DISTRIBUTED ENERGY STORAGE

Energy storage allows for power to be generated at a different time than when it is consumed (a process known as "time shift"). Distributed energy storage refers to small batteries that can be used in homes and businesses to capture electricity produced by DER sources (such as wind and solar) and save it for later. In this way, storage smooths the energy supply and helps combat problems of intermittency created by solar and wind power, thereby enabling greater deployment of renewable energy technologies.

The price of batteries has come down significantly in recent years and as uptake continues, prices are expected to continue dropping.[1] In the long run, batteries can save customers substantially in electric bills, especially if time-variant pricing is in place, enabling customers to store electricity at times of day when it is cheapest and release it for use on-site or into the grid at times when energy costs the most. By storing and redeploying energy at times of peak need, distributed batteries can reduce the need for fossil fuel peaker plants.[2]

With investments in vehicle-to-grid technology, electric vehicles can also be used as batteries that store and then return energy to the grid when needed, helping to address the problem of renewable energy intermittency and lead to more stable electricity pricing. However, this technology is not yet widely available and most charging stations and vehicles are unidirectional. A dearth and inconsistency of state regulations for vehicle-grid integration complicates rollout.[3]

As batteries for energy storage and electric vehicles come into wider use, concerns are mounting about the environmental and social impacts of mining for the lithium, cobalt, graphite, and manganese that are used in their production. Most of the world's lithium comes from salt flats in the Andes, where mining requires vast amounts of groundwater, sometimes causing groundwater depletion, soil contamination, and other forms of environmental degradation.[4] Almost half of the world's cobalt is derived from artisanal mines in the Congo, where children are often employed in dangerous conditions. Waste from cobalt mining can produce sulfuric acid when exposed to air, which can negatively affect rivers, streams, and

---

[1] Project Drawdown. "Distributed energy storage." https://drawdown.org/solutions/distributed-energy-storage

[2] Steimer, Hamilton (December 2, 2020). "Home battery storage programs provide grid flexibility and save customers money." *EESI.* https://www.eesi.org/articles/view/home-battery-storage-programs-provide-grid-flexibility-and-save-customers-money

[3] EV Connect. "What is vehicle-to-grid technology and how does it work?" https://www.evconnect.com/blog/what-is-vehicle-to-grid-for-electric-vehicles

[4] United Nations Conference on Trade and Development (July 22, 2020). "Developing countries pay environmental cost of electric car batteries." https://unctad.org/news/developing-countries-pay-environmental-cost-electric-car-batteries

aquatic life for hundreds of years.[5] Graphite mining is also known to be hazardous and environmentally damaging.[6]

There is now growing interest in mining the deep seabed, especially the Clarion-Clipperton Zone in the Pacific Ocean, for manganese nodules which often contain small amounts of cobalt, nickel, copper, and traces of rare earth elements. The environmental impacts of deep-sea mining are only minimally understood at present, but may be significant.[7] To resolve these problems, it is vital to develop technology and economic incentives to perform mining sustainably, develop less mineral-intensive batteries, and to recycle battery materials.

- Fishery friendliness: Batteries have the potential to improve the fishery friendliness of the overall energy portfolio by enabling reductions in total energy used. Concerns related to mining and disposal of mineral components should be addressed as part of a fishery friendly approach to climate action.
- Co-benefits: Co-benefits of distributed energy storage include energy resilience and cost savings.
- Environmental externalities: Batteries can produce lifecycle GHG emissions and can have environmental impacts associated with mining and manufacturing.
- Policy catalysts: Distributed energy storage can be promoted through rebates, tax incentives, grants, loans, implementation of time-variant electricity pricing, carbon pricing, and renewable/clean energy portfolio standards.
- More information:
  - Drawdown: Distributed energy storage
  - NREL (July 10, 2019): "Could batteries provide peaking capacity on the grid? With declining cost projections, NREL analysts see potentil."
  - EV Connect: What is vehicle-to-grid technology and how does it work?
  - International Energy Agency. *The role of critical minerals in clean energy transitions.*
  - United Nations Conference on Trade and Development. *Commodities at a glance: Special issue on strategic battery raw materials.*

Continue reading at https://fisheryfriendlyclimateaction.org/solutions

[5] United Nations Conference on Trade and Development (July 22, 2020). "Developing countries pay environmental cost of electric car batteries." https://unctad.org/news/developing-countries-pay-environmental-cost-electric-car-batteries

[6] United Nations Conference on Trade and Development (July 22, 2020). "Developing countries pay environmental cost of electric car batteries." https://unctad.org/news/developing-countries-pay-environmental-cost-electric-car-batteries

[7] Schlossberg, Tatiana (August 4, 2021). "The race for electric vehicle parts leads to risky deep-ocean mining."