Policy Implications with Cost Drop of Battery Storage

IRENA Battery Storage Costs & Market Outlook to 2030

Energy Storage Europe 2017

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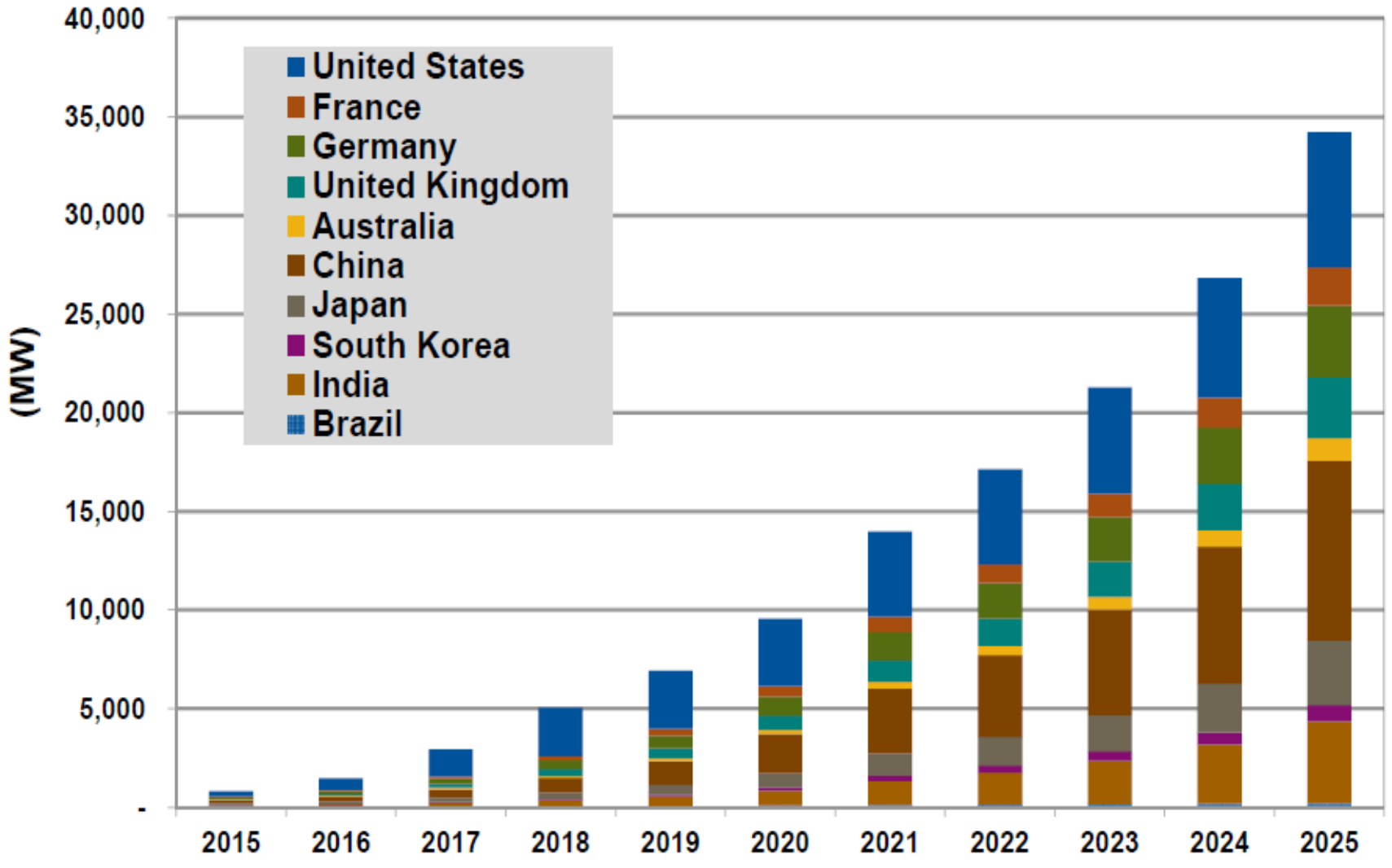
Presentation Outline

- Policy goals affected by cheap battery storage
- Policy implications for the electricity sector
- Policy implications for the transport sector
- Cross-cutting policy implications

Chart 1.1 Annual Installed Energy Storage Power Capacity, Top 10 Countries: 2015-2025



(Source: Navigant Research)

Policy goals affected by cheap battery storage

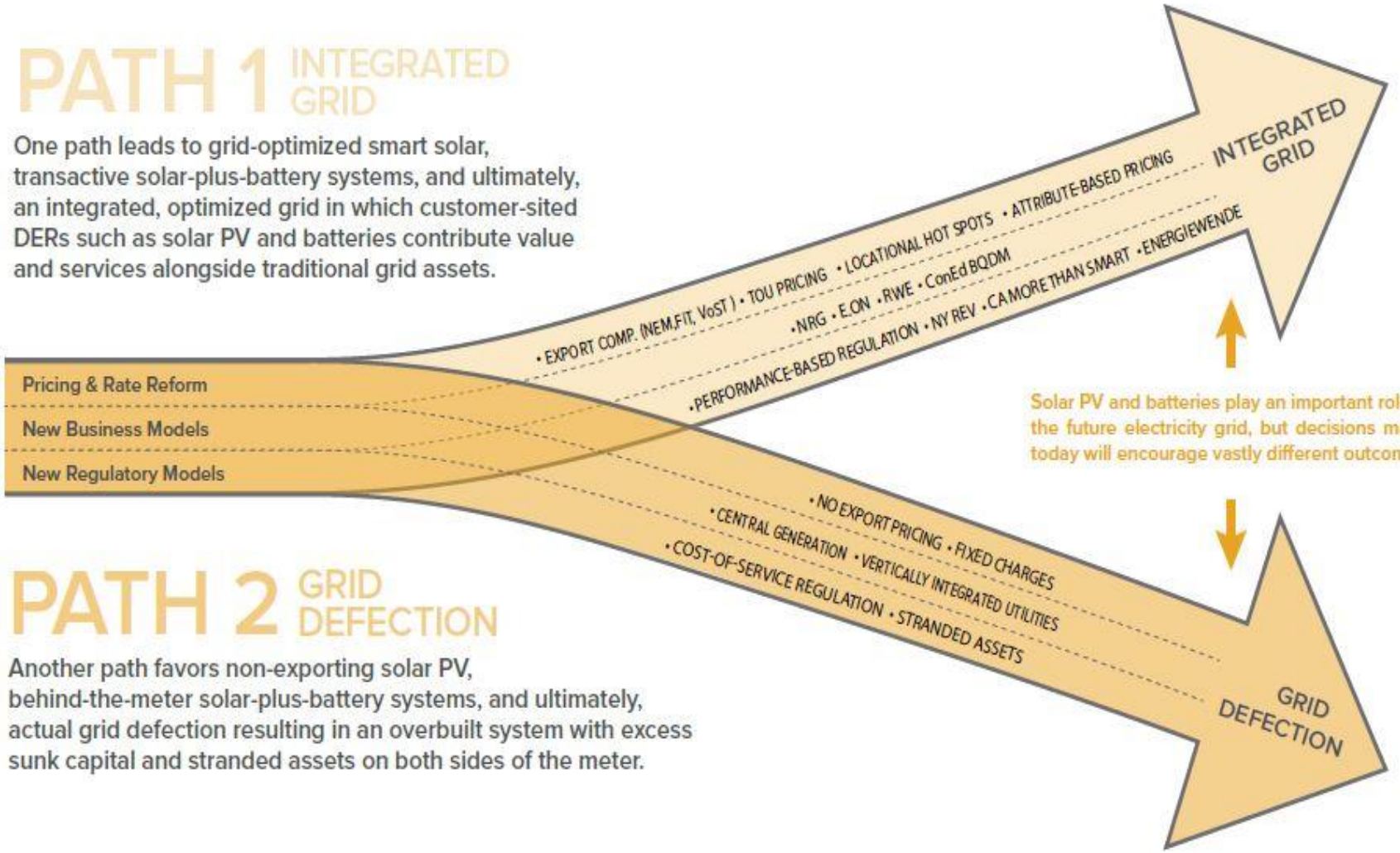
- Access to reliable and sustainable electricity
- High shares of volatile renewable energy
- Sustainable mobility
- Sustainable economic development
- Technology leadership

Policy implications for the electricity sector

- RMI 2014: Avoid grid defection through proactive regulation
- Carbon Trust 2016: Align incentives and remove barriers, monetize system benefits, reduce policy uncertainty, engage broad stakeholder in adapting market structures, define standards for performance and operation of storage
- ACORE 2016: A variety of ESS rises „behind the meter“ (backup power, demand shifting/charge management, solar self-consumption, fast-charging of EVs) -> aggregate to provide additional value as capacity or grid resources

-> Grid regulators need to (re-)act now!

POSSIBLE TRAJECTORIES FOR ELECTRICITY GRID EVOLUTION



Source: Rocky Mountain Institute

Policy implications for the transport sector

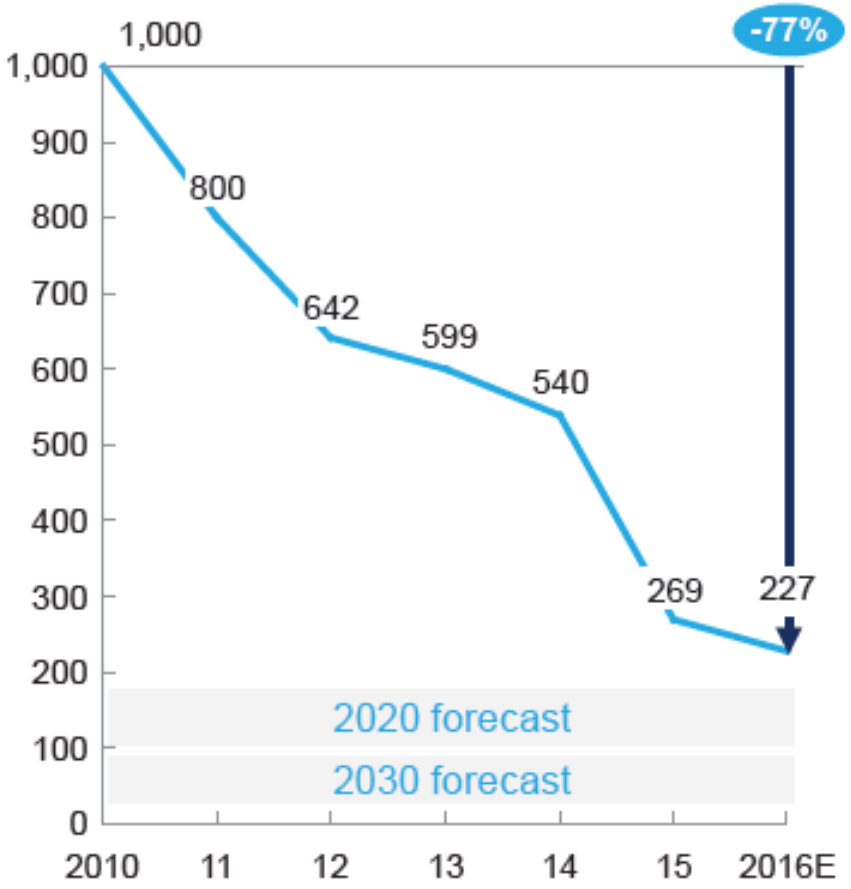
- McKinsey 2017: Automobile consumer demand is shifting in favour of e-mobility, key technologies improve faster than anticipated -> accelerate investment in charging infrastructure at national, regional, and city levels
- TonySeba 2016: Disruption of the automobile market before 2030 -> avoid stranded investments in traditional car technologies
- Shift in transport paradigm towards driverless, shared e-mobility has strong implications on the labour market, traffic rules, consumer behaviour and mobility patterns

-> Transport policy makers need to (re-)act now!

Rapid decreases in battery prices have helped accelerate EV sales, especially in Europe and China

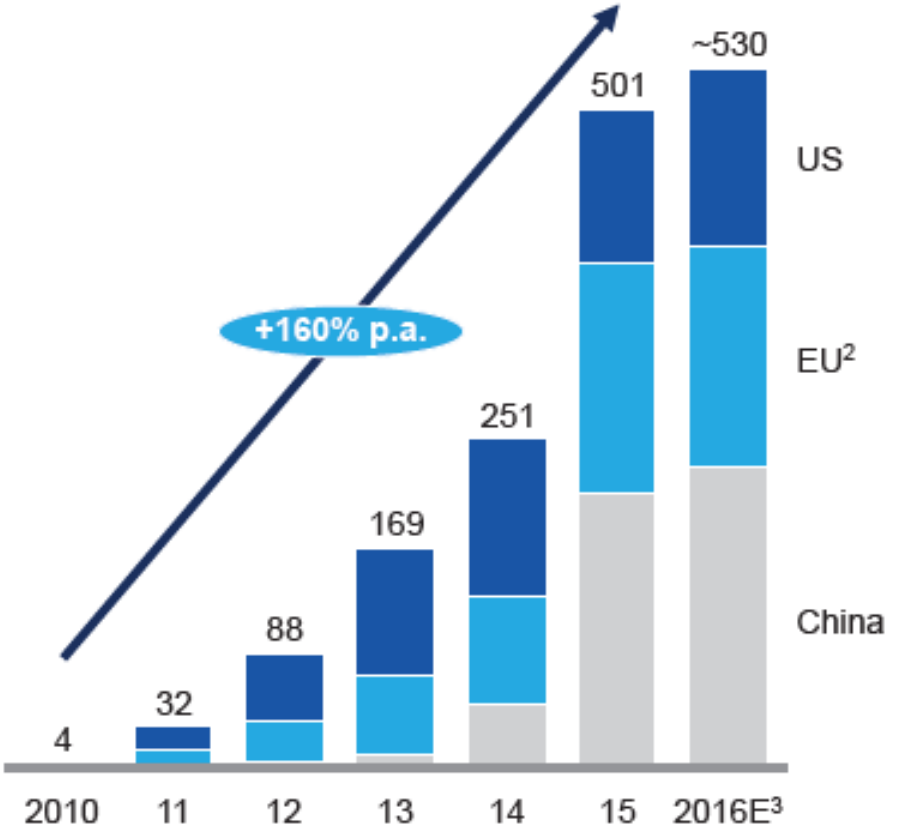
Average battery pack price

$ per kWh



US, EU, and China electric vehicle sales[1]

Units, thousands



1 Plug-in hybrid electric vehicles and battery electric vehicles; excludes low-speed vehicles and hybrid electric vehicles without a plug
2 Includes Denmark, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, and the UK
3 Extrapolated based on Q1-Q3 2016 IHS data and assuming continued growth in all three markets in Q4
SOURCE: IHS, Bloomberg, New Energy Finance

Automotive industry megatrends are self-reinforcing and will likely accelerate the transition to e-mobility in the long term

Examples of potential EV reinforcement points from other automotive megatrends

Autonomous

- EV vehicle architecture has a central control unit to facilitate autonomy
- Autonomous charging could add convenience

Connected

- A connected EV ecosystem could increase the convenience of charging
- Connected car grid solutions could enable cost-effective load balancing

Automotive industry megatrends

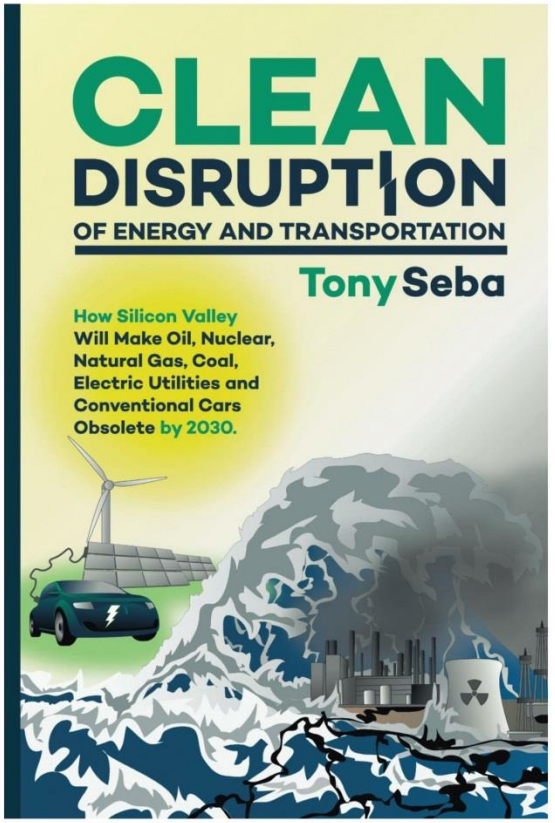
Shared

- Greater annual driving distances can offer a decisive TCO edge for EVs
- Some consumers may prefer access to multiple vehicle types over ownership (including EVs)

Electrified

- Tightening emissions efficiency rules make EVs necessary to meet standards
- Lower battery costs improve EV economics

SOURCE: McKinsey Sustainable Mobility Initiative


CLEAN
DISRUPTION
OF ENERGY AND TRANSPORTATION
Tony Seba
How Silicon Valley
Will Make Oil, Nuclear,
Natural Gas, Coal,
Electric Utilities and
Conventional Cars
Obsolete by 2030.

Cross-cutting policy implications

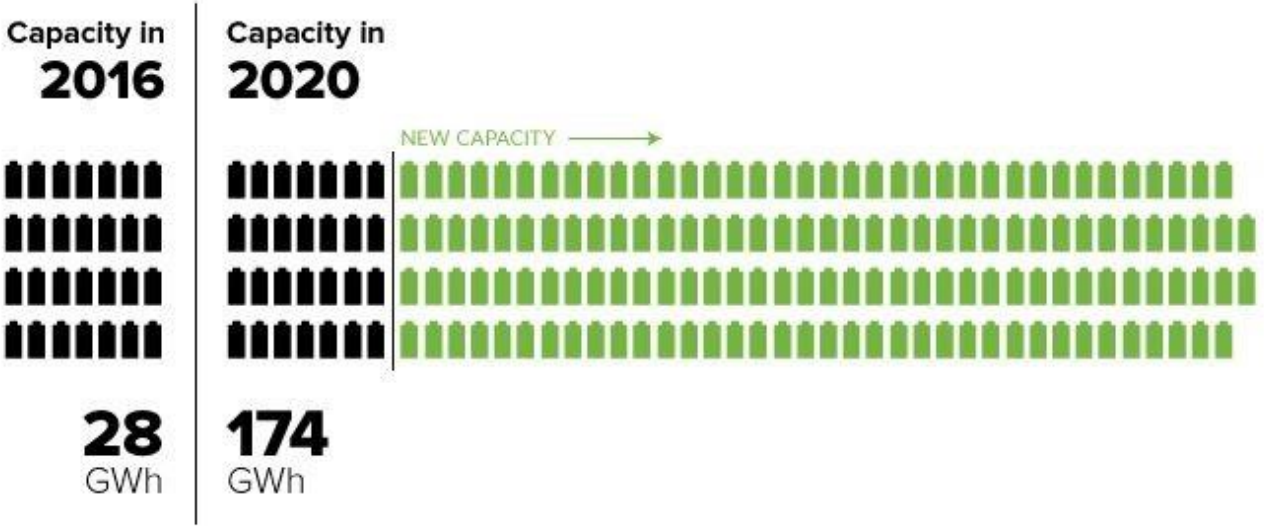
- Attract investment in battery production and new products and services
- Remove barriers and hurdles for the private sector to engage in new business plans around battery storage
- Ensure transparency through national reporting requirements on energy storage services and devices
- Agree on common reporting guidelines for energy storage services and technologies at international level (e.g. IRENA)

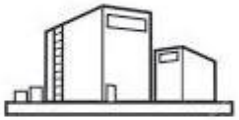
The race for new opportunities around ESS has already started.

CHINA IS LEADING THE CHARGE

Lithium-ion megafactories in China to grow capacity 6X by 2020

Global lithium-ion battery production capacity will increase by **521%** between 2016 and 2020.

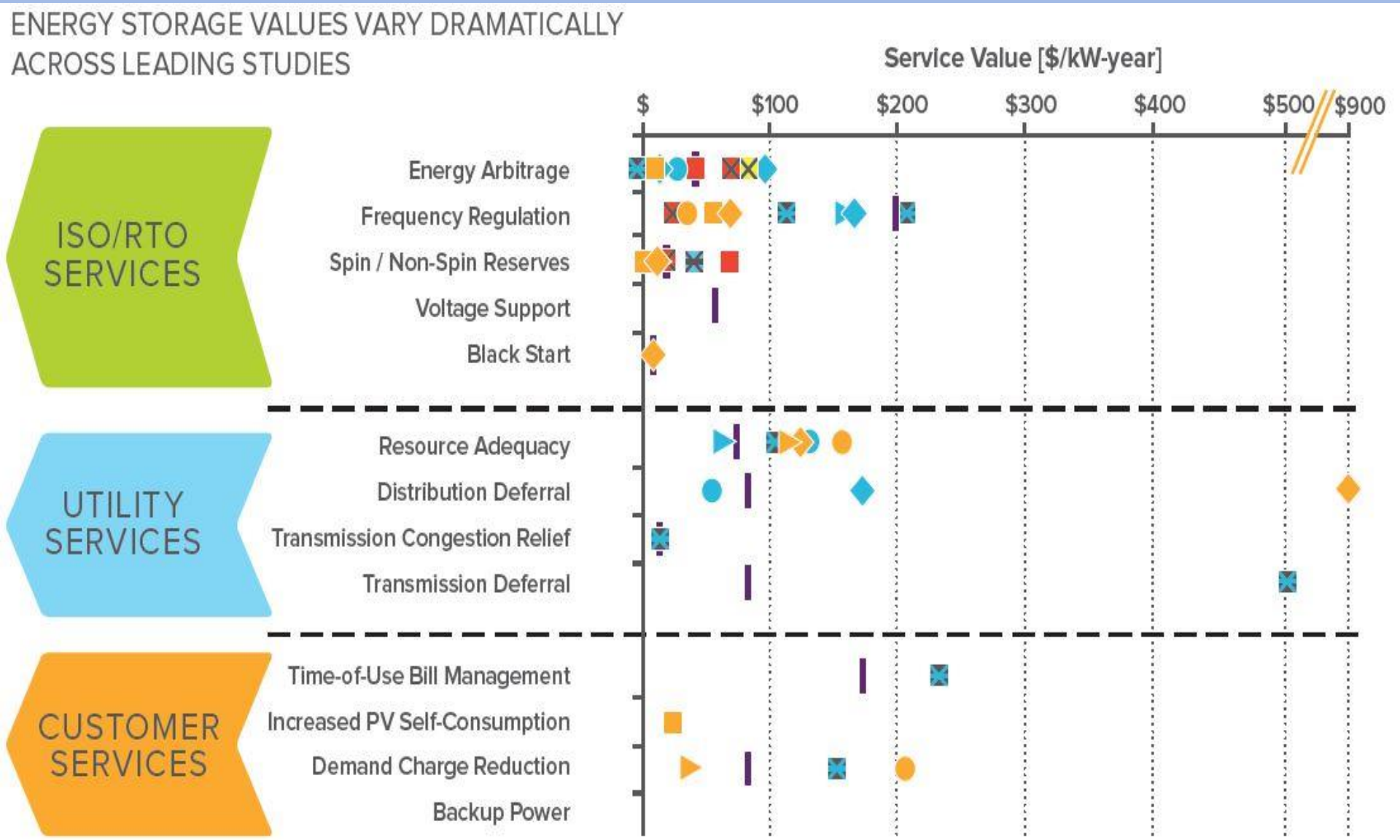




China's battery sector continues to be a hub for most of this growth.

Source: http://www.visualcapitalist.com/china-leading-charge-lithium-ion-megafactories/

	2016 Capacity (GWh)	2020 Capacity (GWh)	% of Global Total (2020)
United States	1.0	38.0	22%
China	16.4	107.5	62%
Korea	10.5	23.0	13%
Poland	0.0	5.0	3%
Total	**27.9**	**173.5**	**100%**



Source: Rocky Mountain Institute

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IRENA Report Shows Renewables Are Gaining Ground in Nearly Every Measure

IRENA Membership

Events

IRENA event on 'Battery storage cost and market outlook 2030'
15 – 16 March 2017
Düsseldorf, Germany

Berlin Energy Transition Dialogue
20 – 23 March 2017
Berlin, Germany

Kick-off Meeting for RRA Mali
3 – 6 April 2017
Bamako, Mali

More Events