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Electric Grid Storage

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Electric Grid Storage – What Do We Need?

Utility scale chemical battery storage to deal with rapid intermittency in both **generation** (renewables) and **demand** (rapid changes in use throughout the day).

We Need:

- Large scale
- Stable
- Long Lasting

19th Century Batteries for 21st Century Electric Grids

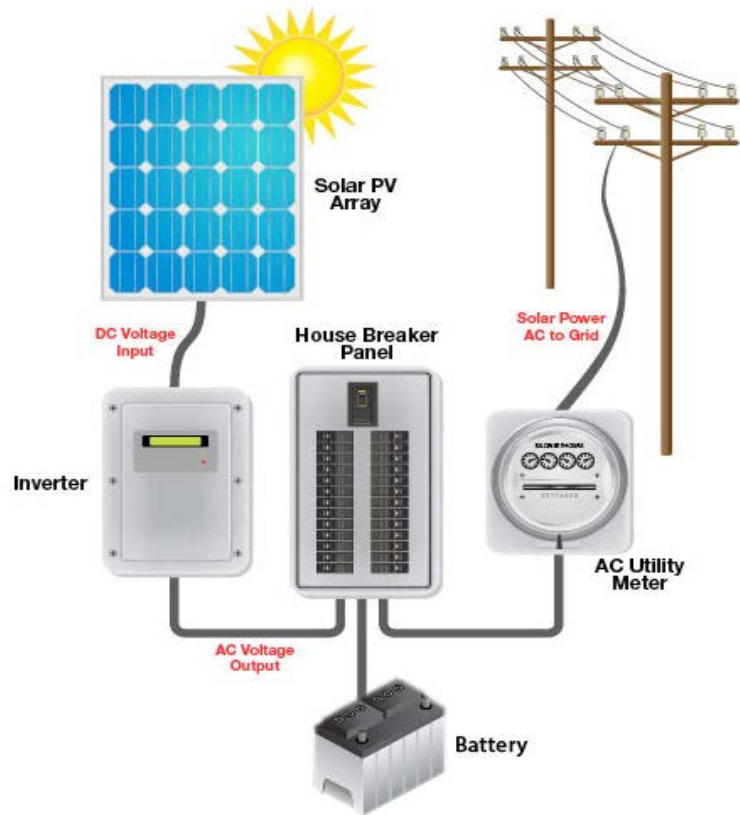
GigabitFactory – When fully operational, will produce more lithium ion batteries than all the world's battery factories combined.
Expected production: 30 billion watt-hours/year



If we are to make storage systems large enough to arbitrage the electric grid, we would need a minimum of 8 hours of storage—preferably days.

- According to BloombergNEF, there were 316 gigawatt-hours (GWh) of global lithium cell manufacturing capacity (2019)
- United States consumes **18,000 Billion watt-hours / day**
- It will take **100 years (1 century)** of production from the Gigabit Factory in order to produce 8 hours of storage

Issues with Current Storage Technologies



- **Lithium Ion** – Short Operating Life, Rapid heat generation
- **Sodium Ion (Li-ion)** – Carry 3 times the capacity of Lithium, new technology – not fully tested.
- **Vanadium-Flow Batteries (V-Flow)** – commercialization of vanadium suffers from high cost of V
- **Pumped Hydro Storage** - 99% of grid storage. Geologic and environmental constraints.

Costs and environmental constraints eliminate current battery technologies and Pumped Hydro as viable options.

Lawrenceburg: Uses for Lithium Ion

Lawrenceburg is looking forward to utilizing current lithium ion battery technologies to save money and create a new revenue stream.

In order to save money, Lawrenceburg can commence with augmenting existing fleet of vehicles to EV in conjunction with generating revenue by installing EV charging stations.



- **For present and near-future:** will dominate the small volume niche such as personal electronics and electric cars
- Not suitable for large fleets. Most appropriate for small or light fleets.

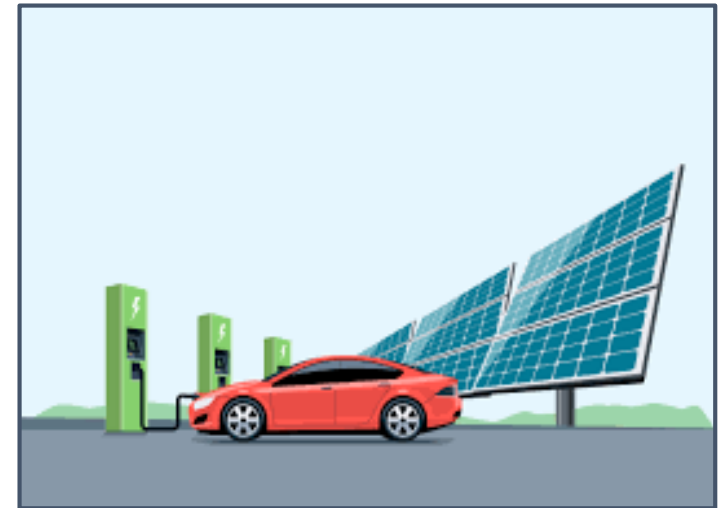
Potential Savings for the City

2018 Average Fuel Costs per gallon:

- \$1.9053 Unleaded
- \$2.2378 Diesel

2018 Fuel Cost for the City of Lawrenceburg:

- \$192,329.18



Revenue Stream:

Lawrenceburg Municipal Utility can expect a ordinance-based return of around 20% on all EV sales