We began working on a new DC-driven control system as a derivative of our work around solar pre-cooling. Since almost all refrigeration systems run on AC, which we felt was not ideal when attempting to maximize efficiency from PV solar, we looked to leverage a 100% DC solution to improve results. However, the solutions we were encountering were just not flexible enough, not intuitive enough and not robust enough. They fell short of managing source, load, and prioritization. So, we designed our own. Which lead to a patent and an exploding market opportunity. We realized that this new DC control system had much broader applications than just powering our refrigeration system—it could be used to smartly manage ANY DC environment with multiple power inputs and outputs. Now, we want to take our control system to the next level.

Prototype operating specifications (current scope)

Our control system version 2.9 currently controls the flow of energy managing both source and load. Within scope for our next prototype are:

- **IoT Integration** – Internet of Things (IoT and IoT MQTT Gateway), Beacons, Sensors, Data Gatherers
- **Data / Web Services Integration** – Power Grid / Power Company (for rates, usage data and sell back to the grid), weather data, subscription to cloud services via computehub.io for consumer reporting, NEST, RING, etc.
- **Machine Learning / Artificial Intelligence Algorithms** – the solution must learn the usage pattern of the consumer (whomever and whatever the application). Take a home … the system would begin to learn the power demands and patterns and build out a usage profile.
- **Power Zone Capable** – power up this zone / power up that zone… prioritize the distribution of power based on usage patterns, user settings, the zones I care about, what costs less, etc.
- **Exposed Webservices –** APIs and Webservices published for broader integration and flexibility
- **Improved UI/UX** – The front-end experience needs to be improved (ultimately will be a smart phone app and a touch screen).
- **Blockchain Aware** – We intend to build this such that the logic can make use of emerging blockchain technology to tokenize smart choices (compensate via digital currency), further decentralizing and democratizing solar.
- **Data Analytics and Reporting** – usage pattern data that gets fed to the consumer, agency, customer while they are using our system in home or out in the field. This would allow for better decision making.
- **Hardware and Connectivity Platform** – Cellular Gateway, WiFi, Bluetooth, Ethernet
- **Security** - Security / Credentialling and Intrusion Prevention

On the list but out of scope for next phase:

- **Fly Wheel Logic** – Creating an energy fly wheeling effect and for the avoidance of high tariff or peak charges because the system is power rate aware.
- **User Alerting and Communication** – Receive a notification on your phone letting you know "hey, you have excess solar power, it would be a great time to vacuum and you will save $$."
- **Gamification** – Have achievements that let the user know how much money they saved that day.
- **SmartPhone App** – This is obviously table stakes, but the logic needs to be completed first
- **Cloud Services** – We have a cloud partner willing to assist with prototyping cloud subscription services for both reporting and for additional tuning and integration

Design Narrative: A Hardware Platform: the system sits in line such that it can be aware of what power sources feed the application (house, RV, boat, tent, warehouse, whatever). We have a design for that intelligent piece of hardware. There is a degree of simplicity to it… it simply needs to understand "if plugged into port 1 = solar, port 2 = shore power, port 3 = xxx, etc." On the other side, it needs to feed the house and it needs to talk to the "brain" or the control system (SolarXOS) itself.

Compute: The control system, in turn, needs to be able to interrogate that devices inside the house (see note about smart outlets). The control system is software running on top of local hardware. We will offload some of the compute to the cloud… but the integration with the house will need to have a nerve center (in a manner of speaking).

Specific Request for Technical Assistance:

There are a series of things that Solar X Works is seeking to partner with Connectors on.

These include:

- Front end development and UI/UX design.
- Support associated with IoT integration.
- Support for the algorithms / logic associated with AI.
- Test labs / facilities
- Specific testing of energy storage integration
- Custom logic board design