

WHAT I LEARNED THIS WEEK

Excerpt from February 22, 2018

9 China could dominate the next phase of disruption in the \$6 trillion energy sector—creating new winners and challenging U.S. leadership.

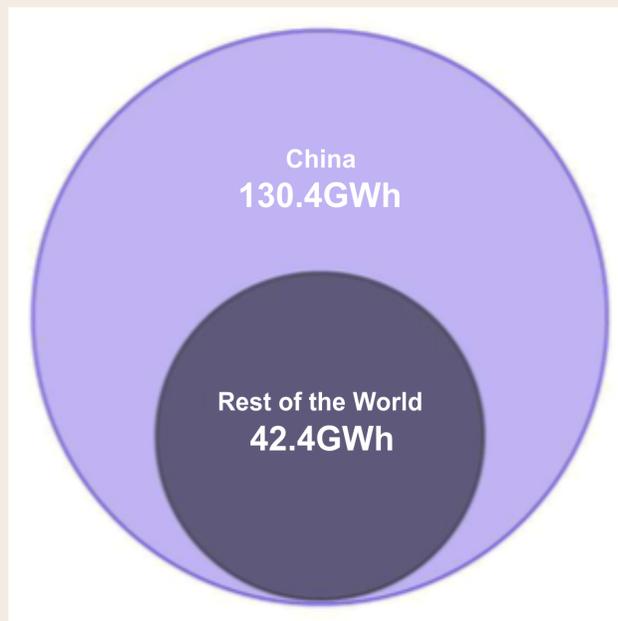
In *WILTW* June 1, 2017, we argued that the deployment of 100 megawatt-hours of grid battery storage in Southern Australia represented a major inflection point for the technology. Prior to Australia's deployment of battery storage, no utility or government would have considered intermittent renewables for a shortage of baseload generation capacity. Traditionally, the utility would have run a high-capacity transmission line to a distant coal plant or invested in a fossil-fuel-based solution.

Improving battery efficiency is now converging with the plummeting cost of intermittent renewables. Lithium-ion battery costs have dropped by a factor of five since 2010 and are presently about \$200 per kilowatt-hour for electric vehicles specifications. Morgan Stanley estimates they could fall to \$100 by the early 2020s.

Natural gas is beginning to get "edged out of power markets" by solar and wind combined with utility-scale batteries, notes Bloomberg. Last week, First Solar (FSLR) won a contract to supply Arizona's largest power utility when electricity demand peaks on its grid between 3 PM and 8 PM. The company proposed building a 65 megawatt (MW) solar farm with a 50 MW battery system, beating out bids from natural-gas power plants. State capacity mandates plus **a new rule approved by the Federal Energy Regulatory Commission last week** promise to accelerate the emerging trend by allowing energy-storage technologies to compete with other generation sources in wholesale energy markets.

Three key factors will drive China’s rising influence in the global energy storage sector: (1) China is making huge investments in international clean energy projects; (2) China is locking up the supply chain for battery components; and (3) **China has a pipeline of planned battery plants triple the size of the rest of the world combined.**

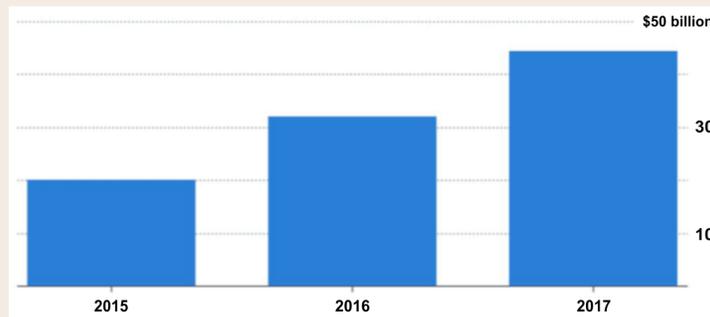
China’s battery plants pipeline



Source: Bloomberg New Energy Finance

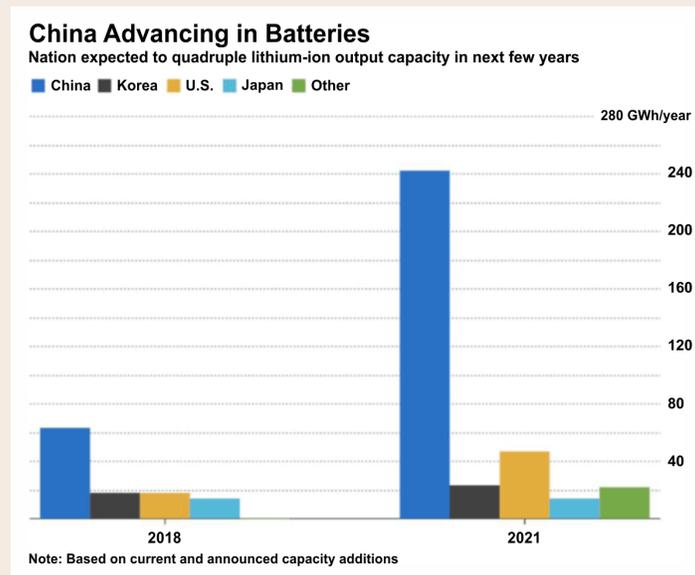
Consider the following:

- **In 2017, China invested \$44 billion in large, international clean energy projects and M&A—up 38% from 2016 and double 2015’s level.** Renewable energy sources are expected to account for nearly 75% of the \$10.2 trillion of global investment in new-power generation technology through 2040, estimates Bloomberg New Energy Finance. Recently, State Grid Corp. of China, the world’s largest power utility, completed the acquisition of a controlling stake in CPFL Energia SA (CPFE3 BZ), making it Brazil’s largest power-distribution company.



Source: Bloomberg

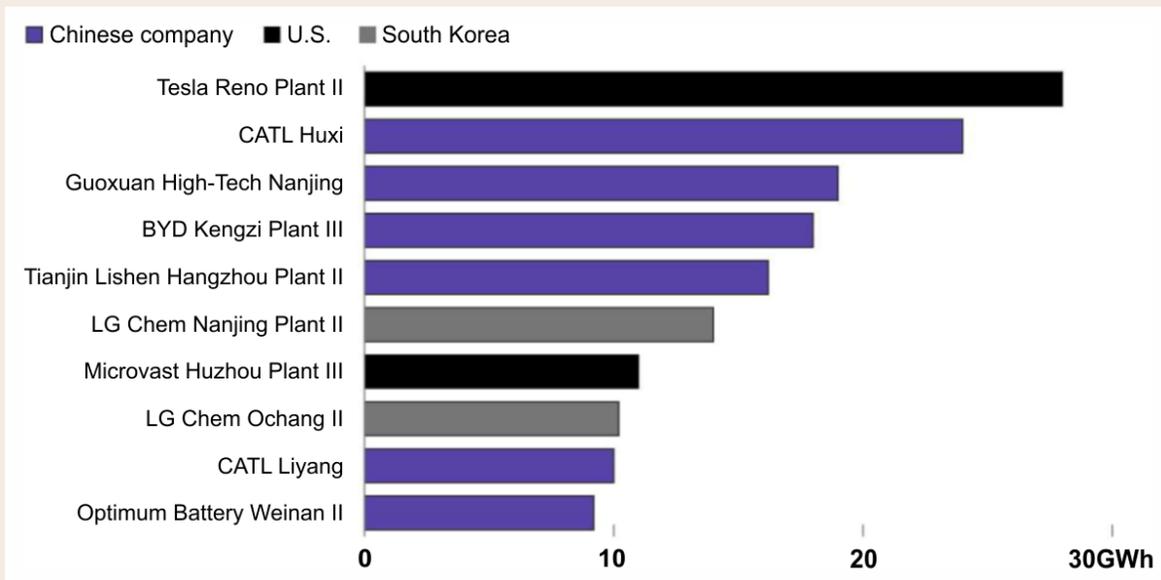
- China is on-track to increase its global market share in lithium-ion batteries to nearly 70% by 2021**, estimates Bloomberg New Energy Finance. China has announced plans to add over 150 gigawatt hours of production in the next three to four years—tripling the nation’s current capacity—and more than double the current global capacity of 110 GWh, highlights *The Wall Street Journal*.



Source: Bloomberg

Contemporary Amperex Technology Ltd. (CATL - listing pending) is already one of the top producers of batteries in China. Now, it is aiming to raise \$2 billion through a public offering to expand into Europe and the U.S, using the proceeds to build a battery-cell plant nearly as large as Tesla’s gigafactory. The factory will quintuple CATL’s production capacity—**making it the world’s largest electric-vehicle, battery-cell manufacturer**—surpassing Tesla, BYD, and LG Chem Ltd.

The chart below shows that five of the world’s ten largest battery cell plants are based in China.



Source: Bloomberg

- China is outmaneuvering other nations to secure supplies of lithium, nickel and rare earths.** Although China contains only about 20% of the world’s lithium resources, it consumes over 40% of the world’s lithium deposits. Chinese companies already dominate the first steps in the lithium-ion battery production process—producing about 77% of refined cobalt chemicals.

Several Chinese companies are making investments in Latin America and Australia to secure lithium supplies. Chinese private equity firm GSR Capital has also reportedly been seeking to acquire Potash Corp’s 32% equity stake in SQM—the world’s largest producer of lithium. Additionally, Tianqi Lithium (002466 CH) is investing \$600 million to construct a lithium processing plant in Kwinana, Western Australia, which will produce 48,000 tons of battery grade lithium hydroxide each year.

Gangfeng Lithium (002460 CH), the nation’s largest producer of the raw material, has filed for an IPO in Hong Kong to raise at least \$1 billion. Gangfeng plans to use the proceeds for acquisitions, further exploration of lithium resources, and capacity expansion to meet rising demand for electric vehicles.

Chinese miners also control 62% of the global supply of cobalt. In 2017, China invested over \$80 billion in overseas resource projects, notes the *Asia Times*—including cobalt mines in the Congo Democratic Republic, which produces 60% of current global cobalt production. Chinese cobalt miners, such as Zhejiang Huayou Cobalt Co. (603799 CH) and China Molybdenum Co. (3993 HK), dominate production from the network of middlemen who buy cobalt from freelance miners.

China's cobalt imports from Congo, totaled \$1.2 billion in the first nine months of 2017—versus \$3.2 million from India, the world's second-largest importer of lithium. Demand for cobalt is growing fast, with production quadrupling since 2000 to 123,000 tons annually—and could reach over 200,000 tons per year by 2025 (see *WILTW* August 31, 2017).

- **China is scaling cutting-edge battery technologies.** China is the largest producer of Vanadium and is now constructing the world's largest 800 MWh battery with the metal. **Vanadium flow batteries could revolutionize the global renewables sector**—due to their proven reliability, lower cost, and longer battery life. New V-flow Vanadium batteries could potentially reduce the cost of storage to as low as 5 cents per kWh, argues scientist James Conca. For utility-scale projects, V-flow batteries outcompete Lithium-ion and any other solid battery. Vanadium batteries can hold different levels of electrical charge, are non-flammable, and do not degrade for over 20 years.

The global storage market is expected to double six times by 2030, reaching 305 gigawatt-hours (GWh) of capacity, estimates Bloomberg New Energy Finance. Growing competition with China will likely force western counterparts to increase investment to gain competitive advantage—driving overall distributed energy costs lower and increasing adoption. Distributed renewable energy combined with economical storage systems could undermine incumbent electric utility business models. **Ultimately, utilities may morph into managers of distributed energy microgrids** (see *WILTW* October 31, 2013).

The Ardour Global Alternative Energy Index (AGIGL) and the Solactive Global Lithium Index (SOLLIT) sectors have been gaining relative strength—yet are trading at discounted valuations—9.4x and 10.1x expected EV/EBITDA, below their respective historical means of 10.4x and 11.1x.



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