Exploring Energy Storage by Duration

STEPTOE & JOHNSON PLLC

January 29, 2025

Presenters and 2024 National Champions

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Agenda

- General Overview of Exploring Energy Storage
- Energy Storage by Duration of Said Storage
  - Short-Duration
  - Medium-Duration
  - Long-Duration
- Land Use and Zoning
- Commonly Used Contract Agreements
- Tax Implications
- Questions

The Most Common Energy Storage Types

- **Pumped Storage from Hydroelectricity**: Accounts for 96% of energy storage capacity on the U.S. grid
- **Battery Energy Storage (BES):** Only 4% of capacity but growing quickly, expected to reach 13 GW (41 GWh) by the end of 2024
- **Flywheel Storage**: Great for grid fluctuations
- **Other Storage Technologies:** Compressed air, thermal storage, gravitational storage, and others are all used in niche applications across the world




Battery capacity figures from BloombergNEF

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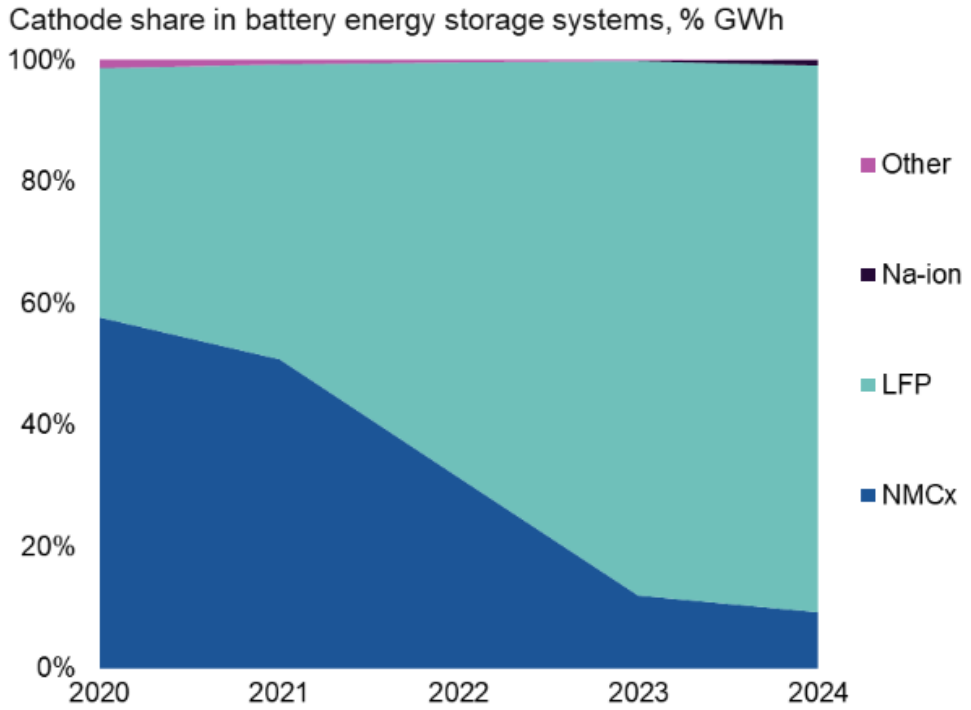
Battery Energy Storage Value

- **Ancillary Services:** Helps maintain grid stability
- **Renewables Integration:** Helps ensure an efficient use of energy produced from renewables
- **Grid Support:** Managing transmission & distribution network constraints
- **Resource Adequacy:** Ease the strain on the grid during peak demand
- **Energy Arbitrage:** Storing energy when prices are low and selling high to max profits

Source: Roland Berger and Volta Foundation

The Most Common Batteries

- **Lithium-ion (LFP)**: Dominant stationary storage chemistry
- **Lithium-ion (NMC)**: Previous world leader higher, but higher costs have reduced demand
- **Sodium-ion**: Emerging substitute to Li-ion – U.S. holds >90% of world's salt reserves
- **Flow**: Two types, vanadium and iron flow – typically longer duration and safer than Li-ion
- **Metal Air**: Capable of 100-hour storage, yet to fully commercialize



Cathode chemistry chart from CRU Group

Worldwide soda ash reserves from Statista

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Short-Duration Energy Storage – Ultracapacitors

- The **sprinters** of energy storage
- **Rapid response** – ideal for sudden fluctuations in supply or demand
- **Smooths** intermittent nature of renewable energy storage assets
- **Increased usage** in data center applications where resiliency is critical

Short-Duration Energy Storage – Li-ion Batteries

- The **dominant** force in energy storage
- **Rapid response** – ideal for sudden fluctuations in supply or demand
- **Smooths** intermittent nature of renewable energy storage assets
- **Increased usage** in data center applications where resiliency is critical

Intra-day Energy Storage

- **Renewable Integration:** Shores up renewable assets
- **Transmission & Distribution Deferral:** Can help defer or avoid upgrade costs
- **New Technologies:** Non-li-ion tech is emerging rapidly in this duration
- **Peak Demand Reduction:** Can reduce demand for businesses and utilities during high consumption periods

Long-Duration Energy Storage - Seasonal

- **Bridging the gap:** Better flexibility during poor renewable power generation
- **Cost-Effective:** Longer duration becomes cost-competitive with fossil fuels
- **Enhanced Resilience:** Longer duration improves resiliency and limits blackouts for the grid

Seasonal Energy Storage – Hydrogen

- **Quarterly storage:** Does not suffer from significant self-discharge over time like batteries
- **Versatile Storage:** Can be stored as a gas, liquid, or within a chemical carrier like ammonia
- **Multiple End-Users:** Not only is it used for electricity generation, but can also be used for heating and various industrial processes

Land Use and Zoning

- The tools used for obtaining site control in energy storage development are very similar to those commonly used for wind, solar, and traditional energy projects
- Local land use, zoning, and environmental regulations, and title restrictions, play a major role in how long and how difficult it will be to obtain development entitlements
- Brownfields, or previously developed industrial sites, are already zoned for commercial use and may have existing infrastructure that can be repurposed for an energy storage project and possible substation, or other interconnection possibilities
- Few states have statutory requirements addressing energy storage facilities

Land Use: Co-Location

- Pairing a storage system with solar or wind generation projects has two main advantages:
  - Store power when market prices are low or negative
  - Store power when the electricity that would otherwise be delivered to the interconnection point by the project is curtailed

Common Contracts

- **Fixed Price Contracts**: Financing parties prefer to have long-term agreements with stable and reliable revenue streams; product developers typically use three types of long-term contracts: (1) capacity contracts, (2) end customer battery use contracts, and (3) resource adequacy contracts.
- **Capacity Contracts**: The utility pays a fixed capacity payment or battery-use payment for the right to dispatch energy from the storage system, subject to compliance with negotiated operating procedures (i.e., meeting specific metrics like maintaining guaranteed level of availability). In exchange for the fixed capacity payment, the buyer or offtaker received the benefits of operating battery.
- **End Customer Battery Use Contracts**: The commercial and industrial customers pay a fixed monthly fee for the right to use the battery. Ownership of the project, including the right to obtain any applicable tax credits, is retained by the project sponsor or indirectly by tax equity investors.
- **Resource Adequacy Contracts**: Resource adequacy is the ability of the electricity system to supply electric power and energy to meet electricity demand at all times, taking into account scheduled and unscheduled outages.

Tax Implications

The **Inflation Reduction Act (IRA)** expanded the technologies eligible for the Investment Tax Credit (ITC) to include standalone energy storage technology. The IRA has expanded options for financing energy storage projects in two main ways:

1. Projects are no longer required to be paired or co-located with a solar or wind project for the projects to qualify for an investment tax credit
2. Project sponsors that do not have the tax capacity to take advantage of the ITC are no longer required to enter into a tax equity transaction with a third-party to monetize these credits

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- Federal Tax Benefits
  - Production Tax Credit (Wind)
  - Investment Tax Credit (Solar, option for wind)
  - Modified Accelerated Cost-Recovery System

- State Tax Benefits in Ohio and Pennsylvania
  - Residential Clean Energy Credit provides a 30% tax credit for the purchase of residential clean energy equipment with battery storage

Shaping Your Practice to Include Renewable Energy, LexisNexis (2022)

Questions?

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