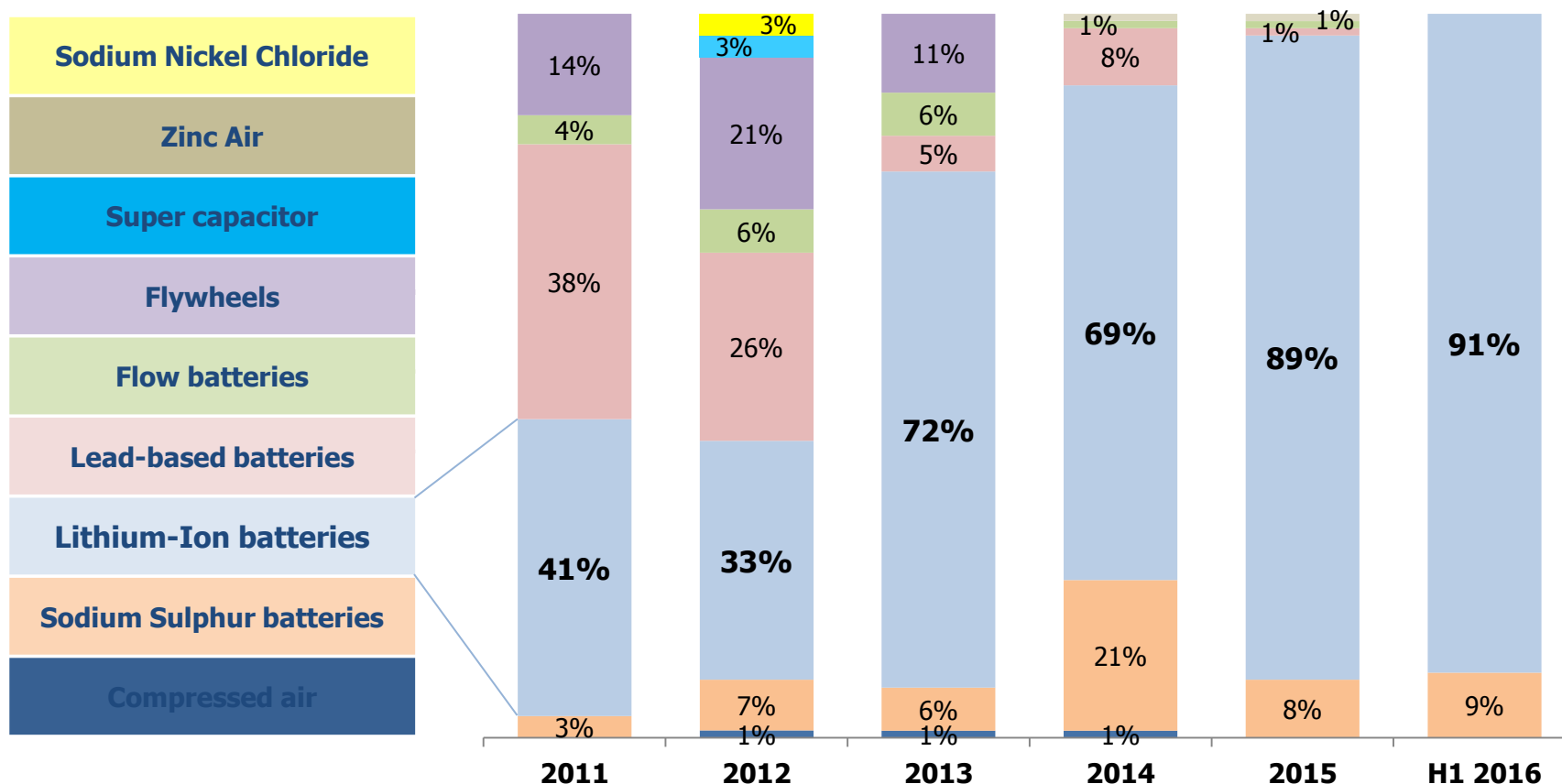
The very supportive government policies, more than preliminary experiments, consider the LiB storage technology as a promising economic solution to the issues.





ESS Driver - Technology

The advancement of LIB technology along with economics of scale enables the ESS industry fueled to grow, right timing and right positioning.

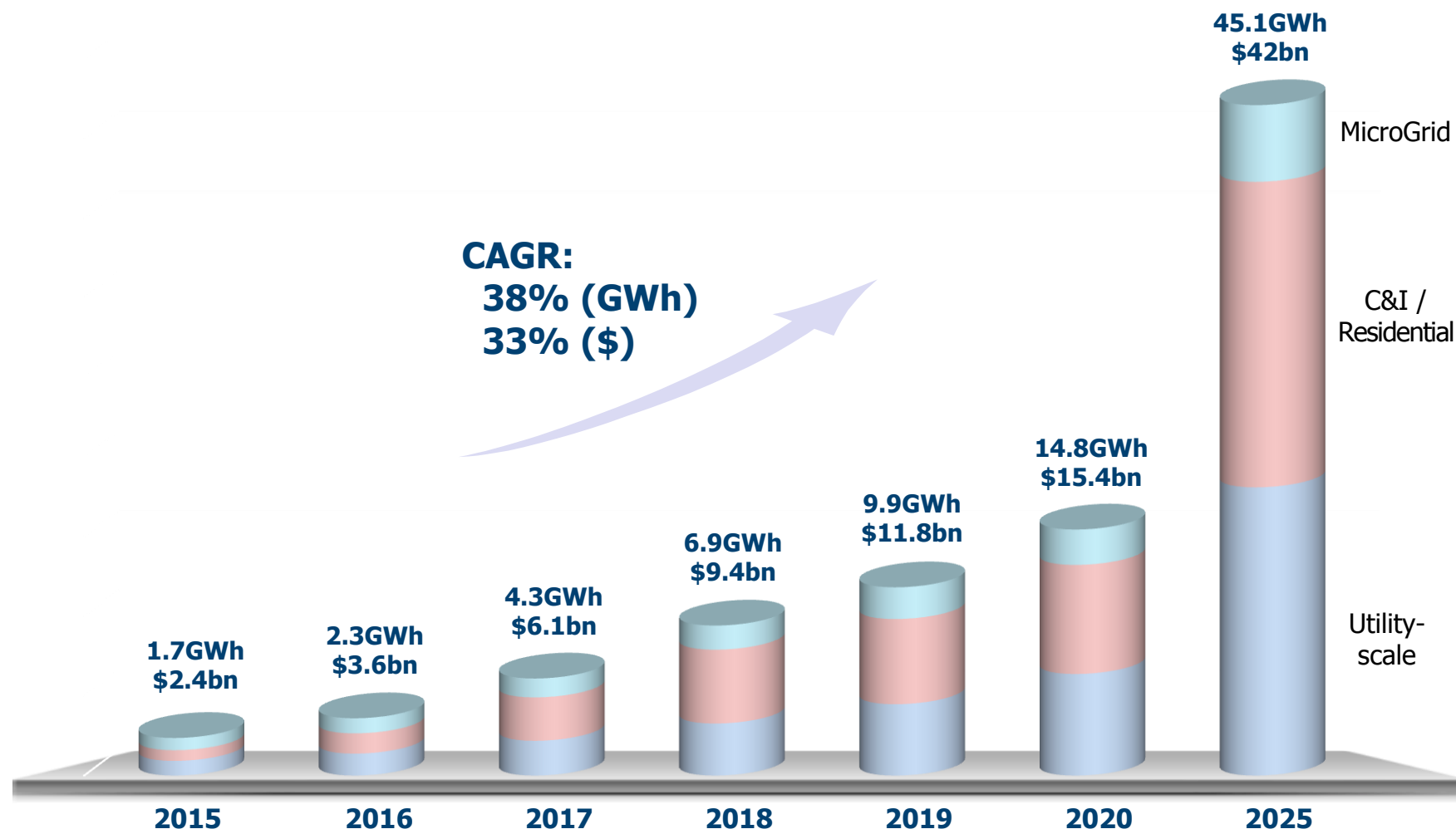


Source : Bloomberg



ESS Market Outlook

No other industry ever shows this growth rate, which is in CAGR 33%.



Source : Navigant

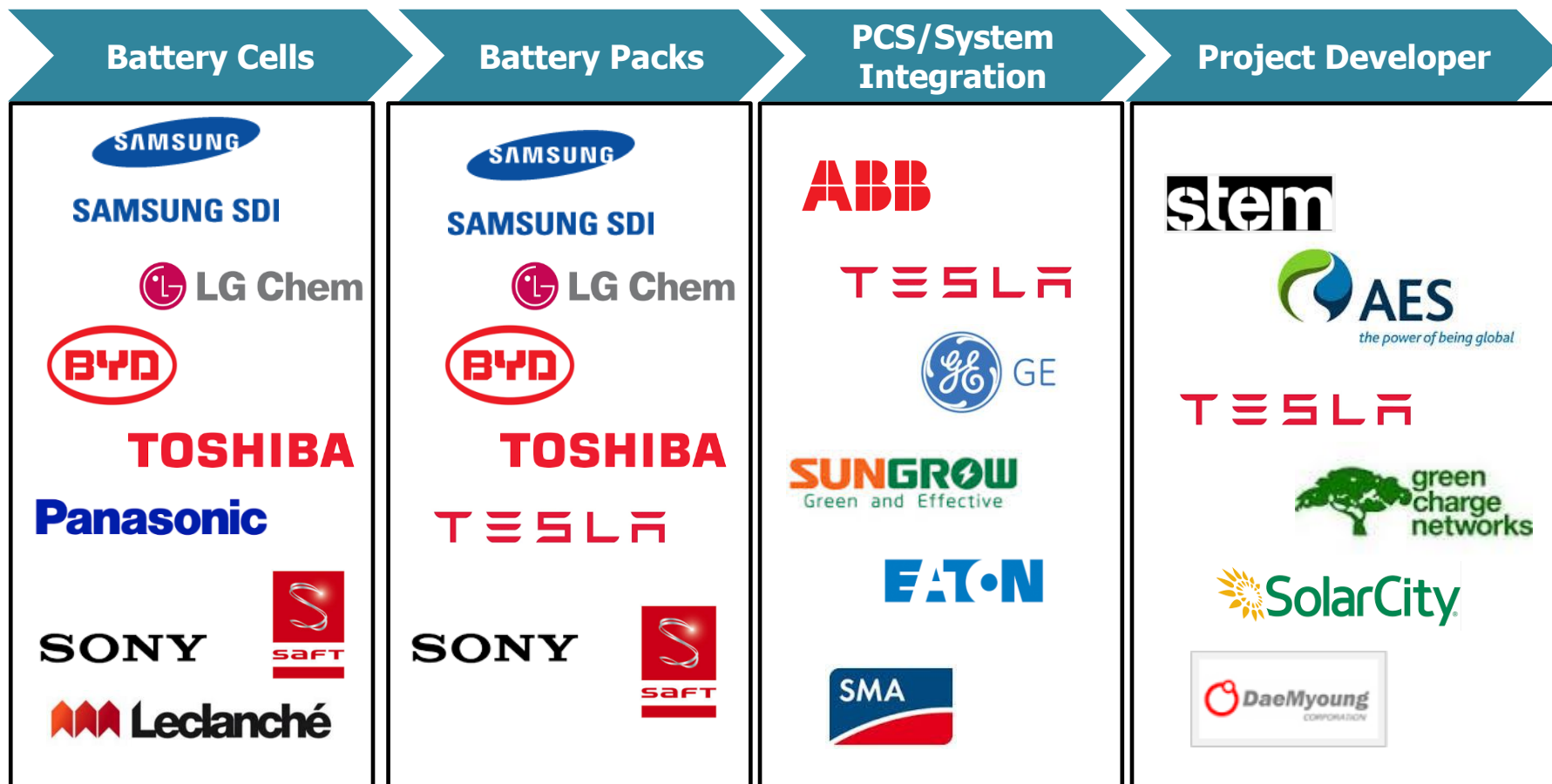


SAMSUNG SDI



Value Chain ESS Markets

ESS ecosystem consists of a number of players with different backgrounds and specialties, and old and new.





Market Trend – New Players with Business Models

New players introduce new energy business models thanks to new technologies, favorable business environments, persistent problems, etc.



Tesla has acquired SolarCity in August 2016.

Partnership with Panasonic for battery cells



Daimler AG has established a subsidiary for the ESS business expansion.

Building a battery module assembly factory, not cell manufacturing



BYD provides total energy solutions from PV, ESS to system integration even EVs.

Business start from Li-ion battery company



Volkswagen invests in constructing battery Pack manufacturing plants.

Building a battery packaging lines, not cell manufacturing

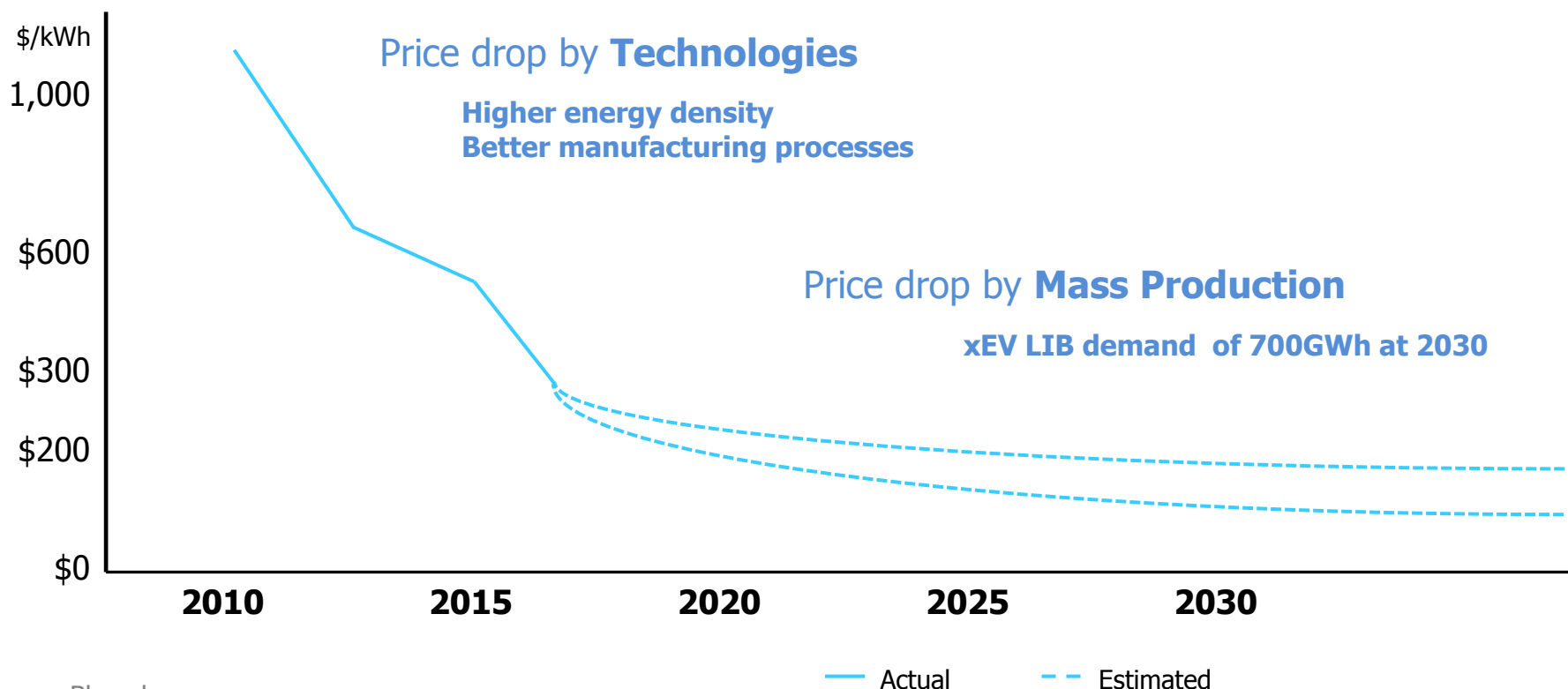
✓ **Bigger economics of scale**

✓ **Packaged energy solutions**



Market Trend – Price Plummeting

LIB price falls rapidly due to strong technology-driven competition and the convergence of batteries in both EVs and ESS.



Source : Bloomberg



Samsung SDI – Leading LiB Supplier Market

- ✓ Applies the same cells for EVs & ESS to achieve economics of scale.



- ✓ Increase energy density while keeping cell's physical dimension the same (357Wh/L today to 617Wh/L at 2020).





Samsung SDI – Leading in Opening Storage Market

Commercializing new technology & serving the energy storage markets globally
as enabler

Total Installed
630+MWh



Europe

India

Australia

Korea

Japan

USA



Utility



Residential



Telecom



Utility



UPS



Commercial



Residential



Utility



Commercial



Then What?

We have to ask ourselves how to prepare things to meet the challenges in the future !

- ✓ **Who will lead the high technology-driven ESS markets in the future where traditional manufacturing competence still be influential?**
- ✓ **How the business model will be formulated by the markets where the new high tech merges into the old, conservative industry with tall chimneys?**
- ✓ **What sort of policies must be in place for the domestic players to lead the industry where the politics still influence the economics?**





Thank You !

