R018-C: Development of Innovative Modular Lithium Iron Phosphate Battery Packs for Energy Storage
Submitted by Clean Republic LLC
Principal Investigator: Yong Hou
Request for $220,000; Total Project Costs $443,000

Technical Advisor Comments

- One reviewer recommended fund, two recommended funding may be considered.
- The 50% match comes from industry, $138,000 cash and $85,000 in-kind.
- All 3 reviewers felt the methodology was adequate.
- 1 reviewer identified the following concerns:
    - "This is not 1 proposed research project, it is actually 3, and if any of them falls short of expectations the anticipated availability of improved mid-sized lithium ion battery packs would be in doubt…"
    - "…IP issues are not really addressed here. And yet, this is a very highly crowded sector from an intellectual property perspective…"
        - Applicant has stated, "…We have reached the same conclusion…in this matter from our own market experience. From carefully reviewing and constantly updating ourselves on the research and practical solutions from other groups, we have found niches to commercialize our solutions where ther is little conflict and therefore exciting sales opportunities. Likewise, from the IP side, we will continue this effort to stay abreast of any possible conflicts."
    - "Another risk is the reliance upon partner, AllCell, that is a thinly-capitalized startup in its own right and hasn't been able to raise much capital since attempting (and it would appear unsuccessfully) a $5M equity raise 2 years ago…the thermal management side of this project is completely dependent upon AllCell's phase change materials IP and approaches, and without further information about AllCell's current financial statue it's difficult to say how much of that portion of the project is at risk or not."
    - "…another risk is that the rapid emergence of alternative large- to mid-format energy storage technologies will obviate the current opportunity for lithium ion to have any economic value proposition at all…"
        - Applicant has stated, "…We don't feel the maturity of these technologies poses realistic near-term threats to practical lithium battery applications…"
- All 3 reviewers felt investigator's awareness of current research was adequate.
- All 3 reviewers felt investigator's background was adequate.
- All 3 reviewers felt investigator's project management plan was very good.
- 1 reviewer stated, "Overall, funding of the proposal is justifiable. The technical risk of such development is low, but whether it translates to economic success is a large unknown. The main weakness of the proposal is lack of targets, both technical and cost, that can be used to judge whether the work is successful or not…"
    - Applicant has stated the following targets:
        - "…very few people in the lithium battery industry are familiar with practical ways to commercialize cold-weather thermal management solutions for medium and large-scale energy storage systems in applications like back up power and wind energy. One of the main technical targets in our work is to beat the industry standard battery capacities in the 0°F to -30°F temperature ranges by at least 10%."
        - "We plan to have a 90% success rate from individuals in customer service simulations whereby non-experts will be asked to use our standard instruction manuals and directions to safely and effectively replace modules of large pack systems without the direct help of our technicians…"
        - "…We plan to prove we can achieve all the stated technological improvements while simultaneously offering consumers at least10% lower retail prices in comparable niches and maintaining a profitable business model."
- 1 reviewer stated, "…The combination of battery management with cell discharge/charge balances, thermal management and fabrication of hierarchical modular is unique. I would recommend the proposal funded."

- 1 reviewer stated, "…My skepticism is largely based upon the uber-competitiveness of this industry (by all reports, the Chinese-driven price pressures that collapsed the US-based solar panel manufacturing industry is analogous to what is expected to happen in the lithium ion battery industry)…"
    - Applicant has stated, "…While we acknowledge the commodity chemical materials seem to be reaching a price floor, our own supply chain and vertical integration experience in the industry has shown us there is still significant price reductions that can be made on the retail end of lithium battery supply chains simply by further "removal of middle men…"

Technical Advisor Recommendations

Funding may be considered. This is a competitive industry and it would be a new industry for ND. This may present a challenge to commercialization. Additional information on the synergies between the industry and the State would strengthen the proposal. While the applicant gave some clarification regarding intellectual property, the Council may wish for additional information regarding the IP strategy since it is so competitive.

If successful, this proposal could result in commercialization in North Dakota. The proposal comes from industry and the match comes from industry as well. This strengthens the proposal.

Suggested Contingencies If Funded

- None.