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Battery Storage ELECTRICITY



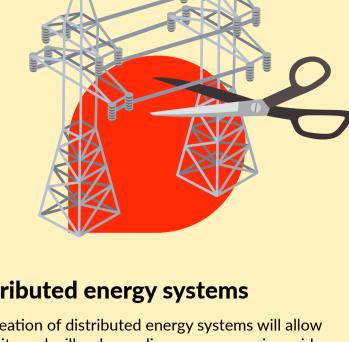
Energy storage can be applied to all steps Until recently, the energy storage sector had been dominated by bulk technologies, with of the energy value chain, and can decouple energy supply and demand. It is a field pumped hydro storage representing over 99%

with multiple technologies and diverse applications. So, why is battery storage important?

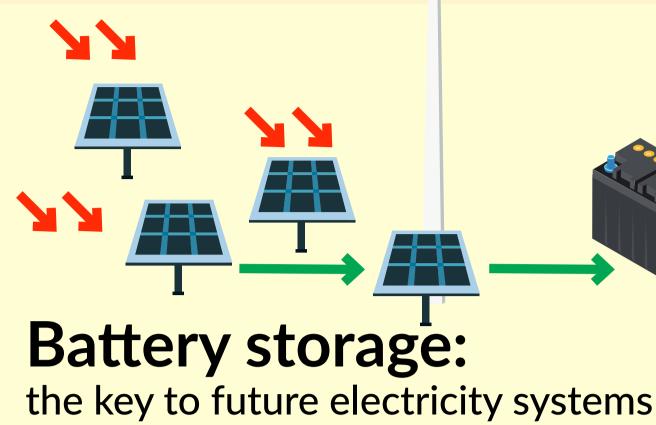
of the world's electricity storage facilities.



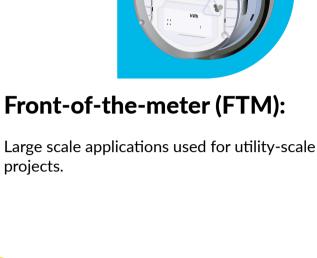
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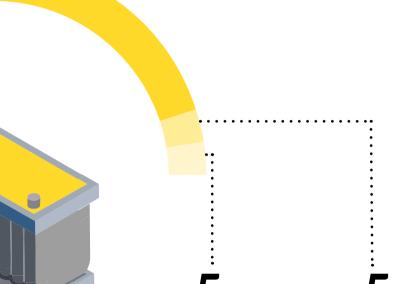


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other battery

technologies (i.e. redox

flow or lead-acid)

other storage

technologies

announced in the second half of the year.

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companies, manufacturers and equipment providers to expand their storage activities, leading to a more concentrated market. Link





Lithium-ion batteries used to cost \$1,085-

4,100 /kWh in 2010, and in 2016 they are

said to cost under \$140/kWh.



France- Germany-Australia- Italy:

countries with significant solar

According to IEA, for the Paris

goals to be met, the world will need

21GW of battery storage by 2021.

deployment.

capacity led the growth for BTM



in 2016.

As of August 2016, total installed

171.05GW from 1,267 projects.

energy storage amounted for

Tesla's first Gigafactory is in Nevada,

USA, and, once completed, its

planned annual battery production

capacity will be 35GW to meet the

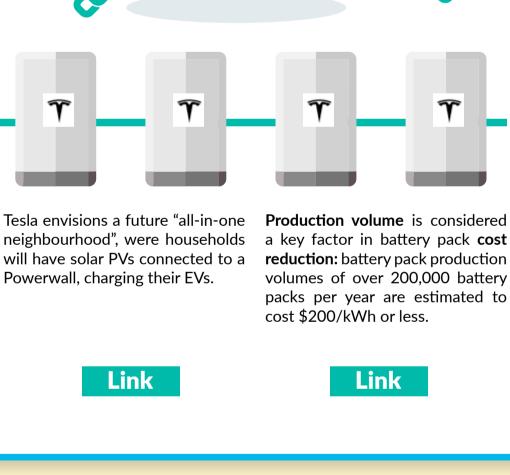
future expected demand in battery

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storage solutions.

In 2016, over 4,400 residential deployment for behind -thebattery systems were deployed meter application experiences across the US totalling 127MW. historic rates, led by the UK which tendered over 500MW of battery storage capacity.

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USA-a big player in the utility-scale energy storage

total installed capacity.

electric vehicles.

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Cost reductions in battery storage were driven

largely by R&D for other sectors, mainly for

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residential market grew 151% from Q1 2017.

Much of this increase resulted from California

Link

U.S energy

and Hawaii.

105% storage ППППППП projects 2013 2016 In 2015, the market for grid-scale batteries was In 2011, US Congress passed "Storage Behind-the-meter deployments rose 140% four times larger than 2014. Technology for Renewable and Green Energy from Q1 2017 to Q2 2017. The residential Act of 2011" to provide energy investment market rose 89% from Q1 2017, while the non-

6,750

Australia-focus on distributed energy opportunities

> ARENA Australian Government Australian Renewable

> > Energy Agency

batteries with a capacity of 52 The battery storage growth has At the end of August 2017, South The Australian Renewable Energy MWh were installed in 2016, the potential to triple by the end Australia called for proposals Agency (ARENA) has set the more than 13 times the 500 of 2017. on Bulk Energy Storage and acquisition of 'dispatchable' energy as a central element of Australia's installations in 2015. Firming Renewable Generation future electricity system. projects that will receive financial assistance from its \$150 Renewable Technology Fund. Link Link Link Link

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INNOVATION | environment

AEMC

Market

Energy

proposal for restricting

Commission (AEMC) has drafted

distribution network operators

in parts of Australia from owning

or operating energy storage

assets in an attempt to stimulate

a "competitive market" market for

behind-the-meter batteries.

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Agreement's ambitious climate goals.

Register Now

Tesla will build the world's biggest

lithium ion battery in South

Australia, a 129MW battery

connected to the 270MW

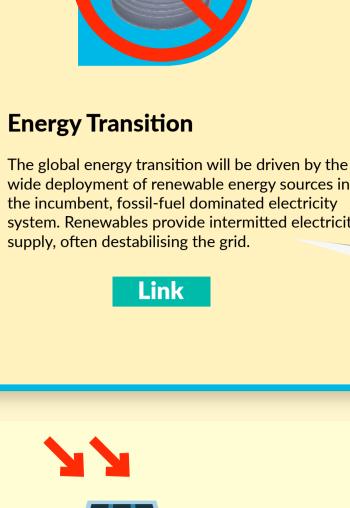
Hornsdale Wind Farm wind farm

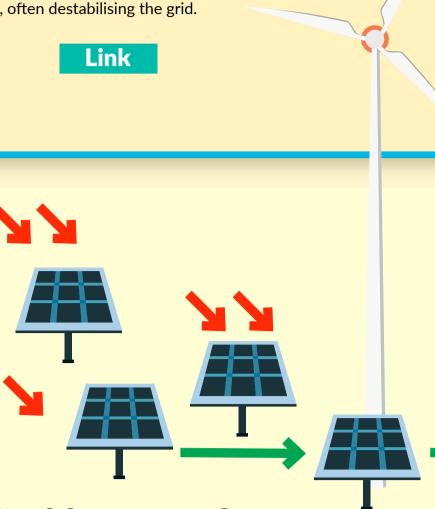
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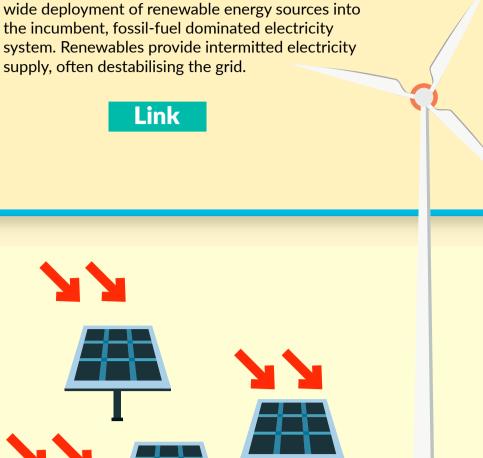
aimed to stabilise the grid.

Join us at the Sustainable Innovation Forum alongside COP23 to hear more on how the most influential national and local policy makers, UN agencies, business leaders, investors and international NGOs are leading by example towards the full achievement of the Paris

> Bonn, Germany alongside COP23

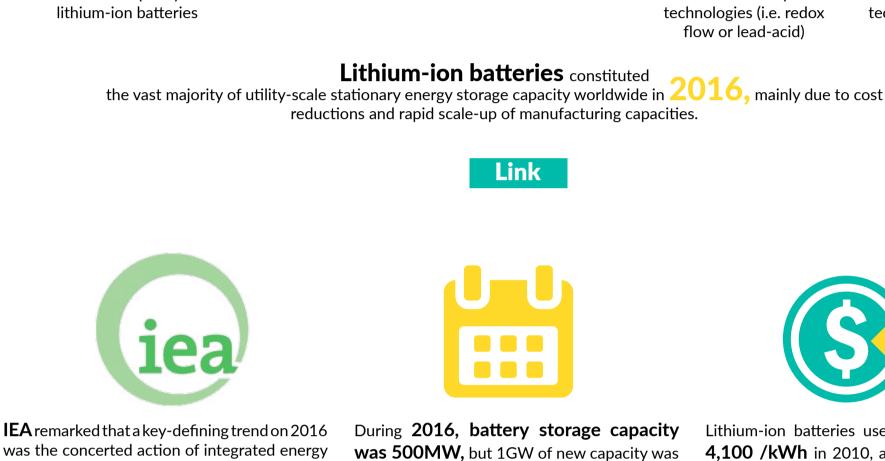






Distributed energy systems The creation of distributed energy systems will allow flexibility and will reduce reliance on expensive grid infrastructure, also solving problems of grid-integration for renewables.

Battery storage applications are divided into two main categories:



of installed capacity was

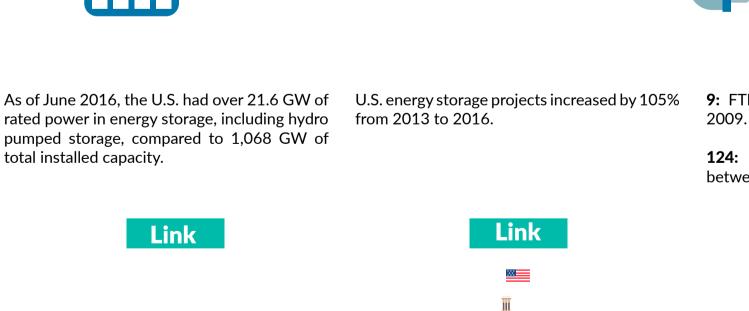












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credit for offgrid or on grid energy storage,

Link

offering up to 20% allowed credit.







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