

Battery Manufacturing



Your Battery OEM.

Rainhouse decided to pursue battery manufacturing capabilities after a client's request. Our clients often approach us with challenges that push us to our limits. Fueled by our desire to do the best we can and grow as a company, we utilize both our research and development team and our manufacturing experience and expertise to make products that meet the needs of our clients.

Taking our client's request and advice, Rainhouse approached Canadian Electric Vehicles (CanEV) about a project to tackle the lack of local battery manufacturing capacity in BC and the supply chain issues associated with it. Rainhouse, along with CanEV applied for and received a Supply Chain Resiliency Grant (SCRG) from the BC provincial government with the goal of establishing the necessary competence and supply chain needed to develop a battery pack that will power CanEV's new mid-sized utility truck, as well as prepare Rainhouse for future battery manufacturing projects.

Rainhouse's long-term goal when it comes to battery manufacturing is to invest, develop and produce battery energy storage systems (ESS) for green technologies, including off-grid storage and electrified vehicles and vessels, which have the potential to drive our local economy going forward.

Thus far, our research, with the help of the University of Victoria's Clean Transportation Research team, has involved identifying new and used battery sources, testing, battery performance, and long-term degradation modeling. We have experimented with end-of-life Nissan Leaf batteries and with new cells to create three different prototypes. We are also working to acquire all the necessary equipment for testing and production and determine the certification requirements for the battery packs we hope to be producing soon.





Prototype A

The smallest of our units for lower wattage appliances.

Specs

- 50.4V, 25.2Ah, 1.3kWh, 1200W
- Molicel P42A 21700 cylindrical cells, 84 cells in 14S6P configuration, similar cells to 2020+ Teslas
- 42.0 – 58.8 V range
- BMS with under/over-voltage protection, temperature protection, real-time cell monitoring via USB or Bluetooth, 25A circuit breaker
- Max continuous discharge of 25 A (1200W)
- Outputs: 12 VDC, 5V USB x 4, 120 VAC x2

This prototype was the first battery pack completed and served as a valuable learning experience. This battery pack is a self-contained unit with the charger and inverter mounted inside the enclosure, which is easily carried by one person, or mountable in a 19" rack. It is capable of powering small appliances, perhaps even a 1200W microwave, and charging phones, laptops etc. This small battery pack could be suitable for light use while camping or as a backup for a home or cabin in the event of a power outage. This design does not require any external components other than the power cord for the charger, and the rack mount capability allows it to be scalable. These features provide this small battery pack an advantage over other designs available in the market. Currently, this model is not intended to be sold and only serves as a test platform and demonstration piece.



Prototype B

Our medium size units for household and recreational use for higher wattage appliances.



Specs

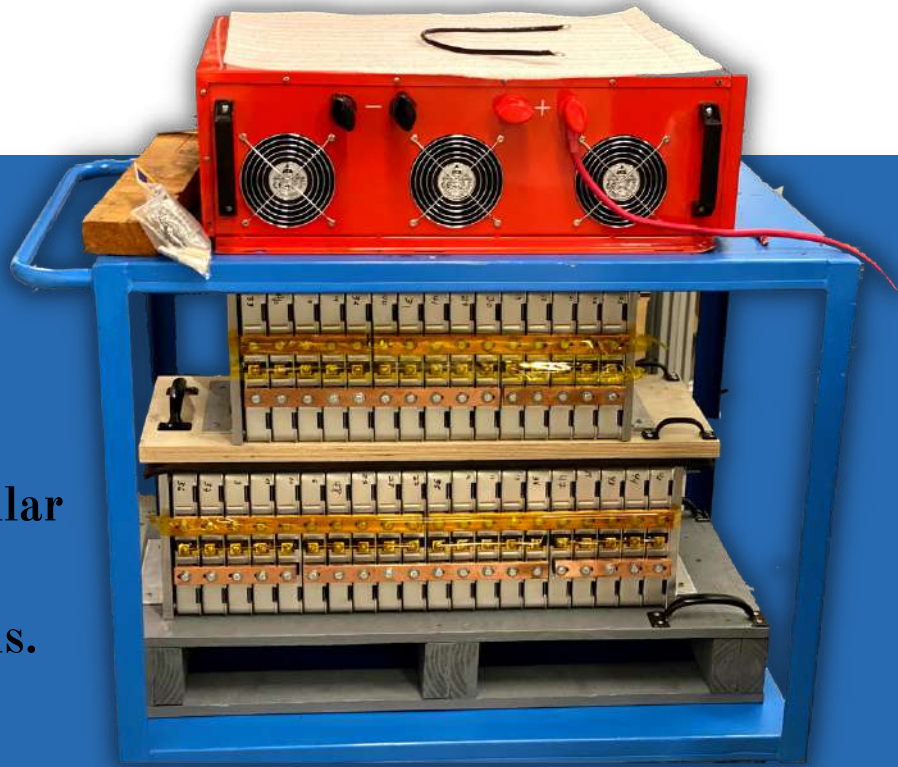
- 53.2V, 37.3Ah, 2.0kWh, 2500W
- 7 second-life Gen 1 Nissan Leaf modules in series (14S2P Li-ion)
- 43.4 – 57.4V range
- BMS with under/over-voltage protection, 63A circuit breaker.
- Max continuous discharge of 47 A (2500W)
- Outputs: 2500W inverter, 120 VAC x2



Prototype B was the second battery pack we built, and differently from Prototype A, it utilizes second-life Nissan Leaf modules and provides nearly double the output power and capacity. Though with fewer features, this design is larger and heavier. It is still movable with two people, more cost-effective, and even more scalable as the larger modules allow for larger packs that are less labour intensive to assemble. This pack would be suitable for similar applications to Prototype A and for very small-scale solar storage to use at a cabin or RV.

Prototype C

Our largest and only modular unit for solar storage, off-grid/microgrid applications.



Specs

- 53.2V, 177Ah, 9.4kWh, 5000W
- 35 second-life Gen 1 Nissan Leaf modules in a 7S5P configuration (14S10P Li-ion)
- 43.4 – 57.4 V range
- BMS with under/over-voltage protection, temperature protection, real-time cell monitoring via USB or Bluetooth, circuit breaker up to 100A
- Max continuous discharge of up to 100A (5000W), dictated by breaker and inverter selection.

This last prototype was used to power much of our 2021 Engineering Showcase event. This design comes to just under 10kWh capacity and represents five Prototype B packs in parallel. Prototype C was created on the basis of 10kWh modules for off-grid and microgrid systems with a variety of renewable energy sources and is nearly infinitely scalable.

The average household uses between 20kWh and 30kWh of electricity every day. While Prototype C wouldn't power an entire home for a full day, it could be used as an emergency backup for essential appliances such as a refrigerator/freezer, to power lights, charge devices, and maybe have a TV on for a few hours. If paired with a suitable solar array, Prototype C may be capable of powering the essentials for a few days until power is restored.

Combining a system of four to five modules the size of Prototype C with 10-20kWh of solar power generation per day will make entirely off-grid living possible with high-efficiency appliances.