Linklaters

Energy Storage: Charging up the future

John Maxwell

Xylia Sim

18 June 2020

Contents

Introduction

What has been a game changer in energy storage:

> increased reliance on renewables

– challenges to the grid as a result of intermittent nature

> decarbonisation – energy storage as a cleaner alternative to natural gas peaker plants, diesel generators

> technological advances in battery storage, especially lithium-ion

State of the market

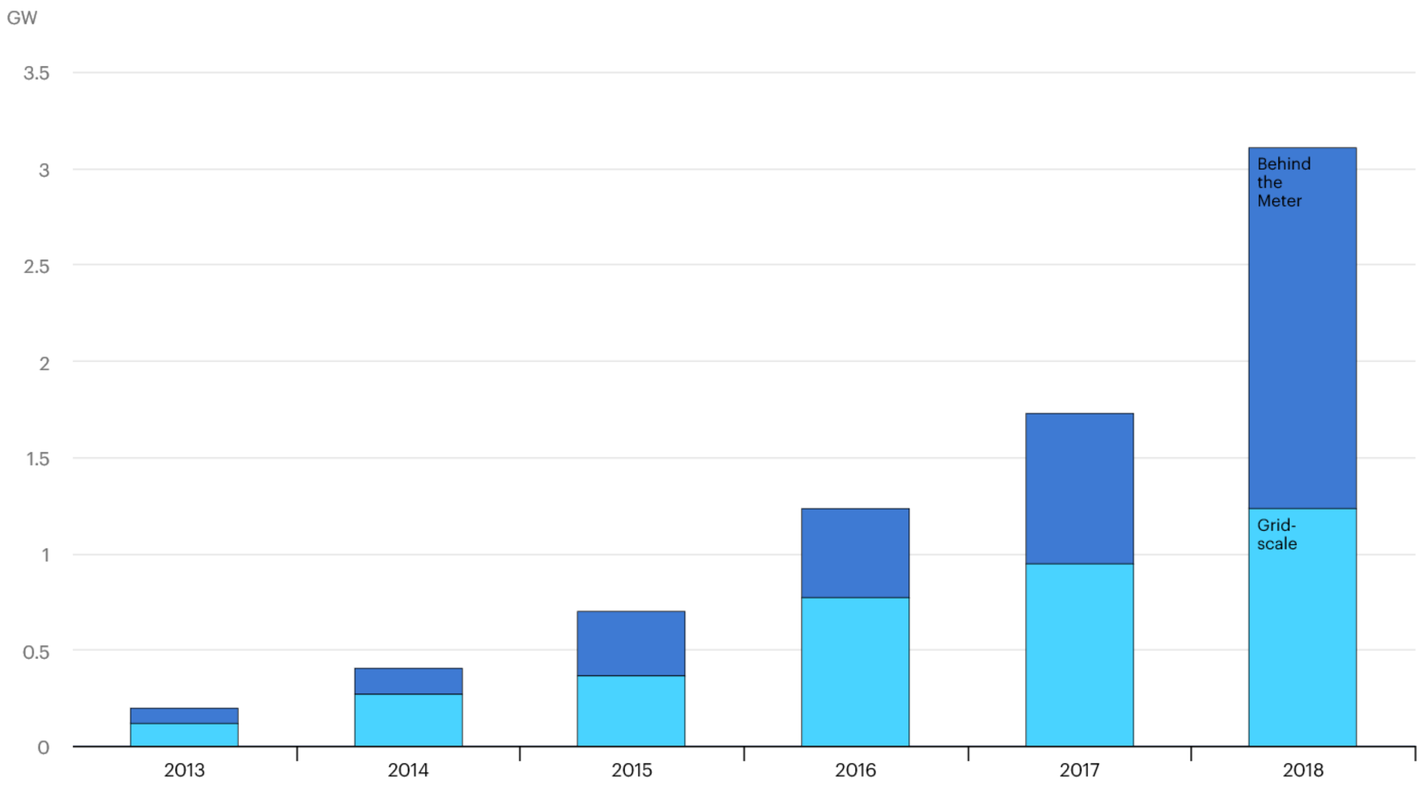
Battery storage systems continue to gain traction around the world

> Location of battery storage systems:

– Installation with generator

– Installation with grid

– Installation "behind the meter" by end-user



Source: IEA, *Annual storage deployment, 2013-2018*, IEA, Paris https://www.iea.org/data-and-statistics/charts/annual-storage-deployment-2013-2018

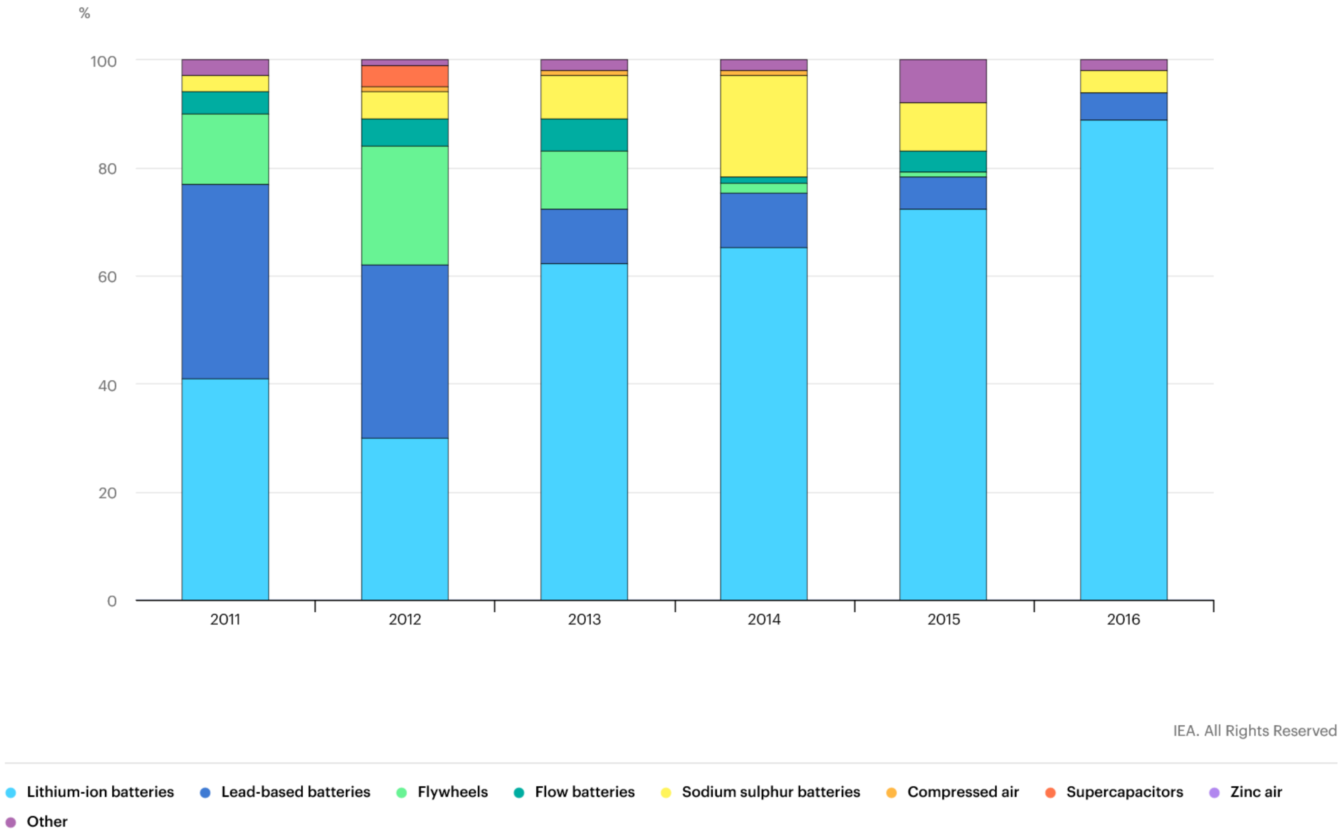
Energy storage technologies

> Chemical / electro-chemical storage – batteries, flow batteries, solar heat & salt, hydrogen

> Potential storage – compressed air, pumped hydro

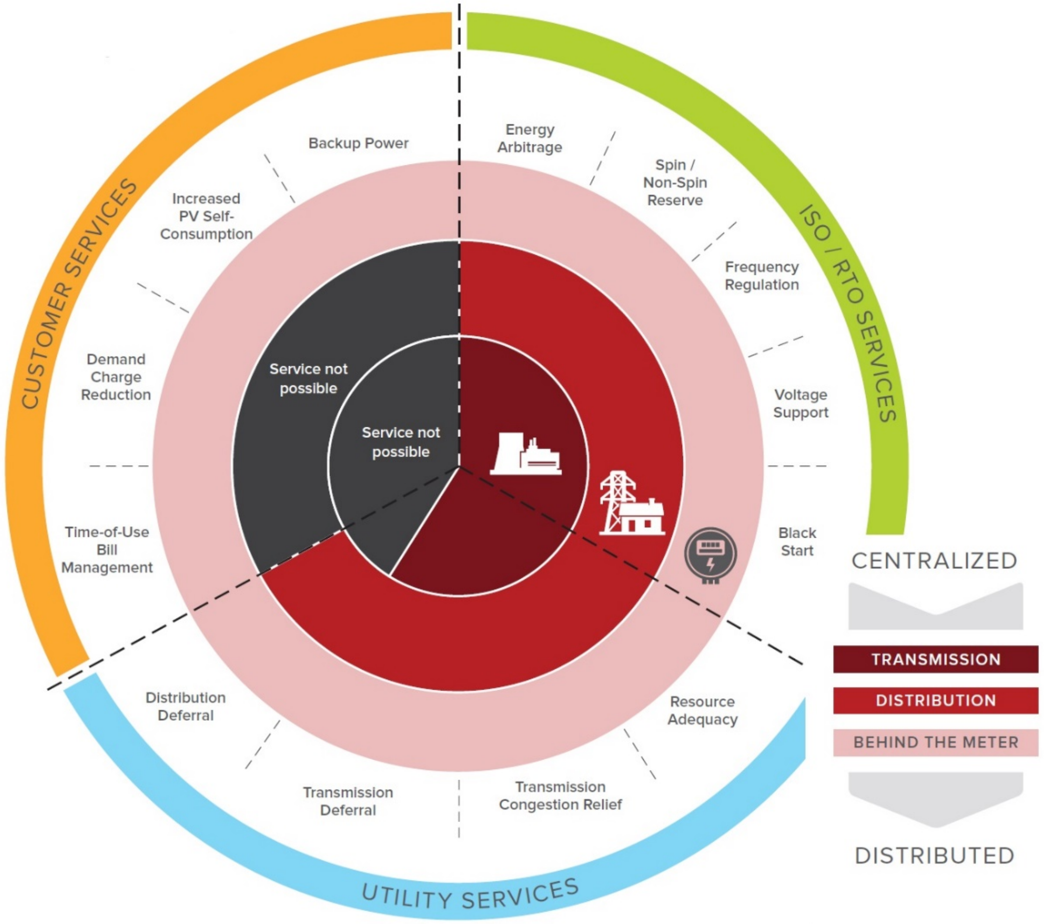
> Kinetic storage – flywheels

> Thermal storage – heat and cooling



Source: IEA, *Technology mix in storage installations excluding pumped hydro, 2011-2016*, IEA, Paris https://www.iea.org/data-and-statistics/charts/technology-mix-in-storage-installations-excluding-pumped-hydro-2011-2016

Uses of energy storage



Source: Fitzgerald, Garrett, James Mandel, Jesse Morris, and Hervé Touati, *The Economics of Battery Energy Storage: How multi-use, customer-sited batteries deliver the most services and value to customers and the grid*, Rocky Mountain Institute, September 2015, http://www.rmi.org/electricity_battery_value

Policy and regulatory issues

> Regulatory uncertainties pose a challenge to investors / financiers

> Regulatory framework needs to catch up with the technology

- how to best capture the full range of application and flexibility of energy storage – need for a new regime?
- arbitrage vs financial incentives
- technology agnostic

Bankability issues (1)

> Structure and financial modelling

> Revenue

- Stand alone storage: short/medium term contracts vs PPA model
- Attached to another renewables projects: single or separate revenue streams?
- Costs of importing power to charge storage

> Financing:

- For co-storage projects – to what extent project finance debt can be used to fund riskier element

Bankability issues (2)

> Construction and O&M

- Type of contracting model
- Limited performance warranty coverage
- Degradation – 10 year lifespan vs 20-25 year PPA?
- Noise coverage guarantees

> Environmental and Social

- Supply chain considerations
- Safety

Conclusion

Thank you | Questions?

Linklaters Contact

John Maxwell

Asia Head of Energy and Infrastructure, Japan

Tel: +813 6212 1227
john.maxwell@linklaters.com

Xylia Sim

Counsel, Singapore

Tel: +65 6692 5893
xylia.sim@linklaters.com

Meiji Yasuda Building 10F
1-1, Marunouchi 2-chome
Chiyoda-ku, Tokyo 100-0005
Tel: +81 3 6212 1200
Fax: +81 3 6212 1444

One George Street
#17-01 Singapore 049145
Tel: +65 6692 5700
Fax: +65 6692 5708