A Salty Solution

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1. Introduction

OK, let's say you work for a company that needs to build a new Data Center, and a large one at that. Large Data Centers need huge amounts of power, and they need this power when there is a demand for computation, irrespective of the price of power at that time. Furthermore, if you are on a grid that has poor power reliability (which has a tendency to coincide with areas with low property-values, which would otherwise be good for large data centers), there is a slight chance the grid may be dead (that is, not be capable of feeding power to your data center) at any given moment.

So, what are potential solutions to the quandary presented in the above paragraph:

1. Back-up on-site generation
2. An uninterruptible power system (UPS)
3. Full-time on-site generation
4. Both 1 and 2 above
5. Both 2 and 3 above

Let's start in the middle with solution 3 above. Until most of the last decade, your only choice for generation was a fleet of internal combustion prime movers, each driving a generator. These not only have a high up-front cost, but because they need to be periodically run (mainly to make sure they still run by testing them, but also to keep their engines, fuel-systems etc. operational), there is a high ongoing cost. Also, since they have a long startup time, you probably really need solution 5 (with at least a short run-time for the UPS). The good news is that solution 5 probably has the highest overall availability, regardless of the availability of the local grid, but dependent on the availability of the on-site generation (thus, this should probably be a fleet of at least three or four diesel generators with a large fuel-supply).

Your author was in the army in the late 1960s (yes that was almost 60 years ago, and thus I am older than dirt). I was trained as a Nike Hercules Electronic Maintenance Tech.[1] The Nike Hercules were nuclear-armed surface-to-air missiles that had an extremely high-altitude capability, and thus each missile could (theoretically) destroy a fleet of incoming ICBMs or (more likely) bombers. This design eventually evolved into the current American Ground-Based Midcourse Defense (GMD) system. See the site in the footnote referenced at the end of this sentence for more information on GMD.[2]

Back to back-up power. At each Nike Site we had a building full of large diesel generators, that were all run periodically to ensure that they would operate when they were REALLY deeded (when the U.S. was being attacked). This is before large UPS were available, and the only energy-storage technologies were low-voltage lead-acid batteries, thus the diesel gen-sets were the only "uninterruptable" game in town.

[1] If you don't know what a Nike Hercules is, it is see: https://en.wikipedia.org/wiki/Nike_Hercules

[2] The American Ground-Based Midcourse Defense (GMD) system, https://en.wikipedia.org/wiki/Ground-Based_Midcourse_Defense

However, now we have a number of advanced battery technologies and really large inverters that can be used in really large, 240v or 480v UPS-systems. However, unlike with military systems of the past, these are commercial systems. The good news here is that, with the current growth of data center demand, there is a huge volume to drive new innovative designs.

In recent years lithium-ion batteries have dominated UPS-systems mainly because mobile and stationary energy storage, combined, has created a huge demand for this technology. However, lithium is relatively rare, and with the current demand of EVs and smaller battery-backed devices growing rapidly, ditto for the price of lithium.

So, what is the lower-cost replacement for pricy lithium? How about an element close to lithium in its characteristics, but dirt-cheap, or rather ocean-water-cheap. We literally have oceans of this material's primary source – ocean-water, which is a water-solution of (primarily) sodium chloride (NaCl), also known as table-salt, and tiny amounts of other compounds. There are also huge terrestrial supplies of NaCl.

Salt is currently mass-produced by evaporation of seawater or brine from brine wells and salt lakes. Mining of rock salt is also a major source. China is the world's main supplier of salt. In 2017, world production was estimated at 280 million tonnes, the top five producers (in million tonnes) being China (68.0), United States (43.0), India (26.0), Germany (13.0), and Canada (13.0) …[3]

Large quantities of sodium chloride are used in many industrial processes, and it is a major source of sodium and chlorine compounds used as feedstocks for further chemical syntheses.

2. Back to Data Centers

Since the beginning of civilization, availability of energy has defined what humans can build. The next era will be enabled by artificial intelligence- (AI-) controlled factories. This will enable (mostly) autonomous industry. These will be facilitated by electricity that is cheaper and more abundant than any in history and will mainly be produced by renewables. Peak Energy is building the company that delivers it: an integrated energy company anchored on the lowest cost electron delivered to the grid.[4]

Our first product is the world's first fully passive grid-scale energy storage system: engineered to outlast its 20-year warranty without scheduled maintenance and drop-in compatible with any battery energy storage systems currently in operation. We deliver the lowest cost electrons to power homes, and run factories today.

Peak Energy is rethinking how grid storage is built, and who builds it. We're the first U.S. company to vertically integrate every step of the Energy Storage Industry.

Author's comment: Peak's basic technology is sodium-ion (Na-ion) batteries. These are designed for grid-scale stationary energy storage rather than electric vehicles. See the image (clearly not something that can be used in an EV) and last two paragraphs on page 3.

[3] Wikipedia Article on sodium chloride. https://en.wikipedia.org/wiki/Sodium_chloride
[4] Peak Energy Website, https://peakenergy.com/ Much of the content in Section 2 comes from this site.

Peak's batteries are more than a product. They're a platform for growth. By delivering affordable, reliable, and abundant energy, we enable the next era of American innovation: AI infrastructure, advanced manufacturing, electrified industry, and resilient communities.

Our systems reduce the need for expensive new generation and transmission assets, helping utilities, developers, and grid operators meet rising demand without passing on higher costs. And because our supply chain is rooted in the U.S., Peak supports the expansion of domestic mining, refining, and battery manufacturing, creating thousands of high-quality jobs and strengthening America's position in the global energy race.

2.1. Lowest Total Cost of Ownership.

Built for the grid, proven at scale. Peak is a true drop-in for incumbent BESS: same install crews, same EMS integration, no new playbook to learn. A 20+ year design life-span with zero scheduled maintenance and no augmentation means a bankable asset you can underwrite with confidence, not a maintenance liability. Passive thermal management removes the components behind most BESS failures, unlocking higher uptime, lower operating expenses, and a safer site near load centers. Peak has already deployed in partnership with nine of the largest Independent Power Producers and utilities in the United States, with grid operation for over 10 months. Systems are fully 48E ITC compliant[5] and offer the lowest total cost of ownership, saving $75/kWh through minimal operating costs.



Our chemistry (NFPP)[6] is purpose-built for stationary storage, not borrowed from mobility. Incumbent battery chemistries were built for vehicles, where energy density and weight matter most. Stationary' storage has different priorities: reliability, operating costs, long-term performance, and safety.

Our NFPP-based sodium-ion chemistry uses abundant materials like sodium, iron, and carbon and avoids critical minerals entirely, derisking the supply chain It aligns with proven cell manufacturing methods and is reliable across wide temperature ranges.

[5] Section 48E, formally the Clean Electricity Investment Credit, is the technology-neutral Investment Tax Credit (ITC) for projects beginning construction in 2025 or later. Any facility with a greenhouse gas (GHG) emissions rate not greater than zero can qualify, regardless of technology.

[6] NFPP stands for "Sodium (Na) Iron (Fe) Pyrophosphate," a polyanion-type cathode material used in Peak Energy's sodium-ion batteries

Our systems prioritize serviceability, uptime, and predictable long-term performance. There are no moving parts in our product, no active cooling, no auxiliary systems, and no unnecessary complexity. The GSI.I is a four-hour grid solution, engineered to operate with minimal and low operating expenses for 20+ years. By removing components that fail and using a chemistry that degrades slowly, we've built a system that operates quietly and reliably in the background. Peak's system removes active cooling, reduces cabling, and simplifies installation. It is open-air, modular, and passive by design. Simplifying the system bolsters the economics.



ESS Gigafactory in Sacramento, California