

**Subject:** Technical Assistance Request for Battery Management System (B.M.S.) Development Incorporating Innovative Features

**e'Lektrik** seeks technical assistance to plan, design, and develop an interoperable and flexible system integrating renewable energy production according to its system patent claims. The aim of this Proof of Concept (PoC) is to use M.A.T.L.A.B. Simulink to model an all-modular energy storage solution with hot-swappable circuits, interchangeable battery trays, battery modules, and a Battery Management System (B.M.S.) with energy storage approach tailored for renewable solar energy applications.

### Goals

1. **Modularity:** Validate that each modular component (circuits, trays, modules) can be easily replaced without affecting overall system operations.
2. **Hot-Swappability:** Confirm that circuits can be swapped in real time without causing system shutdowns.
3. **Interchangeability:** Validate compatibility with different battery types and vendors.
4. **Advanced B.M.S.:** Demonstrate a B.M.S. capable of managing modular components and integrating solar energy.
5. **Renewable Integration:** Validate seamless integration of solar energy into the storage solution.
6. **Scalability:** Ensure the system is scalable in storage capacity and solar integration.

### Objectives

1. **Model Design:** Use M.A.T.L.A.B. Simulink to design an energy storage system model, incorporating all modular components and solar integration.
2. **Simulate Scenarios:** Run simulations for various scenarios, including hot-swapping, module replacement, and varying solar input conditions.
3. **Test B.M.S. Functionality:** Conduct stress tests on the B.M.S. for modular management and solar energy handling.
4. **Performance Metrics:** Record critical metrics such as swap time, load balancing, failure recovery, and solar-to-storage efficiency.
5. **Validation:** Validate model assumptions with a smaller physical prototype if possible.

Given the unique and advanced capabilities offered by national labs, esteemed private facilities, and the invaluable members of the American Made Network, we kindly request specialized technical assistance in the areas outlined below:

1. **Technical Knowledge:**
  - Insights and expertise in advanced battery management solutions, with particular emphasis on regenerative and hot-swappable circuits.
  - Consultation on integrating modular energy storage systems specifically for solar energy applications.
2. **Personnel and Expertise:**
  - Collaboration with experts in B.M.S. design, solar energy, and cutting-edge electronics.

- Engagement with specialists proficient in integrating diverse system components harmoniously.
3. **Lab Space and Equipment:**
    - Access to state-of-the-art laboratory facilities for design, testing, and prototyping phases.
    - Utilization of specialized equipment that can simulate real-world solar energy scenarios and validate B.M.S. functionality.
  4. **Hardware and Software:**
    - Collaboration in M.A.T.L.A.B. Simulink modeling and simulation to aid in our proof-of-concept development.
    - Assistance with hardware selection, firmware development, and B.M.S. software interfaces.
  5. **Research and Development:**
    - Collaboration in R&D phases to ensure that the B.M.S. meets the stringent requirements of modern solar applications while ensuring robustness and efficiency.
  6. **Proof-of-Concept Development:**
    - Using M.A.T.L.A.B. Simulink modeling, we aim to simulate a viable product that underlines critical solution functionality. Expertise and guidance in this modeling phase would be invaluable.
  7. **Prototype Development:**
    - Assistance transitioning from a simulated model to a fully functional prototype demonstrating the B.M.S.'s revolutionary features.
  8. **Opportunity Space:**
    - We hope to leverage expertise in understanding the unique needs of underserved communities and deriving vital insights from potential end-users.
  9. **Market Impact:**
    - Collaboration in gauging our progress, verifying assumptions with potential customers, and showcasing the profound impact our solution can offer to the energy storage market.
  10. **Network Activation:**
    - We seek guidance in expanding our connections networking with mentors, funders, and crucial partners, including members of the American Made Network. Your expertise can help establish our solution's technical feasibility and practical deployment potential.

Moreover, recognizing that all ambitious endeavors come with challenges, we'd greatly appreciate guidance in risk identification and strategy formulation for potential pitfalls. Accessing to supportive policies, regulations, and incentives at the federal, state, and local levels is crucial for promoting energy efficiency, renewable energy adoption, and energy storage integration. Streamlined permitting processes, net metering or feed-in tariffs, tax credits, and financial incentives. Access to market and reliable supply chain for sourcing high-quality battery storage systems and equipment. Assistance collaborating with technology providers or EaaS companies that offer robust monitoring and data analytics solutions to enhance operational efficiency and effectiveness of battery storage retrofit. Assistance with establishing relationships with reputable suppliers and manufacturers that provide reliable and proven battery technologies with ongoing technical support and warranty services to ensure timely delivery.