TECHNICAL BID / EQUIPMENT PROPOSAL

Low-Power Agro-Processing, Cold Storage & Packaging Equipment

1. EXECUTIVE SUMMARY

This proposal presents a solar-friendly equipment specification for the machines listed in the client's schedule. The design approach is to avoid unnecessary oversizing, use high-efficiency motors and drives, select direct-drive or belt/chain arrangements where appropriate, and use variable-speed control where the process permits. Machines are specified with stainless-steel product-contact surfaces where food contact occurs, with carbon-steel structural frames and guards.

The proposed equipment is intended for agricultural produce including rice, maize, millet, sorghum, groundnut, cowpea, ginger, flour and other food products. The specification also includes cold rooms, industrial dehydrators, weighing systems and bag packaging/sealing equipment.

2. SOLAR-POWER DESIGN PRINCIPLES

Design item	Requirement
Motor efficiency	IE3-class or better AC motors where practical; high-efficiency BLDC/DC motors may be used for small intermittent machines.
Speed control	VFD/inverter drives for motors where variable throughput is useful; soft-start for fixed-speed loads.
Power factor	Target PF ≥0.90 for larger AC motor loads; use appropriately sized VFDs rather than unnecessary capacitor banks.
Low standby losses	Control panels to include contactors/isolators and automatic shutdown so idle motors do not remain energized.
Transmission	Use correctly aligned belt/chain/direct drive systems with sealed bearings to minimize mechanical losses.
Refrigeration	Use inverter/variable-capacity compressor technology where available, good PUF insulation and electronic temperature control.
Solar compatibility	Prefer 230/400 V, 50 Hz equipment compatible with a three-phase solar inverter for industrial loads.

3. MASTER EQUIPMENT SCHEDULE

No.	Equipment	Application / size	Qty.	Target electrical design
1	Purchase & supply of machines	Rice destoner; thresher/polisher; groundnut processor; grinding machines; gari & yam processing machines	As required	Solar-optimised models
—	Ginger washing & peeling machine	Kaduna only	1	Low-speed/high-torque drive
1	Grain cleaning & grading	Multi-grain cleaner/grader	1	≈1.5–2.2 kW
2	Thresher & sheller	Rice	1	≈3–5.5 kW
3	Thresher & sheller	Millet/Sorghum	1	≈3–5.5 kW each
4	Thresher & sheller	Corn	1	≈5.5–7.5 kW each
5	Thresher & sheller	Groundnut/Cowpea	1	≈3–5.5 kW
6	Flour milling	Food-grade hammer/plate mill	1	≈5.5–7.5 kW
7	Oil press/extractor	Groundnut, sesame & soy	1	≈5.5–11 kW, VFD controlled
8	Cold room storage	7 × 7 × 7 ft	1	Inverter compressor, ≈1.5–2.0 kW peak
9	Industrial dehydrator	Medium	1	≈6–12 kW each, staged heating
10	Weighing scale	Electronic platform	2 per location	<20 W each
11	Bag packaging & sealing	Weigh-fill/seal system	2 per location	≈0.5–1.5 kW each

4. DETAILED TECHNICAL SPECIFICATIONS

4.1 Ginger Washing & Peeling Machine – Kaduna

Quantity: 1 (Kaduna only). Designed for washing and surface peeling ginger with controlled abrasion. The machine shall minimize bruising and product loss.

Parameter	Proposed specification
Capacity	300–500 kg/h, adjustable feed rate
Power	1.5–2.2 kW high-efficiency motor; VFD preferred
Electrical	230/400 V, 50 Hz; 3-phase preferred for solar inverter compatibility
Product-contact material	SS304 stainless steel
Frame	Powder-coated carbon steel or SS304 where exposed to wash water
Washing system	Rotating/abrasive drum with water spray manifold and drain
Peeling	Abrasive food-grade lining/brush system, adjustable intensity
Approx. dimensions	1,800 × 800 × 1,200 mm
Target energy use	≈3–6 kWh per tonne, depending on product condition and washing intensity
Safety	Emergency stop, motor overload, guarded drive, drain and splash protection

4.2 Rice Thresher / Sheller

Quantity: 1. Low-power rice threshing system designed for paddy separation with reduced grain damage.

Parameter	Proposed specification
Capacity	800–1,200 kg/h
Power	3.0–5.5 kW; select lower rating where actual crop throughput permits
Drive	High-efficiency motor + belt/chain drive; VFD recommended
Cylinder	Balanced threshing cylinder with replaceable/adjustable teeth
Product-contact parts	SS304 or food-grade coated steel
Frame	Heavy-duty carbon steel
Approx. dimensions	2,000 × 1,200 × 1,500 mm
Target energy use	≈3–5 kWh/t
Safety	Full belt/shaft guards, emergency stop, overload protection

4.3 Maize Thresher / Sheller

Quantity: 3 per location. High-throughput maize sheller with adjustable rotor speed and concave clearance.

Parameter	Proposed specification
Capacity	1.0–1.5 t/h
Power	5.5–7.5 kW; VFD controlled
Electrical	400 V, 3-phase, 50 Hz
Rotor	Balanced steel rotor with replaceable shelling elements
Product-contact surfaces	SS304 at feed/chutes; coated carbon steel chamber
Approx. dimensions	2,200 × 1,400 × 1,700 mm
Target energy use	≈4–6 kWh/t
Dust control	Cyclone/aspiration connection provision
Safety	Emergency stop, overload relay, guards

4.4 Groundnut & Cowpea Thresher / Sheller

Quantity: 1. Crop-specific shelling system with adjustable clearance to reduce kernel damage.

Parameter	Proposed specification
Capacity	500–1,000 kg/h
Power	3.0–5.5 kW
Electrical	400 V, 3-phase, 50 Hz
Adjustment	Adjustable shelling gap and rotor speed
Product-contact material	SS304 / food-grade coated steel
Approx. dimensions	1,800 × 1,100 × 1,500 mm
Target energy use	≈4–7 kWh/t
Collection	Separated shell and kernel outlets

4.5 Flour Milling Machine

Quantity: 1. Efficient food-grade mill for maize, millet, sorghum, wheat and other suitable grains.

Parameter	Proposed specification
Capacity	300–600 kg/h depending on product and fineness
Power	5.5–7.5 kW, VFD optional

Parameter	Proposed specification
Electrical	400 V, 3-phase, 50 Hz
Grinding chamber	Replaceable food-grade screen/hammer assembly
Product-contact material	SS304
Frame	Powder-coated carbon steel
Approx. dimensions	1,200 × 800 × 1,400 mm
Target energy use	≈8–14 kWh/t depending on fineness
Dust management	Provision for cyclone/bag filter
Safety	Magnetic trap, overload protection and guarded drive

4.6 Oil Press / Extractor – Groundnut, Sesame & Soy

Quantity: 1. Screw-type mechanical oil expeller with controlled feed and temperature management.

Parameter	Proposed specification
Capacity	100–200 kg/h feedstock
Power	5.5–11 kW; select motor by crop and required throughput
Energy-saving drive	VFD to match feed rate and crop resistance
Electrical	400 V, 3-phase, 50 Hz
Screw/barrel	Hardened alloy steel, replaceable wear components
Product-contact parts	SS304 food-grade hopper and oil collection surfaces
Frame	Heavy-duty carbon steel
Approx. dimensions	1,800 × 800 × 1,600 mm
Target energy use	≈35–70 kWh/t, crop-dependent
Accessories	Oil filter/settling tank and cake discharge chute

4.7 Cold Room Storage – 7 × 7 × 7 ft

Quantity: 1. Compact insulated cold room for smaller-volume storage, with low electrical demand.

Parameter	Proposed specification
Room size	7 ft × 7 ft × 7 ft (L × W × H)
Insulation	PUF/PIR 80–100 mm, tongue-and-groove joints
Panel skin	PPGI; SS304 optional
Door	Insulated door with magnetic gasket and internal safety release
Refrigeration	Inverter compressor approximately 2 HP class
Peak electrical input	Target ≈1.5–2.0 kW
Evaporator	High-efficiency finned coil with EC/high-efficiency fan
Temperature	Typical +2 to +8 °C chilled storage
Control	Digital thermostat, defrost timer/control, HP/LP and overload protection
Floor	Insulated, waterproof and non-slip

4.8 Industrial Dehydrator – Medium

Quantity: 3 per location. Three medium-capacity food dehydrators per location, designed for vegetables, fruits, ginger, grains and other compatible products.

Parameter	Proposed specification
Capacity	50–100 kg fresh product/batch per unit, depending on product and moisture content
Heating power	6–12 kW per unit, staged/controlled heating
Energy-saving arrangement	Multi-stage heater control; heaters switch in only as required
Air circulation	High-efficiency centrifugal/axial fan, VFD optional
Chambers	SS304 food-grade drying chamber and trays
Trays	SS304 perforated/removable trays
Insulation	50–75 mm high-density PUF/mineral insulation
Approx. dimensions	1,500 × 1,200 × 1,800 mm per unit
Temperature range	Approx. 40–90 °C, adjustable
Control	Digital PID temperature controller and timer
Target energy use	≈0.8–1.5 kWh/kg water removed, depending strongly on product and drying temperature

4.9 Electronic Weighing Scale

Quantity: 2 per location. Accurate platform weighing for incoming raw materials and finished products.

Parameter	Proposed specification
Capacity	150 kg platform; 50 g resolution recommended
Power	<20 W during operation; rechargeable battery backup
Platform	Stainless steel top plate over mild-steel frame
Platform size	Approx. 600 × 600 mm
Display	Large LED/LCD indicator
Functions	Tare, zero, gross/net, calibration
Solar suitability	Very low load; rechargeable battery allows operation during inverter transition

4.10 Bag Packaging & Sealing Machine

Quantity: 2 per location. Automatic/semi-automatic weighing, filling and sealing for dry agricultural products.

Parameter	Proposed specification
Filling range	1–25 kg adjustable; 25–50 kg option available
Capacity	Approximately 4–8 bags/min depending on product, bag size and operator
Power	0.5–1.5 kW; pneumatic/servo components selected for low standby consumption
Electrical	230 V or 400 V, 50 Hz depending on final configuration
Product-contact material	SS304
Frame	SS304 or powder-coated carbon steel
Sealing	Continuous band or impulse heat sealing, adjustable temperature
Approx. dimensions	1,000 × 800 × 1,700 mm
Target energy use	≈0.03–0.10 kWh per 25 kg bag, process dependent

5. PURCHASE & SUPPLY – ADDITIONAL MACHINES

The bid schedule also calls for purchase and supply of rice destoners, threshers and polishers, groundnut processors, grinding machines, gari machines and yam-processing machines. These shall be supplied as individual machines or integrated modules depending on the final site process flow. The following minimum design requirements shall apply.

Machine	Target capacity	Power	Materials	Indicative size	Energy-saving feature
Rice destoner	1.0 t/h minimum	0.37–0.75 kW	SS304/food-grade contact parts	Approx. 0.9–1.1 × 0.6–0.9 × 1.0–1.3 m	Vibration + controlled aspiration
Rice polisher	0.5–1.0 t/h	3–5.5 kW	SS304 product contact; alloy abrasive components	Approx. 1.5 × 0.8 × 1.5 m	VFD/soft start
Groundnut processor	300–600 kg/h	2.2–5.5 kW	SS304 contact surfaces	Approx. 1.5 × 0.8 × 1.3 m	Shelling/cleaning as required
Grinding machine	300–600 kg/h	3–7.5 kW	SS304 contact chamber	Approx. 1.2 × 0.8 × 1.4 m	Interchangeable screens
Gari processing unit	300–500 kg/h	5.5–11 kW total	SS304 contact surfaces	To be finalized by process	Grater/press/roaster options
Yam processing unit	300–500 kg/h	3–7.5 kW total	SS304 contact surfaces	To be finalized by process	Washer/peeler/cutter options

6. RECOMMENDED MATERIAL SPECIFICATION

Component	Minimum requirement
Food/product contact surfaces	SS304 minimum; SS316 where chemical/salt exposure justifies the additional cost.
Structural frames	Mild steel, minimum 2.5–4 mm members according to load; zinc-rich primer + industrial paint/powder coating.
Hoppers/chutes	SS304, folded/welded, smooth internal corners for easy cleaning.
Shafts	Medium/high-carbon or alloy steel, sized for calculated torque and fatigue.
Bearings	Sealed industrial bearings, preferably replaceable standard sizes.
Fasteners	Stainless steel for wet/product zones; high-tensile galvanized/black fasteners for structural zones.
Electrical enclosure	IP54 minimum indoors; IP65 recommended for wash-down/wet processing areas.
Cables	Copper conductors sized for continuous current, voltage drop and ambient conditions; flexible machine cables where vibration occurs.

7. PROVISIONAL ELECTRICAL LOAD SCHEDULE

Load	Qty.	Design peak kW/unit	Connected kW	Operating note
Ginger washer/peeler	1	2.2	2.2	Intermittent
Grain cleaner/grader	1	2.2	2.2	Intermittent
Rice thresher	1	5.5	5.5	Intermittent
Millet/sorghum thresher	1	5.5	5.5	Intermittent; not all necessarily simultaneous
Maize thresher	1	7.5	7.5	Intermittent; not all necessarily simultaneous
Groundnut/cowpea sheller	1	5.5	5.5	Intermittent
Flour mill	1	7.5	7.5	Intermittent
Oil press	1	11.0	11.0	Intermittent
Cold room 10×8×8	1	2.8	2.8	Cycling/variable-speed
Cold room 7×7×7	1	2.0	2.0	Cycling/variable-speed
Weighing scales	2	0.02	0.04	Very low
Bag packaging/sealing	2	1.5	3.0	Intermittent

Important: the connected load above is NOT the recommended solar inverter size. The facility should be designed using a load-diversity schedule because threshers, mills, oil presses and dehydrator heaters do not need to run simultaneously. A final solar design should be based on measured/confirmed machine duty cycles, operating hours, battery autonomy and the client's production schedule.

8. SOLAR-INTEGRATION REQUIREMENTS

System element	Recommendation
Main inverter	Three-phase hybrid inverter system, sized from the diversified maximum demand rather than total nameplate load.
Motor starting	Use VFD/soft starters for larger motors to reduce starting current and reduce the required inverter surge rating.

System element	Recommendation
Battery	LiFePO4 recommended for frequent daily cycling; final kWh based on night operation, cold-room duty and autonomy requirement.
PV array	Final kWp based on local solar resource, daytime production profile and required battery recharge.
Energy management	Priority loads: cold rooms, controls and packaging; schedule high-power machines during peak solar production.
Cold rooms	Treat refrigeration as a 24-hour energy-management load; maintain insulation and door discipline to reduce compressor runtime.
Protection	DC/AC isolators, surge protection, earthing, over/under-voltage, phase protection, overload and emergency shutdown.

9. QUALITY CONTROL, TESTING & ACCEPTANCE

- All rotating equipment shall be dynamically balanced where applicable and tested for vibration, noise and bearing temperature.
- Each motor shall be tested for current draw at no-load and at rated working load.
- Capacity tests shall be performed using the intended crop/product and documented in a commissioning sheet.
- Food-contact surfaces shall be smooth, cleanable and free from sharp projections or exposed rust-prone surfaces.
- Cold rooms shall undergo leak testing, vacuum/pressure checks as appropriate, temperature pull-down testing and thermostat verification.
- Packaging and weighing equipment shall be calibrated before handover.
- Electrical panels shall be labelled and supplied with single-line diagrams, wiring diagrams and operating instructions.

10. DOCUMENTATION TO BE SUPPLIED

- Equipment datasheets and final manufacturer model numbers.
- Motor nameplate data and efficiency class.
- Electrical single-line diagram and control-panel schematic.
- Operation and maintenance manuals.
- Recommended spare-parts list for 12 months.
- Preventive-maintenance schedule.
- Commissioning and acceptance test reports.
- Cold-room refrigeration schematic and controller settings.
- Warranty certificate and after-sales support contact.

11. IMPORTANT DESIGN ASSUMPTIONS

- The cold-room dimensions in the client's schedule are feet: 7×7×7 ft.
- The phrase 'per location' is retained exactly from the supplied schedule; the number of locations must be confirmed before final quantity and price.
- Capacities are proposed target capacities, not guaranteed production rates until the crop, moisture content, desired fineness and operating conditions are confirmed.
- Power ratings are deliberately specified as efficient target ranges. Final motor size shall be selected after process sizing so the motor is not unnecessarily oversized.
- Solar PV, battery and inverter sizing shall be finalized only after the daily production schedule and simultaneous-load profile are confirmed.

12. TECHNICAL BASIS / REFERENCE NOTES

The proposed ranges were benchmarked against current Nigerian and international equipment specifications. For example, a Nigerian 1 t/h rice destoner listing specifies 0.37 kW and 1,000 kg/h, while other gravity destoners list approximately 0.75 kW for 0.8–1.2 t/h. Published Nigerian solar-cold-room listings commonly specify a 10×8×8 ft room around the 6-tonne class with a 3 HP refrigeration unit. These figures are used only as engineering benchmarks; the final bid should be tied to the selected OEM/model and verified at commissioning.

A 2026 Nigerian engineering publication also reports a solar-powered multi-grain thresher using approximately 492 W under load at about 133.5 kg/h, demonstrating that direct solar/DC drive can substantially reduce the electrical demand of appropriately sized small threshers. For commercial bid equipment, however, the power rating should be selected from the required throughput rather than copying a small research prototype.

13. BUDGETARY MARKET PRICE RANGES (2026)

Equipment	Qty.	Indicative price range / unit	Basis / comment
Ginger washing & peeling	1	₦750,000 – ₦1,500,000	Commercial stainless/industrial version; market listing observed at ₦750k for 1.5 kW, 120–250 kg/h.
Rice thresher/sheller	1	₦500,000 – ₦1,000,000	Comparable listings around ₦530k–₦750k; higher-spec versions may cost more.
Maize thresher/sheller	1	₦600,000 – ₦1,200,000 each	5.5 kW commercial listing observed at ₦850k.
Groundnut/cowpea sheller	1	₦600,000 – ₦1,500,000	Groundnut sheller listings observed around ₦600k–₦1.23m.
Flour milling machine	1	₦2,000,000 – ₦3,500,000	5.5 kW hammer mill listing observed at ₦2.1m.
Oil press/extractor	1	₦3,800,000 – ₦10,000,000	100 kg/h industrial extractor observed at ₦3.8m; larger 6YL-130 listing around ₦9.8m.
Cold room 7×7×7 ft	1	₦16,000,000 – ₦21,000,000	Current listings vary substantially; confirm whether quotation includes complete refrigeration system and installation.
Industrial dehydrator – medium	3/location	₦1,100,000 – ₦3,000,000 each	Current 24–32 tray industrial listings observed from about ₦1.08m–₦2.9m.
150 kg weighing scale	2/location	₦85,000 – ₦150,000 each	Current listings observed at ₦85k and ₦145k.
Bag packaging & sealing	2/location	₦1,500,000 – ₦4,000,000 each	Depends strongly on bag size, automatic weighing/filling, sealing and printer options.

The following figures are budgetary market ranges in Nigerian Naira, prepared to give the bidder a realistic procurement allowance before obtaining formal supplier quotations. They are not supplier quotations and exclude solar PV/battery/inverter systems unless specifically stated. Actual prices can change with brand, exchange rate, capacity, stainless-steel grade, import status, delivery, installation and warranty.

14. ADDITIONAL MACHINE BUDGET ALLOWANCES

Additional machine	Indicative range	Budget note
Rice destoner, 1 t/h	₦1,000,000 – ₦1,800,000	A current 1 t/h listing is ₦1.2m; other Nigerian listings span roughly ₦0.7m–₦1.5m.

For the additional purchase-and-supply category, use the following preliminary allowances until the client confirms the exact capacities and brands.

15. QUOTATION GUIDANCE FOR THE BIDDER

- Use the lower end of the range only for standard imported/local-market equipment with limited customization.
- For a formal supply-and-install quotation, allow separately for freight/delivery, installation, electrical control panel, commissioning, civil works, taxes/VAT where applicable, and warranty support.
- For stainless-steel food-contact equipment, quote the exact SS grade and thickness; SS304 should be the default unless the client specifies otherwise.
- For the two cold rooms, obtain at least three supplier quotations before fixing the final bid price because current Nigerian market listings show very large differences for similar room dimensions.
- Do not include the solar PV, batteries or inverter in these machine price ranges. Those should be quoted as a separate energy package after the final load schedule is approved.

Market-check note (October 2026): Observed Nigerian listings include a 1 t/h rice destoner at about ₦1.2m, maize threshers around ₦850k for a 5.5 kW model, a 100 kg/h oil extractor around ₦3.8m, 150 kg scales around ₦85k–₦145k, industrial dehydrators around ₦1.08m–₦2.9m, and cold-room listings showing major variation by supplier and specification. These observations were used only to establish budgetary ranges, not as guaranteed purchase prices.