## DETAILED BUDGET BREAKDOWN FOR PILOT PHASE OF THE SMART SOLAR-POWERED COLD STORAGE UNITS (3 UNITS)

This budget outlines the estimated costs required to move the project from its current concept stage through design, prototyping, pilot deployment, and validation, targeting 2,000–5,000 farmers.

## 1. R&D and Prototyping

This category covers the initial design, software development, and component testing required to develop a functional prototype.

| S/N | Item | Description | Unit Cost (₦) | Quantity | Total Cost (₦) |
|---|---|---|---|---|---|
| **1.1** | **Engineering Design & Simulation** | CAD modelling, thermal analysis, and system integration design by mechanical and electrical engineers. | 1,500,000 | 1 | 1,500,000 |
| **1.2** | **Software Development (Initial)** | Development of the basic firmware for IoT controllers and a preliminary cloud dashboard for data visualization. | 2,000,000 | 1 | 2,000,000 |
| **1.3** | **Component Testing & Validation** | Lab-scale testing of key components like solar panels, batteries, PCM blocks, and refrigeration units to ensure performance and reliability. | 1,000,000 | 1 | 1,000,000 |
| **1.4** | **Prototype Documentation** | Creation of technical manuals, blueprints, and standard operating procedures. | 500,000 | 1 | 500,000 |
| | **SUBTOTAL for R&D and Prototyping** | | | | **₦5,000,000** |

## 2. Fabrication and Materials

This cost component covers all physical materials for building the prototype units, with a focus on sourcing over 70% of structural materials locally.

| S/N | Item | Description | Unit Cost (₦) | Quantity (3 pilot units) | Total Cost (₦) |
|---|---|---|---|---|---|
| **2.1** | **Structural Materials (Locally Sourced)** | Mild steel/aluminium for frames, polyurethane foam with galvanized steel sheets for insulated panels. | 1,200,000 | 3 | 3,600,000 |
| **2.2** | **Refrigeration Subsystem** | High-efficiency compressors, condensers, evaporators, and eco-friendly refrigerants. | 800,000 | 3 | 2,400,000 |
| **2.3** | **Solar Energy Subsystem** | Locally assembled PV panels, MPPT charge controllers, lithium-ion batteries, and inverters. | 2,500,000 | 3 | 7,500,000 |
| **2.4** | **Phase Change Material (PCM) Blocks** | PCM blocks for thermal energy storage to extend cooling during non-solar hours. | 500,000 | 3 | 1,500,000 |
| **2.5** | **Fabrication & Assembly Labour** | Costs for welders, technicians, and engineers for constructing the modular units at PEDI workshop. | 600,000 | 3 | 1,800,000 |
| | **SUBTOTAL for Fabrication & Materials** | | | | **₦16,800,000** |

## 3. Digital Integration

Costs associated with integrating the "smart" components of the system, including IoT hardware and the software platform for monitoring and analytics.

| S/N | Item | Description | Unit Cost (₦) | Quantity (for 3 pilot units) | Total Cost (₦) |
|---|---|---|---|---|---|
| **3.1** | **IoT Hardware** | IoT sensors (temperature, humidity, voltage), GSM/Wi-Fi controllers, and data loggers. | 250,000 | 3 | 750,000 |
| **3.2** | **Cloud Dashboard & Platform Subscription** | Costs for cloud hosting, data storage, and further development of the remote monitoring dashboard for real-time data access. | 1,200,000 | 1 (Lump Sum) | 1,200,000 |
| **3.3** | **AI Analytics & Predictive Maintenance Model (Initial)** | Initial development and training of a predictive model for fault detection and performance optimization. | 1,500,000 | 1 (Lump Sum) | 1,500,000 |
| **3.4** | **System Integration & Testing** | Labour costs for ICT/software developers to integrate hardware with the software platform and conduct end-to-end testing. | 800,000 | 1 (Lump Sum) | 800,000 |
| | **SUBTOTAL for Digital Integration** | | | | **₦4,250,000** |

## 4. Deployment, Training & Pilot Operations

This category includes logistical and operational costs for deploying the prototypes to rural hubs and training the end-users.

| S/N | Item | Description | Unit Cost (₦) | Quantity | Total Cost (₦) |
|---|---|---|---|---|---|
| **4.1** | **Logistics and Transportation** | Cost of transporting the modular units from the fabrication site (PEDI, Ilesa) to three selected pilot rural communities, addressing logistical challenges. | 700,000 | 3 | 2,100,000 |
| **4.2** | **Installation and Commissioning** | On-site setup, calibration, and commissioning of the units by technicians. | 300,000 | 3 | 900,000 |
| **4.3** | **Farmer Training and Sensitization** | Conducting workshops to train farmers and cooperative members on using the system, the pay-per-use model, and the digital dashboard. | 1,500,000 | 1 (Lump Sum) | 1,500,000 |
| **4.4** | **Pilot Phase Monitoring & Data Collection** | Operational costs for project managers and agricultural extension officers to monitor the pilot sites for 12 months, collect data, and gather feedback. | 2,500,000 | 1 (Lump Sum) | 2,500,000 |
| | **SUBTOTAL for Deployment, Training & Pilot Operations** | | | | **₦7,000,000** |

## 5. Contingency & Overheads (10%)

A standard provision to cover unforeseen expenses, administrative costs, and potential price fluctuations in materials.

| Item | Calculation | Total Cost (₦) |
|---|---|---|
| **Contingency & Overheads** | 10% of (SUBTOTAL 1 + 2 + 3 + 4) | |
| | 10% of (5,000,000 + 16,800,000 + 4,250,000 + 7,000,000)<br><br>= 10% of 33,050,000 | **₦3,305,000** |

## TOTAL ESTIMATED PILOT BUDGET

| CATEGORY | TOTAL COST (₦) |
|---|---|
| **1. R&D AND PROTOTYPING** | 5,000,000 |
| **2. FABRICATION & MATERIALS** | 16,800,000 |
| **3. DIGITAL INTEGRATION** | 4,250,000 |
| **4. DEPLOYMENT, TRAINING & PILOT OPERATIONS** | 7,000,000 |
| **SUBTOTAL** | **33,050,000** |
| **5. CONTINGENCY & OVERHEADS (10%)** | 3,305,000 |
| **TOTAL ESTIMATED BUDGET** | **₦36,355,000** |