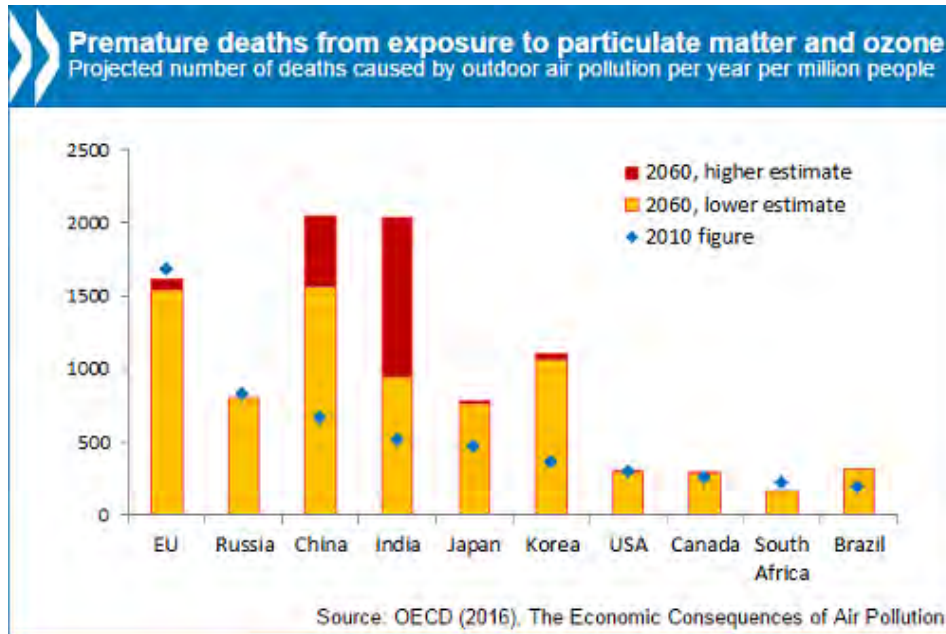


Electric Vehicles and New Technology Roadmap for CAREC



Sohail Hasnie
Asian Development Bank

Outline



- Overview
- New Technologies in Central Asia
- Global Trends
- EV roadmap for CAREC (draft report)

Proposed Investment Projects by Each Country

(Based on brainstorming session on 29 July in Tokyo 2015 and updated on 9 September 2015 in KL)

Project No.		AFG	AZE	KAZ	KGZ	MON	PAK	TAJ	TKM	UZB
A. Supply Side										
1	Solar powered micro-grid for remote areas	✓			✓			✓		
2	Adoption of clean coal technologies in power generation			✓		✓	✓			
3	Improve efficiency of solar industry / establish new industry					✓			✓	
4	Solar off-grid to reduce demand from diesel	✓			✓	✓	✓	✓		
5	Recycling of municipal waste for power generation	✓		✓			✓	✓		✓
B. Electric Vehicle and Storage										
6	Battery based grid storage for reliability improvement of renewable energy			✓		✓		✓		✓
7	Electric vehicles (bus, cars, motorcycles and scooters) pilot for government fleet and public transport	✓	✓	✓			✓	✓	✓	✓
C. Demand Side and Distribution Efficiency										
8	Demand responses through smart meters and diversified tariffs									✓
9	LEDs for public lighting and offices	✓	✓		✓		✓			
10	Efficiency in distribution efficiency and loss reduction			✓	✓		✓	✓		✓
11	Improve load dispatch systems and distribution control with SCADA	✓			✓	✓		✓		✓
12	Reduce heat losses in office buildings by retrofitting				✓	✓				

✓ Proposed in Tokyo on 29 July 2015 and confirmed in KL on 9 September 2015 (AZE and TKM did not participate)

✓ Proposed on 9 September 2015 in KL; For AZE and TKM, proposed in Tokyo on 29 July 2015

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B. Electric Vehicle and Storage										
7	Electric vehicles (bus, cars, motorcycles and scooters) pilot for government fleet and public transport	✓	✓	✓	▪	▪	✓	✓	✓	✓
	Electric bus	✓		✓			✓	✓		✓
	Electric cars	✓		✓			✓	✓		✓
	Electric motorcycles							✓		
	Electric scooters							✓		

- ✓ Proposed in Tokyo on 29 July 2015 and confirmed in KL on 9 September 2015 (AZE and TKM did not participate in KL)
- ✓ Additional information provided on 9 September 2015 in KL; For AZE and TKM, proposed in Tokyo on 29 July 2015

Opportunities for new technologies in CAREC

A. Power Generation Technology

- Power form biomass and municipal waste
- Higher efficiency solar power: (on-grid and rooftop)
- Floating and modular systems for remote areas
- Modernization of existing power plants

B. Power distribution systems

- Remote mini and micro-grid (solar and hybrid)
- Off-grid DC solar kit (with efficient DC appliances)

C. Energy Conservation and Energy Efficiency

- Demand responses: improved sensors, smart meters
- Super efficient lighting, appliances and HVAC
- Robotics and automation (small industries)

D. Storage

- On-grid batteries for system optimum system design
- Batteries for better integration of wind and solar
- Hydrogen as seasonal storage and fuel cell vehicles

B. Electric Vehicles

- Government fleet and public transport
- Public fleet: buses, trucks and tricycles or auto-rickshaws

Capacity Development and Knowledge Management

Solar Power



Tesla, Melbourne



Seoul, Korea



Climate Institutions

- **Green Climate Fund:** new technology projects
- **Global Green Growth Initiative:** partnership of NDCs





Could **India** Really Become 1st Fully Electric Car Country?

CleanTechnica - Jun 15, 2017

Could **India** genuinely become the first country to go fully electric? ... is that **India** is committed to an **EV** future, is working to bring it about, and ...

Elon Musk seeks relief on imports in **India**



Multiple **Indian** 'Gigafactories' expected by 2019

PV-Tech - Jul 12, 2017

This focus is being driven by opportunities in both stationary and electric vehicle (**EV**) applications in **India**, particularly with the government ...



Australia's first battery 'gigafactory' considered for Darwin

ABC Online - Jul 10, 2017

An **Australian** company has announced a bold plan to build **Australia's** first "gigafactory" in Darwin, producing custom-made lithium-ion ...

\$100 million plant Lithium battery plant planned for Top End



Today's headlines!

Today's headlines!

Solar Power Will Kill Coal Faster Than You Think

Bloomberg New Energy Finance's outlook shows renewables will be cheaper almost everywhere in just a few years.

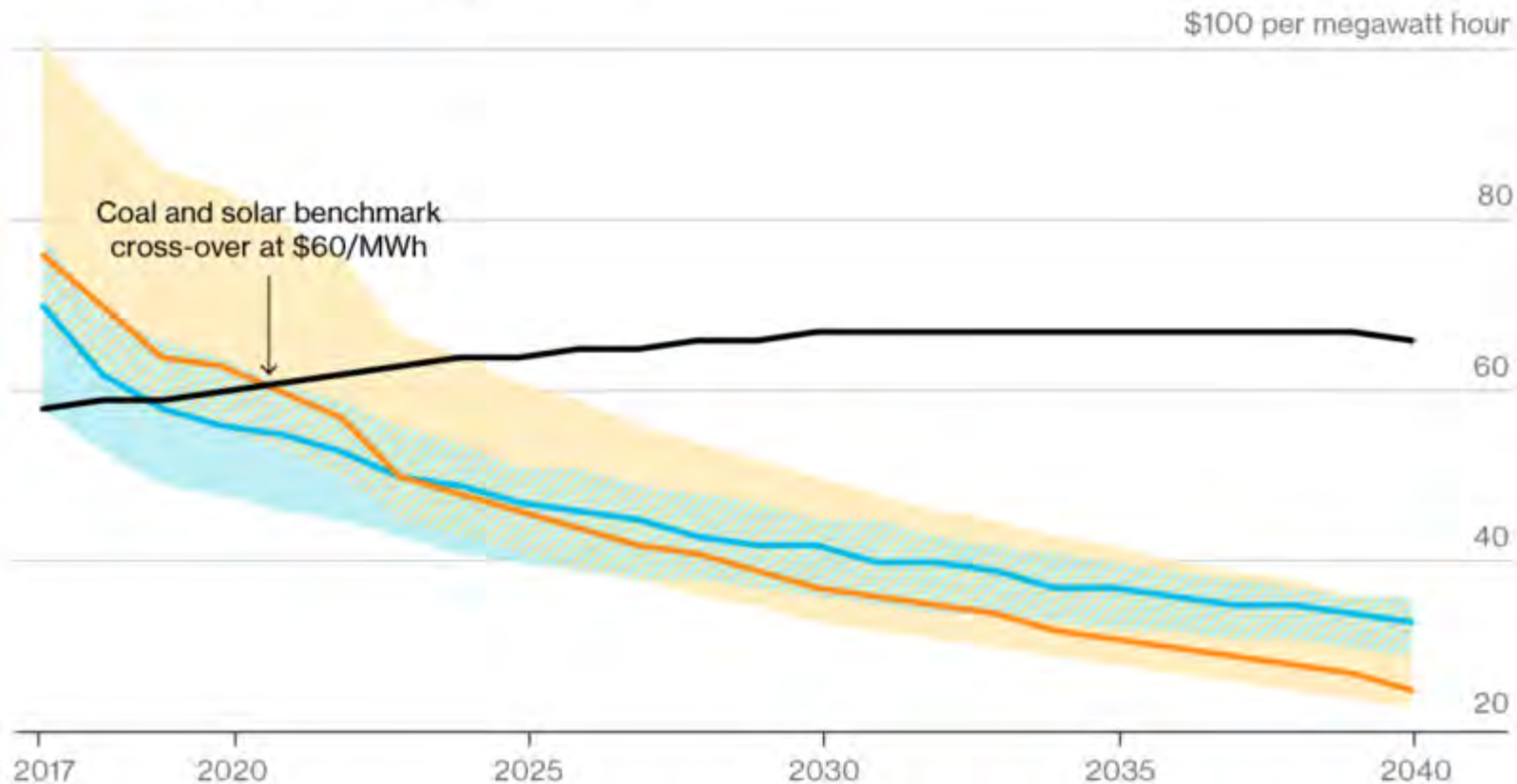
By **Jess Shankleman** and **Hayley Warren**

June 15, 2017 7:15 PM Updated on June 16, 2017 1:08 AM

China's Big Tipping Point

Within four years solar will be cheaper than coal

■ Coal ■ Onshore wind ■ Large solar farms



Levelized cost of energy based on realized load factors (2016 real). Source: BNEF

Bloomberg

Volvo credits Tesla for creating EV demand, says they will stop developing diesel engines to focus on EVs

Today's headlines!

Big, young power plants are closing. Is it a new trend?

Benjamin Storrow, E&E News reporter

Climatewire: Thursday, April 27, 2017



San Juan Generating Station in New Mexico could close in 2022, or three decades earlier than anticipated. Photo by Doc Searls, courtesy of Wikipedia.

Prioritizing Clean Energy technologies

Project Number: 49412-001
Regional Capacity Development Technical Assistance (R-CDTA)
August 2016

Access to Electricity with New Off-Grid Solar Technology in Central Asia

Financed by the Clean Energy Fund under the Clean Energy Financing Partnership Facility



Off-grid DC solar kits for as little as \$1,200?

Published on Friday, 14 October 2016

The answer is yes – off-grid is the future, and the only way to bring electricity to all by 2020.



Off-grid solar can be game-changer for electricity access in Central Asia

Published on Thursday, 22 September 2016

ADB recently approved new funding to demonstrate the technical and financial viability of this new technology combination in the CAREC region.

\$2 million grant
approved
in August 2016

Prioritizing Clean Energy Technologies

Project Number: 49413-001

Regional—Capacity Development Technical Assistance (R-CDTA)

February 2017

Leapfrogging of Clean Technology in Central Asia Regional Economic Cooperation Countries through Market Transformation

(Financed by the Clean Energy Fund under the Clean Energy
Financing Partnership Facility)



Leapfrog into technology to avoid getting
leapfrogged yourself

Published on Friday, 29 July 2016

Those that still question the need for technology
leapfrogging in development need to know if we continue
to use camel-era technology on the highway, we may get
hit by fast cars that have embraced innovation.

\$2 million grant
approved
in February 2017

Future is here

Future is here

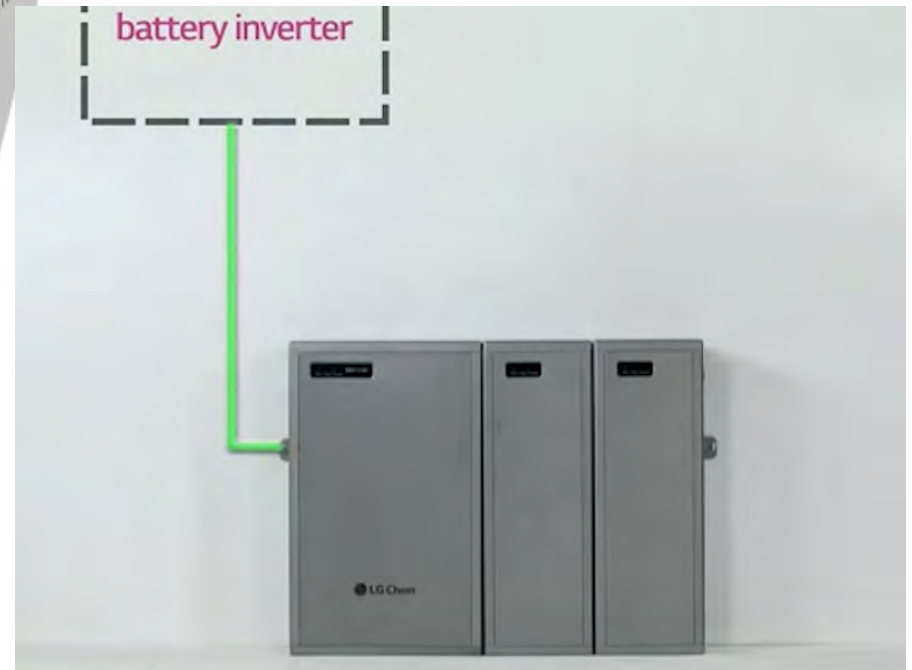


Screenshot via Tesla



A single Powerwall unit stores 14 kWh of energy, but you can link up to 10 batteries side-by-side to increase storage. A single unit, including installation, can cost as much as \$11,450.

Future is here

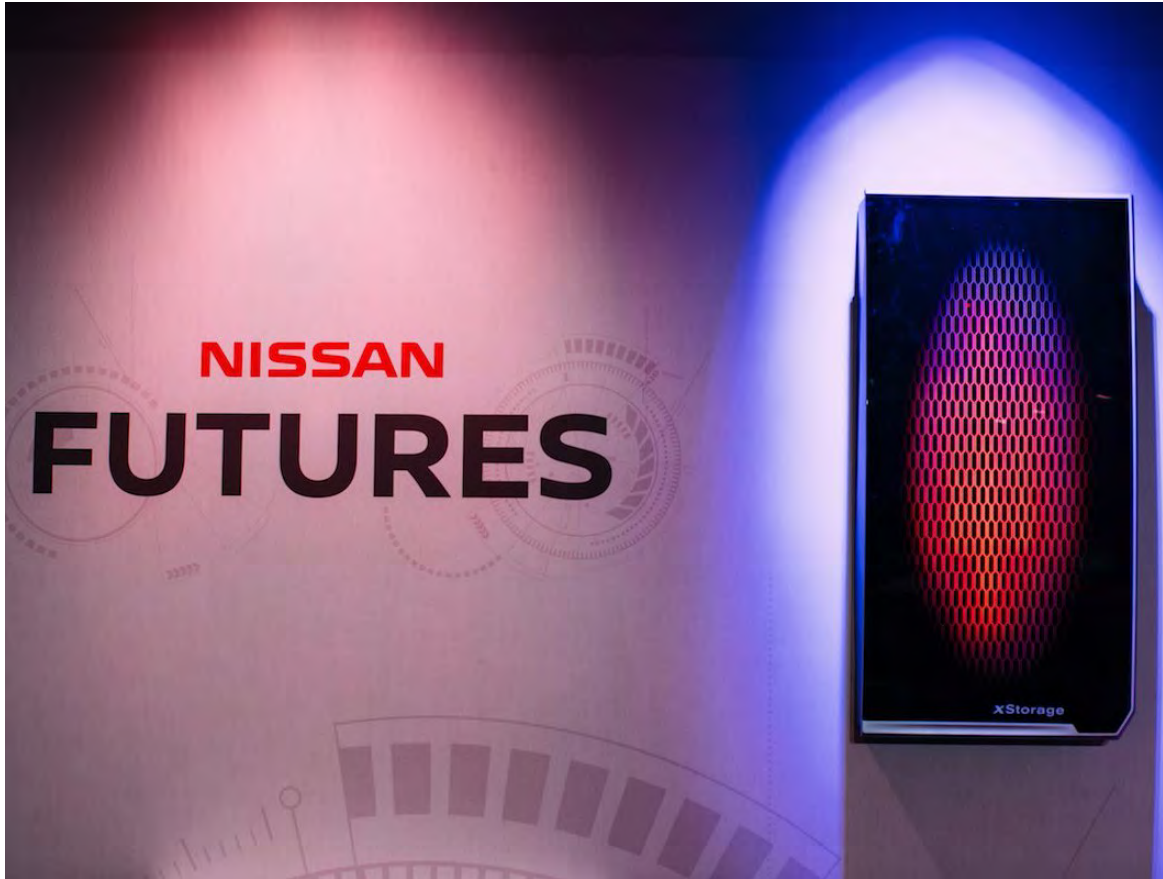


Future is here



The German automaker is following Tesla and LG Chem by partnering with a solar company to combine the battery and solar installation processes. Mercedes' battery stores 2.5 kWh of energy, but units can be combined to store 20 kWh. The biggest storage option costs \$13,000, installation included.

Future is here



\$4,500

3. Nissan offers a rechargeable battery option, called XStorage, which holds 4.2 kWh of energy storage. The automaker began selling the XStorage in May in the United Kingdom, where Tesla and Mercedes also sell their battery options.

Future is here

4. BMW plans to sell two battery options that can store a whopping 22 kWh and 33 kWh worth of energy, but they have yet to launch. Like Nissan, BMW will take a sustainable approach by reusing batteries from its BMW i3 series.



Future is here



Future is here



6. SimpliPhi Power is an at-home battery maker that's been around since 2002, but its original name was LibertyPak Company. SimpliPhi offers several battery options, the largest of which stores 3.4 kWh of energy.

Future is here

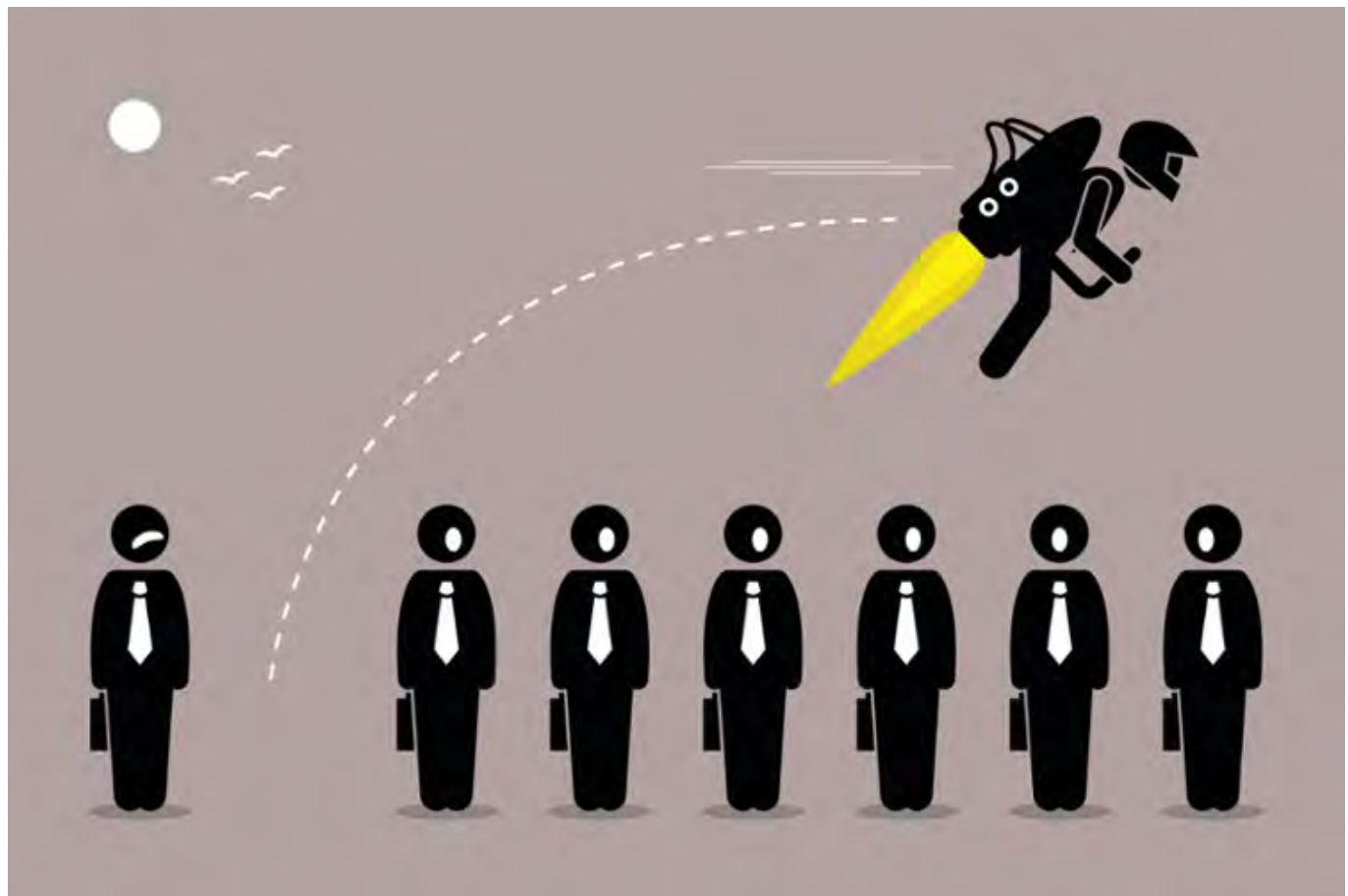
8. Powervault is an at-home battery system that is sold in the UK. All units come with an inverter included, and the most powerful model stores 6 kWh of energy. Prices start at roughly \$3,000.



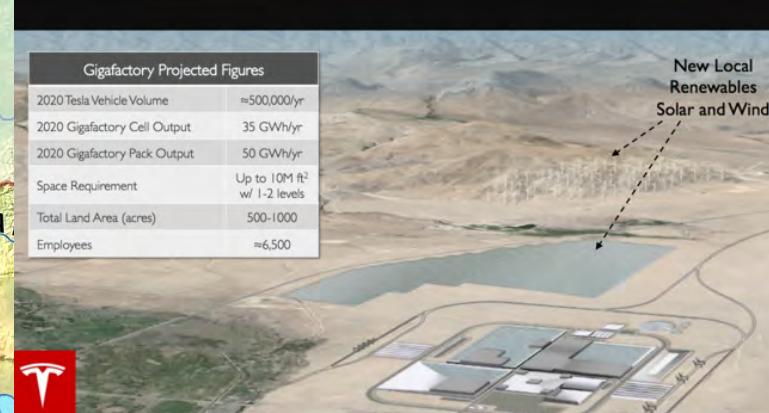
Future is here

10. Panasonic, which makes the cells for Tesla's home battery, also has its own unit that can store 8 kWh of energy. It's currently available in Australia.





How to accelerate leapfrogging?



Regional Battery Factory

- Pilot for electric bus?
- Floating solar?
- Scale up model?