



# **TERMS OF REFERENCE**

**AGRONAT VESSEL**

23April 2023

Issued by:

Agro National Corporation

## **1. Background**

Agro National Corporation (AgroNat) was formed 21<sup>st</sup> April 2020 as a State-Owned Enterprise (SOE) with the overall mandate to assist in developing the agricultural sector in the Maldives. AgroNat is working towards enforcing objectives such as enabling an efficient supply-chain for agriculture, providing technical expertise and training to farmers, expanding the role of women in farming, and facilitating access to quality fertilizers across islands. AgroNat will also aim to achieve economic targets relating to food security, import substitution, creation of jobs and improving the trade balance.

The Government of Maldives, in its Strategic Action Plan devised for 2019 – 2023, had proposed to establish a dedicated SOE for agricultural development, with an objective of revitalizing the agriculture sector as per the Blue Economy vision. Despite being an integral part of Maldivian society for ages, the agriculture sector has remained under-developed and unexposed to modern developments in farming techniques and technology. The government under its agenda for economic diversification aims to promote agriculture as a meaningful sector in the Maldivian economy.

AgroNat aims to expedite an efficient supply-chain for local agricultural products that will enable farmers to collect a fair price for their produce. Hence, AgroNat is purchasing locally produced fruits and vegetables from farmers and re-selling the produce to wholesale buyers. In the intermediate term, the corporation aims to work towards an import substitution policy that will reduce imports of certain locally produced crops by 50%.

AgroNat is working on addressing the challenges faced by farmers in maintaining the cold chain and timely delivery of produce to the market. As such, the company is planning to construct purpose build transport vessels, with reduced fuel requirement and solar power for energy production.

The *Project for Developing Sustainable Agricultural Economy (PDSAE)* builds on the success of the *Sustainable Economic Empowerment and Development for SMEs (SEEDS)* project and aims to further strengthen local productivity of agricultural produce in the Maldives. By doing so, the project aims to enhance food security in the archipelagic nation, which has very limited arable land, and enable more entrepreneurs interested in the agricultural businesses to enter the sector and facilitate secondary and tertiary production of related commodities including foodstuff and textiles. This will be achieved through three outputs focusing on: 1) strengthening assistance to increase local farmer expertise in agriculture, 2) enhancing agricultural capacities and opportunities to ensure food security and 3) enhancing support industries and value-added services to augment agro businesses.

The project, funded by the Government of Japan, will be implemented through partnership with the United Nations Development Programme (UNDP) in Maldives, the Ministry of Economic Development (MED), Ministry of Fisheries, Marine Resources and Agriculture (MoFMRA), Agro National Corporation (AgroNat), Maldives Fund Management Corporation (MFMC), the Business Centre Corporation (BCC) and Housing Development Corporation (HDC).

Under this project, AgroNat will establish a sustainable, effective, reliable, and timely transportation mechanism utilizing low-carbon technology for agricultural produce from farmers to markets, clients, and customers. The assurance of a dedicated and fit-for-purpose transportation mechanism will help increase entry of new businesses to the market as it provides greater confidence that their produce can be delivered to different markets through the nationwide transport network to be introduced by AgroNat.

## **2. Objectives**

AgroNat intends to hire a firm for construction, delivery, and testing of AgroNat vessel.

### 3. Scope of Services and Expected Deliverables

- a. Construction of vessel as per the design and specification provided and agreed.
- b. Supply of necessary documents required for vessel registration.
- c. Ensure compliance with current statutory and regulatory requirements as per the national regulations and maintain the best practices used in vessel construction.
- d. Perform all the operational dock trials and sea trials for the vessels in accordance with the requirement provided by AgroNat and testing plans by AgroNat.

### 4. Facilitate in monitoring

The firm is expected to work very closely with the AgroNat, stakeholder ministries and UNDP in all projects related matters and will report directly to the Head of Business Development Department. The firm shall assist AgroNat and its technical consultants during routine monitoring of boat building work.

### 5. Quotation

The firm is to submit two quotations. The quotations should have a break down price for,

- Mould
- Hull construction
- Solar component
- Engine
- Generator
- Other boat equipment and accessories
- Building work

1. Including solar power system batteries
2. Excluding the solar power system batteries

### 6. Marking Criteria

#	Details	Marks
1	Price	40
2	Duration	5
3	Experience	10
4	Warranty	5
5	Technical evaluation (Building Materials)	35
6	Financial capacity	05

#### 6.1 Price (40% of the Total score)

The highest score shall be awarded to the bid with the lowest bid price. For the remaining bids, points will be given to using the formula below:

$$\text{Price Score} = \frac{\text{Lowest proposed total price from among the bids received}}{\text{Particular Bidder's proposed total price}} \times 40\%$$

### 6.2 Duration (5% of the Total score)

The maximum points allocated under this criterion will be awarded to the bidder with the lowest proposed Delivery Period, and the remaining bidders will be awarded points on a pro rata basis in descending order.

The formula thus used for the computation of the score is as follows:

$$\begin{aligned} &\text{Delivery Period Score} \\ &= \frac{\text{Lowest proposed delivery period from among the bids received}}{\text{Particular Bidder's proposed delivery period}} \times 5\% \end{aligned}$$

### 6.3 Experience (10% of the Total score)

Experience will be considered for the works completed in the last 10 years related to boat building, boat repairs, and supplying boats.

Work experience letter should be in the contractor's letterhead with the contractor's stamp and signature. Marks will be given to maximum 5 experience letters. Each letter will carry 2 marks.

### 6.4 Warranty (5% of the Total score)

Hull (1.25 Marks)

$$\frac{\text{Particular bidders warranty on hull}}{\text{Highest Warranty proposed on hull}} \times 1.25$$

Engine (1.25 Marks)

$$\frac{\text{Particular bidders warranty on engine}}{\text{Highest Warranty proposed on engine}} \times 1.25$$

Solar Charging System (1.25 Marks)

$$\frac{\text{Particular bidders warranty on solar charging system}}{\text{Highest Warranty proposed on solar charging system}} \times 1.25$$

Generator (1.25 Marks)

$$\frac{\text{Particular bidders warranty on generator}}{\text{Highest Warranty proposed on generator}} \times 1.25$$

### 6.5 Technical Evaluation

Those bidders who receive above 50% in technical evaluation will only be considered for the evaluation in other criteria (Price, Duration, Experience, Warranty).

Technical Evaluation Criteria:

#	Details	Marks
1	Fibre resin mechanical properties / quality (data sheet to be submitted) Fibre gelcoat properties (data sheet to be submitted)	50
2	Proposed Scantling design	10
3	<b>Main Engine</b> <ul style="list-style-type: none"><li>• Engine warranty</li><li>• Overhaul timing</li><li>• Spare parts availability (document proof to be submitted)</li><li>• Fuel consumption</li><li>• Compliancy with required specifications</li></ul>	30
4	Generator <ul style="list-style-type: none"><li>• Generator warranty</li><li>• Overhaul timing</li><li>• Spare parts availability (document proof to be submitted)</li><li>• Compliancy with required specification</li></ul>	5
5	Solar Panel <ul style="list-style-type: none"><li>- Solar warranty</li><li>- Aftersales service</li><li>- Data sheet to be submitted.</li><li>- Compliancy with required specifications</li></ul>	5

## 6.6 Financial Capacity

Points for financial capacity will only be awarded to those bidders who had submitted bank statement of last month (March 2023) .

Points will be given in the following manner;

Bank Balance compared to percentage (%) of total Bid price	Points awarded
Greater than 2% of Bank Balance of Proposed bid amount	1 Point
Greater than 4% of Bank Balance of Proposed bid amount	2 Point
Greater than 6% of Bank Balance of Proposed bid amount	3 Point
Greater than 8% of Bank Balance of Proposed bid amount	4 Point
Greater than 10% of Bank Balance of Proposed bid amount	5 Points

Attach copies of the audited financial statements of the last 2 financial years.

Audited financial statements. (Certified copies of audited balance sheets, income statements, and cash flow statements for most recent 2 years to be enclosed.)

## 7. Payment Terms

#	Description	Percentage
1	Advance payment	15
2	Completion of hull (except for cabins)	10
3	Completion of cabins	5
4	Payment 4	15
5	Payment 5	15
6	Payment 6 – after completion and handover of vessel	35
7	Payment 7 – Retention (up to the end of warranty period)	5

\* Payment 4 & 5 date shall be assigned, depending on the duration proposed by the bidder.

## Annex 1

### TECHNICAL SPECIFICATIONS FOR 65 FEET VESSEL

Description	Size/Material	UOM
Hull Material	Fiberglass	
Length Overall	20.421	M
Beam Max	5.791	M
Length On DWL	20.322	M
Depth at Mid Ship	3.111	M
Draft	1.281	M
Displacement Light	24	Tons
Fuel Capacity	2400	Litres
Fresh Water Capacity	1500	Litres
Captain accommodation	1	pax
Crew accommodation	4	pax

Container storage measurement	2	L 5486, B 1698 H 1900
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**65FT vessel with standard specification including the following features:**

- White gelcoat finishing on hull & deck exteriors, FRP hardtop, laminate-glass front & side windscreens as per shared drawings and hydraulic steering system.
- Wiring should be DC marine grade cable.
- Fiber mat thickness of the vessel (keel region 25mm, above from keel: 12mm).
- AgroNat logo and name to be in gelcoat.
- Non-skid deck to be in gray gelcoat.
- D-fender to be fixed in stern.
- 18' x 6' cargo compartment with 24000BTU AC for temperature controlling.
- Cargo storage compartments underneath deck with 3 NOS access hatches.
- Air-conditioned wheelhouse setup with fiberglass gelcoat finished dashboard, cabinets, and bench on sides (dashboard fitted with VHF, COMPASS, GPS and necessary switch panels).
- Air-conditioned crew cabin with 4 beds (mattress not included).
- All AC used should be of inverter type and the coolant used should be HFC and HCFC free
- Standard galley kitchen with sink, exhaust blower and power socket for kitchen appliances.
- Standard toilet with marine electric toilet, wash basin, showerhead, towel holder.
- Electrical wiring (with DC 200AH house battery x 2, battery switch, engine room blower, cabin and deck lights, switches, switch panel, USB charger, navigation light set & search light x 1)
- Engine foundation, engine's seawater-line, fuel and water tank connections and fittings.
- Detail of fiberglass material to be used for building to be mentioned by the bidder.

**VESSEL EQUIPMENTS AND ACCESSORIES**

	UOM	QTY
Maintenance free Battery 200AMP (house & engine start batteries) – data sheet should be provided	Nos	4
Maintenance free Battery 75AMP (generator) – data sheet should be provided	Nos	1
Battery selector switch	Nos	5
DC-DC converter	Nos	1
Blige pump 2000GPH 24V with float switch	Nos	3
Bilge alarm system	Nos	1
Fresh water pump 26LPM 24V	Nos	1
Engine room blower 10"	Nos	2
Exhaust blower 4" (toilet & kitchen)	Nos	2
Marine electric toilet 24V	Nos	1
Engine room light	Nos	6
Compartment and cabin lights	Nos	32
USB charger port dual	Nos	6
Search light	Nos	1



Navigation light set	Nos	1
VHF set with 5' antennae	Nos	1
Marine compass	Nos	1
GPS chart plotter with 9" display	Nos	1
Eco sounder with 9" display	Nos	1
Rader system with 9" display (30 miles minimum range)	Nos	1
Indian sub-continent blue chart G3	Nos	1
Captain seat	Nos	1
<b>Solar charging setup with data sheet</b>	Nos	1
Minimum 15kWh Lithium Battery (LiFePO4 Battery) The battery voltage should match output voltage of the proposed hybrid invertor		
Data sheet should be provided		
<b>Generator</b>		
Marine generator 20kW 1500 rpm – 230V/50Hz (single phase – silenced)	Nos	1
Date sheet should be provided		
<b>Engine</b>		
Marine diesel engine complete set with a capacity – boat speed minimum 12 knot	Nos	1
Data sheet should be provided		
<b>Others</b>		
Fender F7 (blue) with rope	Nos	10
Rope (24mm) - nylon	Roll	1
Anchor (No.10)	Nos	2
Fridge 200L	nos	2
Deep freezer 100L	Nos	1

### **Engine & Generator spare parts**

- One set of spare parts for first maintenance interval

### **Documentation**

- Standard documentation (soft copy) including:

1 operation manual (engine and generator)

Solar charging system operating manual

### **Warranty For**

- Hull
- Engine
- Solar charging system
- Generator

### **Safety Equipment**

- Safety equipment to be provided as per Ministry of Transport and Civil Aviation Authority guidelines.

### **Insurance**

- It is the responsibility of the contactor to ensure the boat building facility and the boat is insured during the making stage until the boat is completed and handed-over to AgroNat,

#### REQUIRED SPECIFICATIONS FOR RESIN

Bidders must submit product datasheets specifying mechanical properties with test methods, nature of chemical, applications or principal properties and certificate of approval from an established classification society for boat building.

Required specifications and mechanical properties

Property	Value
Tensile Strength	90 MPa
Tensile E-modulus	3900 MPa
Elongation at break	4.6 %
Flexural Strength	133 MPa
Flexural E-modulus	4000 MPa
Impact res-unnotched	27 KJ/m <sup>2</sup>
Heat Deflection Temperature	87 °C
Hardness (barcol)	>40

#### REQUIRED SPECIFICATIONS FOR GELCOAT

Bidders must submit product datasheets specifying characteristics of cured product, water absorption of cured product, specifications of base gelcoat, principal properties, and manufacturer recommended applications and certificate of approval from an established classification society for boat building. Bidders shall make sure the datasheets mention test methods.

Required specifications.

Characteristics	Typical Value for Brush Application (Base Gelcoat)	Typical Value for Brush Application (Base Gelcoat)
Barcol Hardness	40-45	45-45
Tensile Strength	50±5 MPa	50±5 MPa
Tensile Modulus	3650±150 MPa	3800±150 MPa
Elongation at Break	≥2.5	≥2.5
Flexural Strength	95±5 MPa	85±5 MPa
Flexural Modulus	3300±150 MPa	3600±150 MPa
HDT 66 psi	≥95 °C	≥95 °C
Water absorption of cured product at 40°C after 16hrs (RINA/LRS approval)	<60 mg	< mg

#### REQUIRED SPECIFICATIONS FOR MAIN ENGINE

<b>Parameters</b>	<b>Specifications</b>
No of Cylinders	6
Displacement (L)	11.6
Horsepower	500
Rated RPM	2100
Configuration	Inline 6
Rating	P2 - Continuous
Time @ Full Load	16 hrs each 24 hrs
Annual Hours Allowed	5000
Mean engine factor	80%
Time Before Overhaul	24000 hrs
Fuel Injection System	Inline Fuel Pump Mechanical Injector
Cooling System	Tube Cooler
Weight (Kg)	1200
Length (mm)	1665
Width (mm)	1021
Height (mm)	1091
Fuel Consumption @ rated power L/hr	90
Torque @ rated rpm (Nm)	1690

#### **REQUIRED SPECIFICATIONS FOR MARINE GENERATOR**

<b>PARAMETERS</b>	<b>SPECIFICATIONS</b>
Max Power Output	20.00 kVA/KW
Type	Single Phase
Current	90.00 A
Voltage	230 V
Frequency	50 Hz
Start up	Electric
Alternator cooling system	Air
Dimensions with soundproof cover	1130 x 600 x 730 mm
Net Weight (With Soundproof Cover)	430 kg
Noise Level	<55 dB (A) @ 7 meters
Air Consumption	1.43 m <sup>3</sup> /min
<b>Engine Specs</b>	
Cooling System	Heat Exchanger
Engine RPM	1500
Number of Cylinders	4
Displacement	2434 cc
Bore	87 mm

Stroke	102 mm
Compression ratio:1	23.20
Oil cap capacity	8.00 l
Refrigerant fluid flow	37.90 l/min
Seawater pump flow	26.50 l/min
Heat discharge	88.00 Kcal/min
Max installation angle	10° continuous / 22.5° intermittent
Speed Governor	Electronic
Fuel Consumption at half load	3.40 l/h
Fuel Consumption at full load	6.10 l/h
Fuel type	Diesel
<b>Alternator Specifications</b>	
Minimum power cable section	25 mm <sup>2</sup>
Maximum fuel pump prevalence	0.80
Fuel supply line	∅ 8 mm
Fuel supply refusal line	∅ 6 mm
Oil drain cap	3/8 NPT
Maximum sea water pump prevalence	1.22
Seawater supply line	∅ 25 mm
Humid outlet pipe line	∅ 60mm
Max. exhaust return pressure outlet	500
Nominal battery voltage	12V
Min CCA rating	670 A; 100 Ah
Minimum Battery cable section	50 mm

#### REQUIRED SPECIFICATIONS FOR BATTERY BANK WITH SOLAR CHARGING SETUP

1. 15kWh Lithium Battery (LiFePO4 Smart) – 24V battery bank setup
  - Nominal voltage 25,6V
  - Nominal capacity @ 25°C 200Ah
  - Nominal capacity @ 0°C\* 160Ah
  - Nominal capacity @ -20°C\* 100Ah
  - Nominal energy @ 25°C 5120Wh
  - Maximum continuous discharge current 400A
  - Recommended continuous discharge current 200A
  - End of discharge voltage 22V
  - Maximum charge current 400A
  - Dimensions (HxWxD) mm 237 x 650 x 163
  - Weight 39Kg
  
2. Battery management System
  - Built-in 500A contactor, used as a fall-back safety mechanism and available as a remote controllable main systems switch.
  - Battery monitor, indicating state of charge percentage and more data.
  - Pre-alarm signal: provide a warning before the system shuts down
  - Bluetooth for use with Connect App, for setup and monitoring.
  - Local and remote monitoring feature with relevant battery monitoring device.

### 3. Inverter/Charger

#### Inverter

- Input voltage range (V DC) 19 -33V
- Output (1) Output voltage: 230 VAC  $\pm$  2%
- Frequency: 50 Hz  $\pm$  0,1%
- Cont. output power at 25°C (VA) (3) 8000
- Cont. output power at 25°C (W) 6500
- Cont. output power at 40°C (W) 5500
- Cont. output power at 65°C (W) 3600
- Peak power (W) 16000
- Maximum efficiency (%) 94
- Zero load power (W) 45
- Zero load power in AES mode (W) 30
- Zero load power in Search mode (W) 10

#### Charger

- Charge voltage 'absorption' (V DC) 28,8
- Charge voltage 'float' (V DC) 27,6
- Storage mode (V DC) 26,4
- Charge current house battery (A) (4) 200
- Common Characteristics Operating temp.: -40 to +65°C
- Humidity (non-condensing): max. 95%

### 4. Solar Panel 2180W

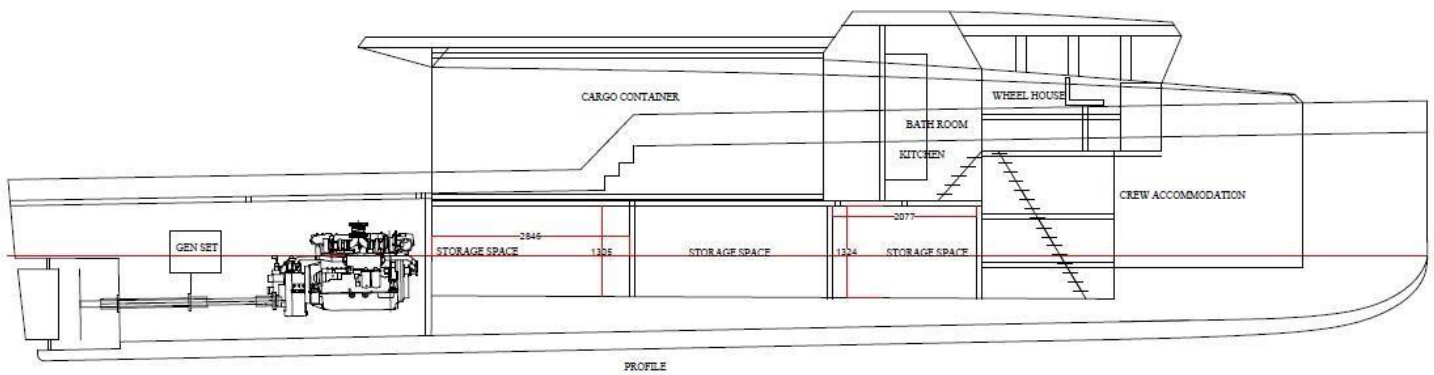
- Cell Type: P type Mono-crystalline
- Maximum Power (Pmax): 545W
- Maximum Power Voltage (Vmp): 40.8
- Maximum Power Current (Imp): 13.36
- Open-circuit Voltage (Voc): 49.52
- Short-circuit Current (Isc): 13.94A
- Module Efficiency STC (%): 21.13%
- Dimension: 2274×1134×35mm
- Weight: 28.9 kg

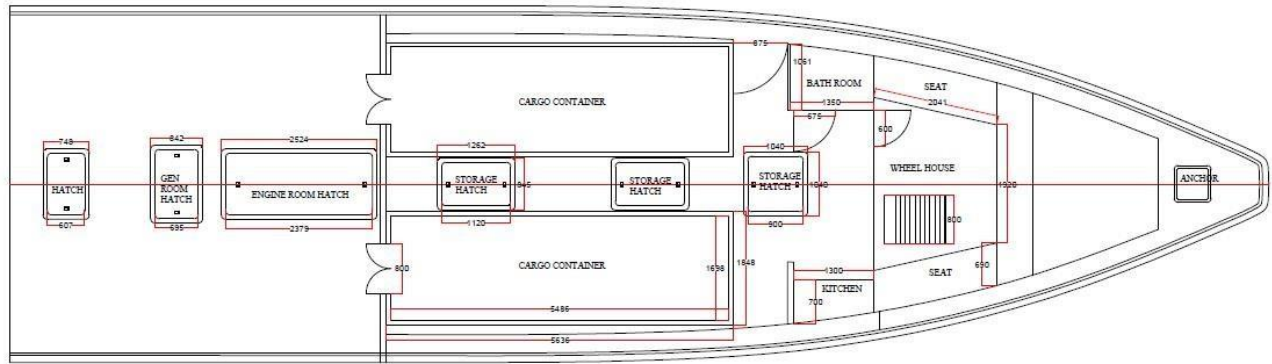
### 5. DC-DC Converter for 12VDC Load

- Converter 100A
- Input voltage range 10-30V
- Under voltage threshold 10V
- Output voltage range 10-30V
- Maximum charge current: 12V:100A, 24V:50A
- Power consumption Converter off, LEDs off (power save mode) 7 mA
- On/off input (pin 1, purple wire)
- 'On' threshold voltage > 2V
- Maximum input voltage 30V
- Output pin 1 and pin 2
- Output voltage if activated Vpinout = Vin
- Maximum current (per pin) Ipinout = 1A
- Operating temperature range -25 +60°C
- Ambient temperature Max current: up to 60°C
- Weight: 4,1kg
- Dimensions 288 x 162 x 95mm

6. Charge Converter for Engine Alternator
7. Solar controller
8. Touch Screen Display and Online Monitoring
9. Solar cable 6.0mm<sup>2</sup> IC DI UV resistant weatherproof tinned copper multi stranded

Annex 2  
DRAWINGS





DECK PLAN



