Business Model Canvas

1. **Key partners**
   - Local farmers and Agro – cooperative to supply cassava starch and hibiscus (zobo)
   - Chemical suppliers for copper, aluminum salt, and processing agent
   - Renewable energy companies ‘n distribution for off- grid solar systems
   - University and R&D centers ‘n on going material optimization.
   - Government and NGOs, funding, policy support, rural electrification programs

2. **Key Activity**
   - Extraction and purification of starch and phenols
   - Fabrication of hybrid electrodes (Cu_2O, $Al(OH)_3$) + starch / phenol coating).
   - Battery assembling and testing
   - Scaling production with roll – roll coating / electroplating.
   - Market deployment (solar home systems, back up devices)

3. **Key Resources**
   - Copper substrate and aluminum salts
   - Renewable agricultural feedstock’s (cassava starch, hibiscus).
   - Manufacture facility with low energy processing equipment
   - Skilled engineering, chemist, and local work force.
   - Intellectual property (patents on hybrid anisotropic electrodes).

4. **Value Proposition**
   - Affordable energy storage ‘n 30 – 40 % cheaper than lithium- ion batteries
   - Sustainable and green ‘n uses renewable agricultural materials, avoid toxic heavy metals.
   - Local empowerment ‘n create jobs and income for farmers and small scale processors
   - Durability ‘n longer cycle life than lead – acid batteries
   - Niche strength ‘n especially suited for off grid rural energy systems

5. **Customer Relationship**
   - Direct partnership with solar distribution and NGOs
   - Community – based sales channels in rural regions
   - After sales service centers for maintenance and recycling
   - Branding as a green, affordable, locally made alternative.

6. **Channels**

- Renewable energy distribution (solar kit supplier)
- Government rural electrification programs
- Microfinance and cooperative scheme (pay as you go solar kit)
- Online / retail stores for small backup systems and consumer's electronics

7. Customer Segment

- Rural house hold 'n off grid energy storage
- Small business 'n shops, clinics, schools needing backup power
- Renewable energy providers 'n hybrid solar – storage kits
- Eco – customers 'n demand for green technologies.
- Industrial / agro facilities 'n low cost backup power systems

8. Cost Structure

- Raw materials (copper, aluminum salts, starch, hibiscus)
- Processing (boiling, electrolysis, coating, assembly)
- Equipment investment (roll to – roll coating, electrochemical testing)
- Labor (farmer, factory workers, engineers)
- Distribution and logistics

9. Revenue Stream

- Direct sales of batteries (small portable 'n medium solar storage 'n industrial unit)
- Partnerships with solar companies for bundled sales.
- Service contracts (battery maintenance replacement programs)
- Technology licensing to battery manufacturers
- Carbon credits / green finance for sustainable material use.