Lincoln’s Park

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Problem:

As our energy demands grow larger and larger each year, society is hard pressed to keep up and maintain such a demand efficiently, safely, and responsibly. Most electrical consumers follow a similar schedule of power demand that stresses the grid greatly during specific hours, while barely at all during others, creating what is known to many as “peak hours”. Electrical providers and designers must design and size power production around this inconsistency and customers hurt because of it.

Competitive Analysis:

One of the most populated sections of the market for home energy storage is the charging of an electric vehicle at home. This section of the market does not inhibit our progress or market share as their products are typically exclusively for this purpose. Beyond car charging, the other primary marker is emergency backup systems. Examples of this include the Goal Zero home energy storage products which integrate through a manual transfer switch and are intended for emergency or temporary usage.

Technical Specifications:

The solution product aims to solve this through the following key points:

1. Reduce customer energy bills through the removal of additional “peak-hours” energy charges
2. Remain inexpensive as to provide sub 6-year return-on-investment costs.
3. Provide flexibility and upgradability while remaining simple to use to allow connection such as auxiliary power sources or electric vehicle charging
4. Reduce overall energy demand for electrical provider when deployed on large scales, allowing more consistent and predictable energy draw for entire neighborhoods.

Product Development Process:

We began our product development process at the exploration phase. This included research, conceptual work, architecture explorations, and feasibility studies. In Phase 1 (the requirements and planning phase), a project plan, product requirements, and risk analysis were created. Phase 2, the detailed design phase, involved three separate sub phases that included architecture technology feasibility, our prototype 1 (design, build, and test) production, and our prototype 2 (design, build, and test) production. Phase 2 involved creating system block and state diagrams, core functionality implementation, building the prototype units, and integration testing. In Phase 3, design verification and design transfer phase, the design was complete, pre-production units were created for design verification, and the team continued to implement verification tests. Phase 4 is the production phase which included manufacturing design guidance and ongoing engineering support.

Future Work:

The refinement of our existing prototype to follow all safety and installation requirements by NEC and UL standards will comprise the most of our work until major obstacles (see lessons learnt section) can be overcome. Future work on the prototype would be to refine it’s goal as a product meant for implementation into new buildings/facilities where up-front costs can be absorbed into the total facility/home.

Lessons Learned:

Lessons learnt during the building, testing, and research process summarize our findings as to why such an idea is not yet mainstream. The cost of a properly sized system simply does not provide enough cost savings to justify the initial investment a consumer would have to pay. That, coupled with the labor and effort it would take to properly install a product safely into existing buildings, calls for a change to the overall product goals or limits the customer base to only new installations during the construction process.

Gantt Chart: