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Pre-feasibility Study for Onshore Power Supply – Inter-island Port Facilities Seychelles

Final Report



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Registered offices
Bonn and Eschborn

Köthener Str. 2-3
10963 Berlin

T +49 30 338424 186
E info@giz.de
I www.giz.de

Prepared by:
Haskoning Nederland B.V.

Laan 1914 no.35
3818 EX Amersfoort
Netherlands
Water & Maritime
Trade register number: 56515154

T +31 88 348 20 00
E info@haskoning.com
I www.haskoning.com

Author/Responsible Editors
Alex Ruijs, Robin van den Berg
Haskoning Nederland B.V., Amersfoort, Netherlands

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01. List of Abbreviations

AIS	Automatic Identification System
B.V.	Private limited company under Dutch law
CAPEX	Capital expenditure
CO_2	Carbon dioxide
DC	Direct current
ESIA	Environmental and Social Impact Assessment
EUR	Euro
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GmbH	Limited liability company under German law
HFO	Heavy fuel oil
H_2	Hydrogen
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
IPP	Independent Power Producer
LFO	Light fuel oil
MECENR	Ministry of Environment, Climate, Energy and Natural Resources
MV	Motor Vessel / Medium Voltage (depending on context)
NDC	Nationally Determined Contribution
NO_x	Nitrogen oxides
OPEX	Operating expenditure
OPS	Onshore Power Supply
OTEC	Ocean Thermal Energy Conversion
PM	Particulate matter
PS	Principal Secretary
PUC	Public Utilities Corporation
PV	Photovoltaic
RES	Renewable energy sources
RFID	Radio-frequency identification
SCR	Seychellois rupee
SMSA	Seychelles Maritime Safety Authority
SPA	Seychelles Ports Authority
TTW	Tank-to-Wheel
UNIDO	United Nations Industrial Development Organization
URC	Utilities Regulatory Commission
USD	United States dollar
WTW	Well-to-Wheel

02. Executive Summary

Every day, ferries and cargo vessels link Mahé, Praslin and La Digue, carrying residents, tourists and the goods on which island life depends. While berthed – often overnight, right next to passenger terminals and, in Victoria, the capital – these vessels keep their onboard diesel generators running to power air conditioning, cooling and other onboard systems. This burns imported fuel and causes greenhouse gas emissions, local air pollution and noise. Onshore Power Supply (OPS) allows vessels to switch off their generators and connect to shore-side electricity instead.

Overall conclusion

This pre-feasibility study assesses OPS at the three main inter-island ports – Port Victoria (Mahé), Baie Ste Anne (Praslin) and La Passe (La Digue) – in close cooperation with the Seychelles Ports Authority (SPA) and national stakeholders. It concludes that OPS is technically feasible at all three ports and can be implemented in the near term:

- Vessels operating on the inter-island routes require only low-voltage connections (400 V, 50 Hz), and most regular ferries and cargo vessels can already connect without significant retrofits.
- The estimated investment is approximately EUR 243,000 per port at Mahé and La Digue and EUR 308,000 at Praslin (accuracy −35%/+50%).
- PUC has informally confirmed that the required grid connections can be provided.

The business cases differ by port. Mahé benefits from its role as the main inter-island hub, Praslin presents a strong case driven by long cargo vessel stays, and La Digue combines daily overnight ferry stays with the opportunity to integrate OPS into its planned port redevelopment. Grid capacity, vessel requirements and detailed infrastructure design still need to be verified in the next phase.

OPS is a practical first step within Seychelles' climate and port decarbonisation agenda. Seychelles' NDC 3.0 (2026–2035) targets a 23.1% reduction in greenhouse gas emissions below business-as-usual by 2035, including a 30% reduction in the transport sector, and net-zero emissions by 2050. While the transport target is currently quantified for road transport, OPS directly supports the wider transport decarbonisation agenda. SPA's Sustainability Policy & Action Plan targets Green Port Certification by 2030, 100% renewable energy by 2035 and net-zero port operations by 2040. The full environmental benefit of OPS depends on the electricity being supplied from renewable sources. In the longer term, OPS can be a first step towards vessel electrification, although charging fully electric ferries would require infrastructure of a substantially larger scale.

OPS readiness by port

Inter-island Passenger & Cargo Terminal (Mahé): Approximately three ferry departures and three cargo vessel calls per day. One Cat Cocos ferry remains berthed overnight every day and two ferries stay overnight about one-third of the time. Regular cargo calls last approximately eight hours and

cargo vessels also stay overnight. Existing shore power comprises a connection of approximately 20 kW (400 V, three-phase, 50 Hz) used exclusively by Cat Cocos ferries, and a small connection of approximately 3 kW (230 V, single-phase, 50 Hz) used mainly by one general cargo vessel (MV Espoir) during overnight stays.

Ero Passenger & Eve Island Cargo Terminals (Praslin): Approximately seven ferry calls per day, typically lasting around 30 minutes, with no ferries berthed overnight. Cargo operations comprise approximately 12 calls per week, with regular calls of approximately 13 hours and overnight stays of approximately 25 hours. Two 32 A, 230/400 V, 50 Hz three-phase shore power connections are available for cargo and harbour craft; no ferry shore power is available.

La Digue Passenger & Cargo Terminal (La Digue): Approximately seven ferry calls per day, with one Cat Cocos ferry berthed overnight every day. Cargo operations comprise approximately 12 calls per week, with daytime calls of approximately two hours and overnight stays of approximately 14 hours. An existing ferry connection used exclusively by Cat Cocos provides approximately 20 kW at 400 V, three-phase, 50 Hz; no dedicated cargo shore power is available. Planned quay developments provide an opportunity to integrate OPS from the design stage.

Port	OPS readiness score	Key strengths	Main challenge	Overall conclusion
Mahé	High	Highest strategic relevance, strongest energy infrastructure, high ferry and cargo activity, existing shore-power experience	Existing privately operated shore-power infrastructure may complicate adoption of a new SPA-operated OPS system	Strong candidate; main inter-island hub with the highest strategic relevance
Praslin	Moderate	Strong cargo OPS business case due to long dwell times and overnight stays, existing shore-power usage	Limited ferry OPS potential due to short calls and no overnight ferry berthing	Suitable candidate, primarily driven by cargo operations
La Digue	High	Strong stakeholder support, favourable overnight vessel profile, ongoing port redevelopment offers integration opportunities	Additional cargo-side infrastructure required and data availability remains limited	Highly attractive opportunity, especially when integrated with future port upgrades
Overall		OPS appears technically feasible at all three ports; stakeholders are generally supportive and vessels are largely OPS-compatible	Further verification of grid capacity, tariffs, business case and detailed design required	Proceed to detailed technical and financial assessment

Top five technical findings

1. Each ferry connection point is designed with 125 A, 63 A and 32 A sockets, and each general cargo / landing craft connection point with 63 A and 32 A sockets, all at 400 V, 50 Hz.
2. None of the vessels surveyed uses a voltage or frequency other than 400 V, 50 Hz, and stakeholders confirmed there is no requirement for other voltages or frequencies.
3. Each port will have its own dedicated PUC grid connection for OPS (at Praslin, one each for the Ero Passenger and Eve Island Cargo Terminals), each with a central intake panel

containing a main circuit breaker, metering, outgoing feeders and provision for future solar PV generation.

4. For the maximum configuration of two ferries and three general cargo vessels, the connected load is 439 A; with a simultaneity factor of 0.50, the design load is 220 A.
5. PUC has informally confirmed that it can provide 250 A grid connections at all three ports; the grid connection costs used in the CAPEX estimate still require formal confirmation by PUC.

CAPEX and OPEX per port

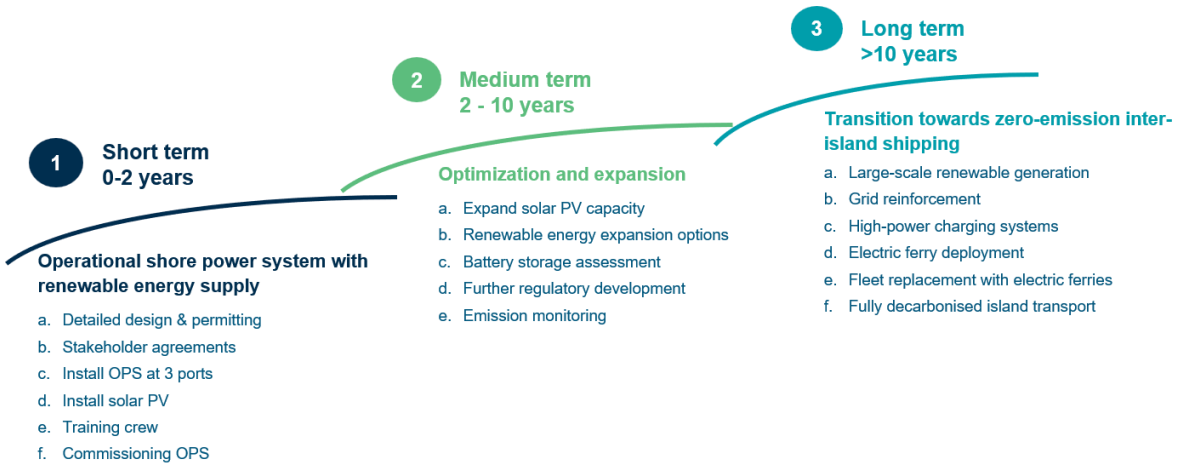
The estimated investment cost for the supply and installation of OPS ranges from EUR 243,300 (SCR 4.063 million) per port at Mahé and La Digue to EUR 307,920 (SCR 5.142 million) at Praslin, which requires two separate grid connections (one each for the Ero Passenger and Eve Island Cargo Terminals). The estimate accuracy is −35%/+50%. This includes the PUC grid connection(s) of 250 A, the main distribution board and metering, shore power connection panels, installation including cabling and civil works, and engineering, design and project management.

Indicative annual operational costs range from EUR 81,000 (SCR 1.353 million) per port at Mahé and La Digue to EUR 91,000 (SCR 1.520 million) at Praslin, comprising periodic maintenance, depreciation and interest, unforeseen repair or replacement, and personnel costs. These OPEX figures are indicative; no separate accuracy range has been determined. Electricity provision costs are excluded because they depend strongly on how electricity is generated or purchased.

Key OPS constraints, risks and mitigation

Existing shore power connections are low-capacity and their condition and remaining capacity require further verification. Short ferry turnaround times limit practical OPS use during regular calls, while future port redevelopment may influence the location and configuration of infrastructure. Grid connection approvals must be obtained from PUC, and responsibilities for ownership, operation, maintenance, metering, invoicing, connection and disconnection, liability and defect handling must be clearly defined before commissioning. Mitigation measures identified in this study include early engagement with the relevant authorities, compliance with the SMSA Shore Power Safety Standard and the IEC 80005 series, formal stakeholder agreements, training for all users, preventive maintenance, a long-term maintenance contract and a stock of critical spare parts.

Implementation roadmap and critical SPA/PUC actions



Short term actions: secure the required PUC grid connections for all three ports and confirm capacity, connection locations and delivery timelines; develop the concept designs into tender-ready designs; verify electrical loads, vessel requirements, civil works, safety systems and grid integration; obtain permits and approvals; formalise arrangements with PUC; prepare procurement documents; appoint a contractor; establish stakeholder agreements, operating procedures, safety protocols, maintenance plans and an emissions baseline; install and commission OPS systems and, as a separate project, solar PV systems; and train port personnel, maintenance staff and vessel crews.

Medium term actions: increase OPS utilisation, maximise the use of solar PV installed at the ports, expand renewable energy integration where feasible, establish structured monitoring, and review tariffs, billing arrangements and maintenance contracts.

Long term actions: integrate OPS into the wider maritime decarbonisation strategy and retain flexibility for higher-power charging requirements and possible grid reinforcement associated with future hybrid-electric or fully electric ferries.

Study limitations and implications of uncertainty

The study identified incomplete vessel-call records and discrepancies in timestamp formats between the three ports. These issues create uncertainty in OPS utilisation and energy-demand estimates and may mean that some eligible calls were not included. Detailed energy-consumption data was available for general cargo vessels, but equivalent ferry data was not available, requiring assumptions and benchmark values. No structured database currently tracks vessel emissions, electricity consumption or broader environmental performance indicators at the three ports. These inconsistencies did not materially affect the overall findings and conclusions of this pre-feasibility study. Nevertheless, standardised port-call registration, a central database, standard reporting templates, OPS metering and clear responsibility within SPA for data collection, verification and reporting are recommended.

Recommended next steps

Secure the required grid connections with PUC for all three ports. Once connection capacities, locations and delivery timelines are confirmed, proceed with detailed design, permitting and procurement. Before commissioning, formalise stakeholder agreements covering operational procedures, safety protocols, maintenance, metering and invoicing, and establish an emissions baseline using the indicators recommended in this study (see Task E).

03. Project introduction

Introduction

This report presents the pre-feasibility study for the implementation of Onshore Power Supply (OPS) at the selected inter-island port facilities of Seychelles. The study focuses on the three main islands of Mahé, Praslin and La Digue, and their respective ports: Port Victoria, Baie Ste Anne and La Passe.

Inter-island maritime transport plays a vital role in connecting the islands and supporting the movement of passengers and cargo. At present, vessels rely primarily on onboard diesel generators to provide electricity while berthed, resulting in greenhouse gas emissions, air pollution, noise and fuel consumption. OPS offers an opportunity to reduce these impacts by enabling vessels to connect to the local electricity grid while alongside.

The purpose of this study is to assess the technical feasibility, energy requirements and implementation conditions for OPS at the three inter-island ports and takes into account future development opportunities in the field of electric sailing. Particular attention is given to the operational characteristics of domestic ferries and small general cargo vessels, which differ significantly from larger international shipping segments such as cruise vessels.

The study supports Seychelles' wider decarbonisation ambitions and provides a structured basis for future investment decisions by identifying suitable OPS concepts, infrastructure requirements, implementation pathways and key considerations for further project development. Seychelles submitted its NDC 3.0 in September 2025, covering the period 2026–2035 and targeting a 23.1% reduction in greenhouse gas emissions below business-as-usual by 2035, including a 30% reduction in the transport sector. While this transport target is currently quantified for road transport, OPS directly supports the wider transport decarbonisation agenda. The study also supports SPA's stated ambitions for Green Port Certification by 2030, 100% renewable energy by 2035 and net-zero port operations by 2040, while contributing to Seychelles' national objective of achieving net-zero emissions by 2050.

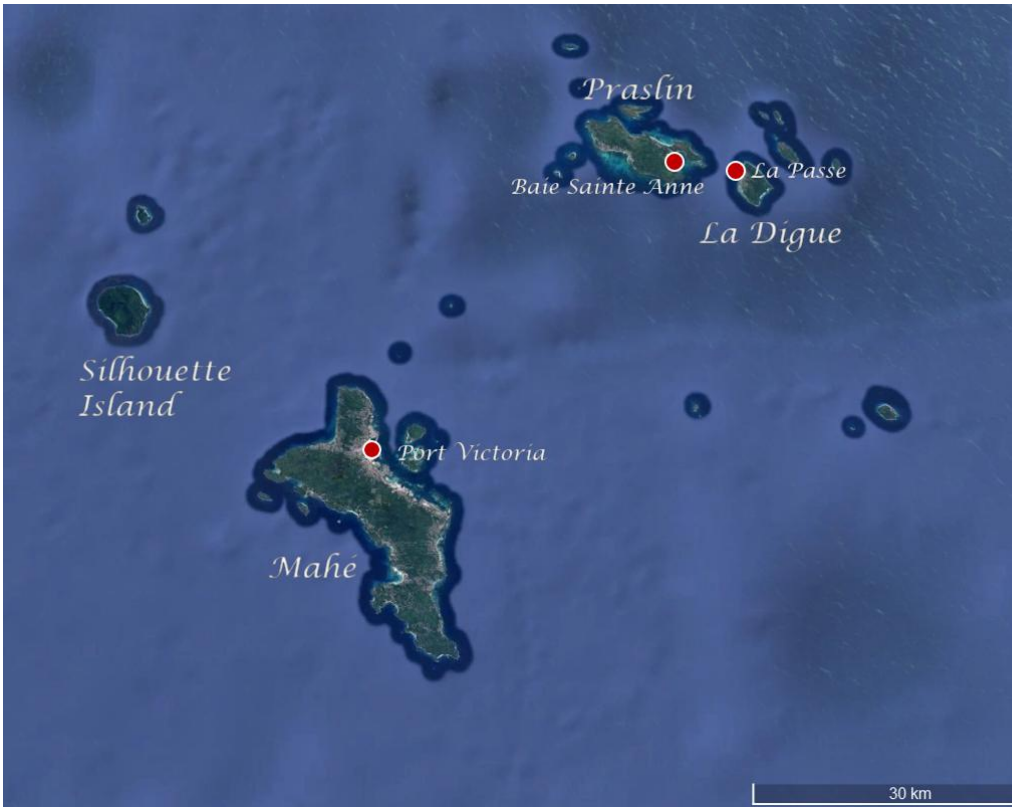
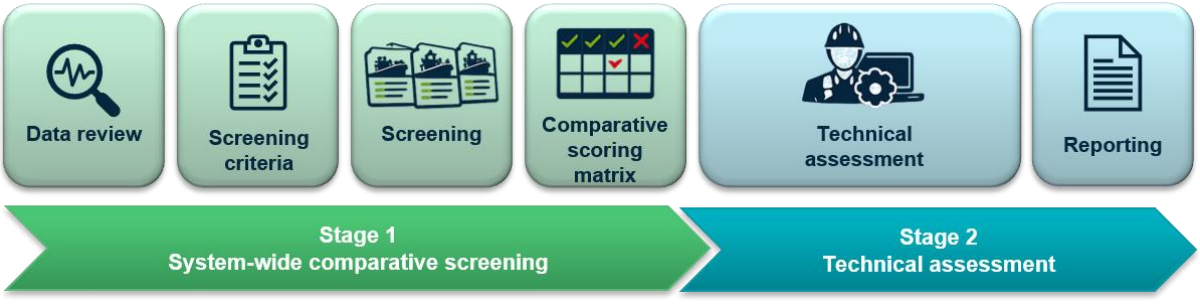


Figure 1 Overview map of the three ports at Mahé, Praslin and La Digue

Project approach

The main goal of this study is to define an OPS concept that can be applied for all three ports, for ship types operating on the inter-island routes. A two-stage approach was applied:

- **Stage 1 – System-wide comparative screening:** All three inter-island port facilities were assessed using a common set of technical, operational, and strategic criteria, resulting in a comparative screening matrix. This stage establishes port-specific profiles, identifies opportunities and constraints, and evaluates the overall readiness of each port for OPS implementation.
- **Stage 2 – Technical assessment**: In this stage, the plan for OPS was worked out into further detail, resulting in sufficient data to allow preparation of an order of magnitude cost estimate (-35% / +50% accuracy), an indicative system lay-out and an operational plan for the application of OPS.



Project scope

The scope of this study is limited to the three principal inter-island terminals of Seychelles: Inter-island Passenger & Cargo Terminal (Mahé), Ero Passenger & Eve Island Cargo Terminals (Praslin) and La Digue Passenger & Cargo Terminal (La Digue). The assessment focuses on vessel categories that represent the majority of inter-island maritime traffic and are considered the most relevant candidates for the application of shore power. The main vessel categories considered in this study are:

- Domestic passenger ferries;
- Small general cargo vessels;
- Landing craft vessels.

Particular attention is given to ferry operations, which are characterised by high service frequencies, short turnaround times and time-sensitive schedules. These operational characteristics have a significant influence on the practicality and utilisation potential of OPS systems.
Inter-island transport in Seychelles is characterised by short sailing distances (50km between Mahé and Praslin / La Digue and 5km between Praslin and La Digue), frequent vessel movements and limited berth occupancy times. As a result, the operational context of coastal ferries like in the Seychelles differs significantly from conventional OPS applications for e.g. cruise vessels and large commercial ports. Compared to these vessel segments, inter-island ferries and cargo vessels generally have lower absolute power demands, shorter daily port stays (excl. overnight stays) and more frequent daily operations.

The assessment therefore adopts a screening-level approach that is specifically tailored to the inter-island environment. Rather than focusing solely on the port infrastructure, the study considers the wider island energy system, recognising that the feasibility and environmental performance of OPS are strongly influenced by the characteristics of the local electricity network and generation mix.
The study determines the technical viability of OPS implementation, identifies scalable deployment pathways, highlights key data requirements and develops a phased implementation roadmap covering short-, medium- and long-term actions. Particular consideration is given to the following boundary conditions:

- Existing grid capacity and future grid development plans;
- Availability of renewable energy and opportunities for renewable integration;
- Future island-level energy planning and decarbonisation initiatives;
- Alignment with national climate and maritime decarbonisation objectives;
- The carbon intensity of supplied electricity and its impact on overall emissions reduction;
- Future developments in vessel electrification and the potential transition towards battery-electric operations.

As such, the study assesses both the immediate opportunities for shore power deployment and the longer-term role of OPS within the broader energy transition of the Seychelles inter-island maritime sector.

04. Overview of the Seychelles inter-island port system

National maritime transport context

Seychelles is an archipelago consisting of 115 islands located in the western Indian Ocean. While many islands are uninhabited or only sparsely populated, the majority of the population, economic activity and transport demand is concentrated on the three main islands of Mahé, Praslin and La Digue. These islands are therefore connected through an extensive inter-island maritime transport network, which plays a vital role in supporting tourism, economic activity and the movement of goods between the islands.

Mahé is the largest island, with an area of around 155 km², and functions as the economic and administrative centre of Seychelles. It hosts the national capital Victoria, the country's principal commercial port and the international airport. Praslin and La Digue are important residential and tourism destinations and depend heavily on regular maritime connections with Mahé for both passenger transport and cargo supply. Ferry services connect the three islands multiple times per day, while dedicated cargo vessels and landing crafts provide scheduled transport of food products, consumer goods, construction materials, and other essential supplies.

Although Seychelles contains numerous jetties, landing facilities and small harbours distributed across the islands, Port Victoria, Baie Ste Anne and La Passe represent the three most important ports within the inter-island transport system. Together they accommodate the majority of passenger and cargo movements between the three principal islands and therefore form the focus of this study.

Inter-island vessel operations

The inter-island maritime transport system is centred around regular ferry and cargo services operating between Mahé, Praslin and La Digue. Passenger transport is dominated by high-speed ferry services operated by the privately owned Seychellois ferry companies Cat Cocos and Cat Rose. Based on the analysed port-call data, approximately seven ferries were identified as operating regular passenger services within the island network. Publicly available information indicates that the Cat Cocos fleet has an average build year of approximately 2013, with vessels ranging from 2007 (Isle of Praslin) to 2017 (Isle of La Digue), while Cat Rose III entered service in 2019.

General cargo transport is provided by a fleet of approximately 16 small cargo vessels supplying the islands with essential goods, including food, construction materials and retail products. These vessels are privately owned and operated by local vessel owners. Most vessel owners live on one

of the three islands and therefore keep their vessels overnight at their home port, resulting in cargo vessels frequently returning to their home island between cargo operations.

In addition to the ferry and cargo fleets, the port-call analysis identified more than 160 harbour and landing craft, which are specialized vessels used for logistics, transport and operational support. They support local marine services, like transport of heavy machinery, construction equipment, or supplies, throughout the island network.

Inter-island operations are characterised by short sailing distances (ca. 50 km), frequent vessel movements and relatively limited berth occupancy times. Ferry operations in particular are schedule-driven, with three (Mahé) or seven (Praslin, La Digue) daily departures and short turnaround times typically ranging between 0.5 and 2.5 hours. The number of ferry departures depend on whether it is peak-tourist season. Cargo vessel operations are less seasonally dependent and occur less frequently but generally involve longer port stays with average durations of five to ten hours, including overnight berthing in several locations.

Compared to conventional OPS applications for cruise vessels and large commercial ships, the inter-island vessel fleet is characterised by lower absolute power demand, smaller vessel sizes and shorter port calls.

05. Stage 1 – System-wide comparative screening

Stage 1 forms the foundation of the study. It consists of two key components:

- Data review and validation, including the earlier performed study and data (Mahé Commercial Quay OPS Study - Haskoning, 2023);
- Structured comparative screening assessment of all three inter-island ports, leading to extensive port profiles of each of the three ports to enable a structured technical assessment in Stage 2.

The assessment combines data review, validation of existing studies, and screening-level analysis using transparent criteria and consistent assumptions.

Review and validation of existing studies and data

A comprehensive review of data and documentation for all three ports was performed, including:

- **The Mahé OPS feasibility study:** The Mahé feasibility study was reviewed and used as a baseline. As it studies a different terminal in the port, the terminal-specific information cannot be used. However, the national context and information on Mahé island, such as the grid capacity and renewable energy generation plans, can be used. Information of the grid capacities was validated in stakeholder consultations with network operator Public Utilities Corporation (PUC).
- **Port call records:** The number and duration of port calls differentiated per vessel types and per port is provided by SPA. The dataset contains port calls of two months: March 2026, which resembles a peak season month, and June 2026, which resembles a month in off-peak season. This data is used for determining the average port call duration per vessel type and the number of vessels that stay simultaneously overnight. These assumptions were validated in consultations with vessel owners and the operations team and harbourmasters from SPA. Furthermore, based on this data the cumulative hours that vessels stay in the port (and during which they could potentially be connected to shore power) is calculated. According to SPA, the number of port calls is not expected to increase or decrease in the future but will remain constant.
- **Physical lay-out data:** SPA has provided the latest port masterplans of the inter-island facilities of each port. This information contains the dimensions of the quay, berthing positions and existing electrical connections.
- **Stakeholder consultations** (see Appendix for complete overview of consultations):

- Two in-person workshops were organised in cooperation with SPA. Present during these workshops were: vessel operators, Department of Environment, Department of Energy & Climate Affairs, Nature Seychelles, Ministry of Transport, Ministry of Tourism, Department of Blue Economy, Utilities Regulatory Commission (URC), Seychelles Maritime Safety Authority (SMSA), PUC and SPA staff.
- On-board vessel assessments and surveys to vessel operators were held during a field mission to the port. During the on-board assessments, the shore power connections, the generator and the switchboard have been studied and besides this some of the vessel owners provided at-berth fuel consumption records and generator running hours. This information is used for assessing the shore power readiness and demand requirements. Furthermore, the engines of the vessels were inspected to gain information on future possibilities for electrification and retrofitting.
- PUC discussions focused on available grid connection capacity at the three ports, connection requirements for future OPS systems, electricity tariffs, renewable energy integration options, net billing and gross metering policies, and the long-term capability of the electricity network to support future vessel electrification.
- Chief executive officer of the SMSA discussions focused on operational and safety requirements for shore power systems, responsibilities of port and vessel operators, and regulatory considerations for the safe implementation and operation of OPS facilities.
- Principal Secretary for Energy and Climate Change discussions focused on national energy policy, renewable energy deployment plans, future electricity demand, climate targets and the strategic role of OPS within the wider energy transition of Seychelles.
- Chief Technical Advisor for the Seychelles electric mobility project (representing the Ministry of Transport) discussions focused on the role of OPS within the wider transport decarbonisation strategy, future vessel electrification opportunities, charging infrastructure requirements and alignment with national transport policies.
- UNIDO discussions focused on opportunities for technical assistance and capacity building to support the implementation of OPS, alignment with international decarbonisation initiatives, potential financing mechanisms, knowledge sharing from comparable projects in other regions, and the role of OPS within broader sustainable maritime and industrial development objectives.

Table 1 Overview of data collection and validation status

Data	Details	Source	Status	Stakeholder confirmation
Previous OPS study	National energy context, grid context, renewable-energy plans, OPS lessons learned from Mahé Commercial Quay	Mahé OPS Study (2023)	Partly transferred. National information used; terminal-specific design and demand data not applicable to inter-island terminals	Confirmed with PUC and SPA

Vessel operations data	Vessel names and types, routes, port-call history, visit frequency, berth duration, overnight stays, simultaneous berth occupancy, cumulative berth hours	SPA port-call database (March and June 2026)	Obtained and used as primary demand dataset	Confirmed with vessel owners, harbourmasters and SPA operations team
Port infrastructure data	Port layouts, berth layouts, fixed berthing positions, available space, operational constraints, existing electrical infrastructure	SPA masterplans and site visits	Obtained and used	Confirmed with SPA
Vessel technical data	Generator ratings, switchboards, fuel consumption, generator running hours, shore-power readiness, electrical characteristics (voltage/frequency)	On-board vessel surveys and operator interviews	Partly obtained; complete data not available for all vessels	Confirmed for surveyed vessels
Grid information	Available grid capacity, connection points, peak loads, future network upgrades, renewable-energy integration options	PUC consultations	Obtained and used	Confirmed with PUC
Electricity and tariff data	Tariffs, metering arrangements, future electricity price assumptions	PUC consultations	Partly obtained; final OPS tariff structure not yet available	Requires further confirmation
Regulatory and policy framework	Safety requirements, OPS responsibilities, national climate targets, renewable-energy plans, transport decarbonisation strategy	SMSA, MECENR, Ministry of Transport	Obtained and used	Confirmed through stakeholder consultations
Future demand assumptions	Expected growth in port calls, fleet development, vessel electrification potential	SPA and vessel-owner consultations	Available at qualitative level only	SPA expects port-call numbers to remain broadly constant
Remaining data gaps	Grid losses, fleet-wide OPS readiness rate, complete fuel-consumption records, OPS commercial model, confirmed future tariff structure	Various	Still required for detailed design phase	Not yet confirmed

Port profiles

Inter-island Passenger & Cargo Terminal (Mahé)

Introduction

Port Victoria is located on the north-eastern coast of Mahé, adjacent to the capital city Victoria. The port has direct access to the national road network and is located in close proximity to Seychelles International Airport, making it the country's principal maritime and logistics gateway. In addition to handling international cargo and fisheries-related activities, the port accommodates the country's busiest inter-island ferry and cargo operations. The Inter-island Passenger & Cargo Terminal functions as the main departure and arrival point for ferry services connecting Mahé with Praslin and La Digue.

Port Victoria comprises multiple specialised port areas, including the Commercial Port, Fishing Port, Oil Terminal and the Inter-Island Quay. For domestic operations, the Inter-Island Quay serves as the principal inter-island terminal and accommodates both ferry and cargo services. The wider deep-water port area covers approximately 2.5 km^2 and includes one dedicated ferry terminal and one domestic cargo terminal, alongside extensive international cargo-handling facilities.

Nearly 95% of all international cargo imports for the country pass through Port Victoria on Mahé. The port receives approximately 850 vessels per year and functions as the primary logistics hub of Seychelles and handles a diverse range of cargo flows serving both the domestic and international market. Within the inter-island transport network, cargo primarily consists of consumer goods, food products, refrigerated cargo, construction materials, fuel and other supplies destined for Praslin, La Digue and the outer islands. The port also supports fisheries-related activities and acts as the principal distribution centre for imported goods entering Seychelles.

Port Victoria has several national sustainability and decarbonisation initiatives ongoing. Previous studies have investigated the feasibility of shore power for cruise vessels (*Mahé Commercial Quay OPS Study (2023) by Haskoning*). The study assessed the technical, financial and environmental feasibility of OPS for cruise vessels, container vessels, reefer vessels and smaller vessel categories calling at Mahé. The recommended concept included a 16 MVA medium-voltage OPS system for cruise, container and reefer vessels and a 950 kVA low-voltage OPS system for fishing vessels, smaller cruise vessels and superyachts. In addition, the study assessed greenhouse gas reductions, air quality improvements, noise reductions and economic impacts, and developed an implementation roadmap for future deployment of shore power infrastructure.

Beyond OPS, SPA is pursuing a broader sustainability agenda focused on green port development, climate resilience and operational efficiency. In 2025, SPA signed a cooperation agreement with RISE Research Institutes of Sweden to support the transformation of Port Victoria into a regional model for sustainable and resilient port operations. The collaboration aims to integrate sustainable port practices, climate-smart infrastructure and innovative green technologies into the future

development of the port. Furthermore, ongoing national initiatives seek to increase the share of renewable energy within the Seychelles electricity system, expand solar and wind generation, improve energy efficiency and reduce emissions from both the energy and maritime sectors.

Terminal lay out of the Inter-island Passenger & Cargo Terminal

The Inter-island Passenger & Cargo Terminal at Mahé consists of separate berthing areas for passenger ferries, general cargo vessels and landing craft. The passenger terminal is served by a dedicated quay with a length of approximately 25 m and is exclusively used by Cat Cocos ferry services.

General cargo and landing craft operations take place at the remaining part of the quay consisting of an approximately 80 m long berth, supplemented by an additional 25 m quay section located on the quay head. Together, these facilities provide sufficient capacity to accommodate up to three cargo vessels simultaneously, with two vessels berthed along the main cargo quay and one vessel berthed at the quay head.

Planned port developments include an extension of the Inter-Island Quay. The current plans foresee a 40 m extension of the ferry quay towards the north, creating one additional berth for ferry operations. The future layout is expected to provide sufficient capacity for two ferries to remain berthed overnight simultaneously. In addition, the cargo quay will be extended on the south-eastern side through an extension of the existing quay head section.

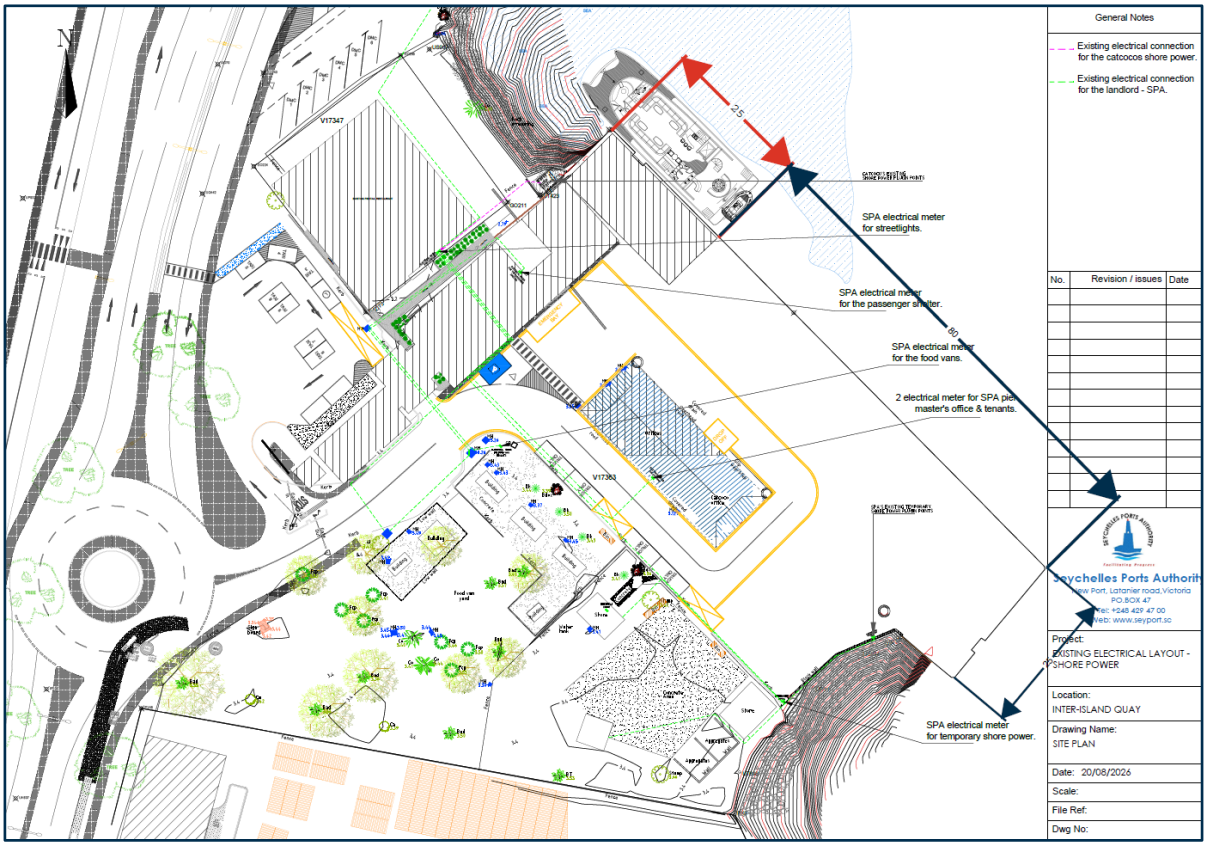


Figure 2 Master plan of the Inter-island Passenger & Cargo Terminal at Mahé. Red = Inter-island Passenger Terminal, blue = Inter-island Cargo Terminal.

Operational data

Ferry operations are characterised by frequent daily movements, with approximately three ferry departures per day (ferry departures at 08:00, 10:30, and 16:30). In general (there might be exceptions), for the first departure the ferry is already at the quay as it has stayed overnight. The last call at the port is approximately at 18:00 when it has returned from the last trip from La Digue/Praslin and then stays overnight. One Cat Cocos ferry remains berthed overnight every day and 1/3 of the time even two ferries stay overnight. These overnight stays create a potential opportunity for shore power utilisation. During the day 'regular' port calls take place for loading and unloading of passengers, which are relatively short, typically around one hour. During peak season, ferries occasionally need to wait at the general cargo berth for short periods, generally less than one hour. These calls (<1 hour) do not offer potential for shore power utilisation as connecting and decoupling takes too much time compared to the connection time.

Inter-island cargo operations also take place on a scheduled basis, with approximately three vessel calls per day. Cargo vessel port calls can generally be divided into 'regular' calls of approximately eight hours. These are mainly performed by three vessels: MV Ahroha II, Pie Chanteuse and La Belle Seraphina. Other vessels might call at the port, but these three vessels are used to base the operational profile on. Currently the vessels do not connect to shore power, but based on the length of the call, there could be potential for connecting. The vessel MV Espoir also stays overnight at Mahé regularly, and uses shore power for cooling of the cargo and other (small) hotelling loads.

Table 2 provides an overview of vessel call characteristics and the potential hours for OPS connection per vessel type. Overnight stays represent the minimum realistic OPS potential, as vessels remain alongside long enough to justify shore power connection. The maximum OPS potential additionally includes all non-overnight port calls ('regular' port calls) exceeding one hour, which are not connected currently but are considered technically feasible for OPS connection. The analysis shows that ferries account for the majority of potential OPS utilisation hours, primarily driven by their frequent overnight stays, while general cargo vessels provide a smaller, yet still meaningful, contribution to the overall electrification potential.

Table 2 Operational data Inter-island Passenger & Cargo Terminal (Mahé)

Vessel category	**Typical port call duration**	**Typical overnight stay duration**	**Percentage of nights that vessels stay simultaneous overnight 0/1/2/3 vessels**	**Sum of hours overnight port calls** *(min OPS potential)*	**Sum of hours port call > 1h but not overnight**	**OPS potential hours per year** *(max OPS potential)*
Ferry	1 hour	17 hours	8 / 65 / 27 / 1	7977	8120	16097
General cargo	8 hours	20 hours	62 / 36 / 2 / 0	3452	1920	5372

Existing shore power infrastructure

The Inter-Island Quay already has shore power facilities available for both ferry and cargo operations.

For ferry operations, an existing shore power connection is available exclusively for Cat Cocos vessels. The system operates at 400 V, three-phase and 50 Hz. Based on information obtained during the site visit and stakeholder consultations, the connection is estimated to provide approximately 20 kW of power. Electricity supply arrangements are currently managed directly between Cat Cocos and PUC. No agreements are in place between SPA and Cat Cocos to establish what will happen when SPA will provide port-owned OPS systems in the future.

A separate shore power connection is available for general cargo vessels and is used by MV Espoir, while occasionally also serving MV Ahroha II. This connection is considerably smaller and is intended for limited onboard loads only. Vessel operators currently perform connection and disconnection activities themselves and are directly charged by PUC. An agreement is in place that in case SPA is going to provide OPS in the future, the vessel operators have to make use of this new OPS infrastructure and will be charged by SPA (instead of PUC).

Table 3 OPS use-case snapshot – Inter-island Passenger & Cargo Terminal (Mahé)

Aspect	Use-case finding
Ferry OPS window	Overnight stays are the principal feasible window: one Cat Cocos ferry stays overnight daily and two ferries do so approximately one-third of the time. Regular calls are typically around one hour; calls below one hour are not considered suitable because connection and disconnection take too much time relative to the connection period.
Cargo OPS window	Overnight stays and regular calls of approximately eight hours provide feasible windows. MV Espoir regularly stays overnight and currently uses shore power for cooling and small hotel loads.
Existing connection	Cat Cocos ferry: 30 A, three-phase, 400 V, 50 Hz, estimated power ~20 kW. Cargo: 16 A, single-phase, 230 V, 50 Hz, estimated power ~3 kW. These are estimated connection powers; no user records or actual measured electricity-consumption data are available in the study.
Spatial and installation feasibility	The ferry quay is approximately 25 m and the cargo area comprises an approximately 80 m berth plus a 25 m quay-head section, accommodating up to three cargo vessels. Planned works include a 40 m ferry-quay extension and extension of the cargo quay. Cargo vessels can be scattered across the quay, which complicates practical cable reach during loading and unloading. The proposed concept places connection boxes approximately 1–2 m from the quay wall; final locations and cable routes require detailed design and coordination with the quay extensions and existing Cat Cocos infrastructure.

Key opportunities

- Existing shore power connections demonstrate operational experience with OPS. Existing operational experience may support stakeholder acceptance and future uptake.
- Presence of overnight ferry stays creates a suitable use case for OPS.
- Presence of overnight cargo vessel stays creates a suitable use case for OPS.

Key constraints/risks

- Existing shore power connections are low-capacity and may not meet future OPS requirements. Existing infrastructure condition and remaining capacity require further verification.
- Short ferry turnaround times limit the practical application of shore power during regular port calls.
- Existing operations of (sometimes simultaneously two) general cargo vessels are scattered over the quay and therefore limit the practical application of shore power during loading and offloading of cargo.
- Existing Cat Cocos shore-power infrastructure may reduce the business case for a new SPA-operated OPS system, as vessel operators may prefer to continue using existing facilities unless economic or regulatory incentives encourage a transition.

Ero Passenger & Eve Island Cargo Terminals (Praslin)

Introduction

Baie Ste Anne is located on the eastern coast of Praslin and serves as the island's principal passenger and cargo port. The port plays an important role within the inter-island transport network by facilitating regular ferry connections with both Mahé and La Digue, while also accommodating scheduled cargo services supplying the island. As the primary maritime gateway for Praslin, the port is essential for both the tourism sector and the provision of goods and services to the local population.

The port infrastructure consists of the ERO Passenger Terminal, serving ferry connections with Mahé and La Digue, and the nearby Eve Island Cargo Terminal, which accommodates inter-island cargo vessels. Together these facilities form the maritime gateway for Praslin and support both passenger and freight movements.

Publicly available statistics on annual cargo throughput and cargo distribution at Praslin are limited. No detailed cargo handling volumes could be identified from public sources. Nevertheless, the port is considerably smaller than Port Victoria and primarily fulfils a regional distribution function within the inter-island supply chain. Cargo handled at Baie Ste Anne mainly consists of consumer goods, food products, construction materials, fuel and other supplies transported from Mahé. In addition to serving the local demand of Praslin, the port also acts as a transhipment point for cargo destined for La Digue. The port therefore plays an important role in maintaining the continuity of supply chains between the three main islands.

Terminal layout Ero Passenger & Eve Island Cargo Terminals

The ERO Passenger Terminal at Baie Ste Anne, Praslin consists of a quay with a total length of approximately 145 m, providing sufficient berthing capacity for up to three ferries simultaneously. Cat Cocos vessels typically berth adjacent to the passenger terminal building, while other ferry operators make use of the remaining sections of the quay. The remaining section is also used by ferries during maintenance activities or when operational circumstances require additional berth capacity.

According to current port development plans, the passenger terminal building is expected to be relocated to the other side of the quay within the next five years.

General cargo operations are accommodated at a dedicated cargo quay with a length of approximately 170 m. On the western side of the facility, an additional landing craft ramp is available, increasing the total operational quay length to approximately 240 m. Depending on vessel size, the quay can accommodate up to four cargo vessels simultaneously (excl. the ramp). The landing craft ramp is regularly used for maintenance activities and therefore requires sufficient operational space to remain available. Several warehouse facilities are located directly behind the cargo quay, supporting cargo handling and storage operations within the port area.

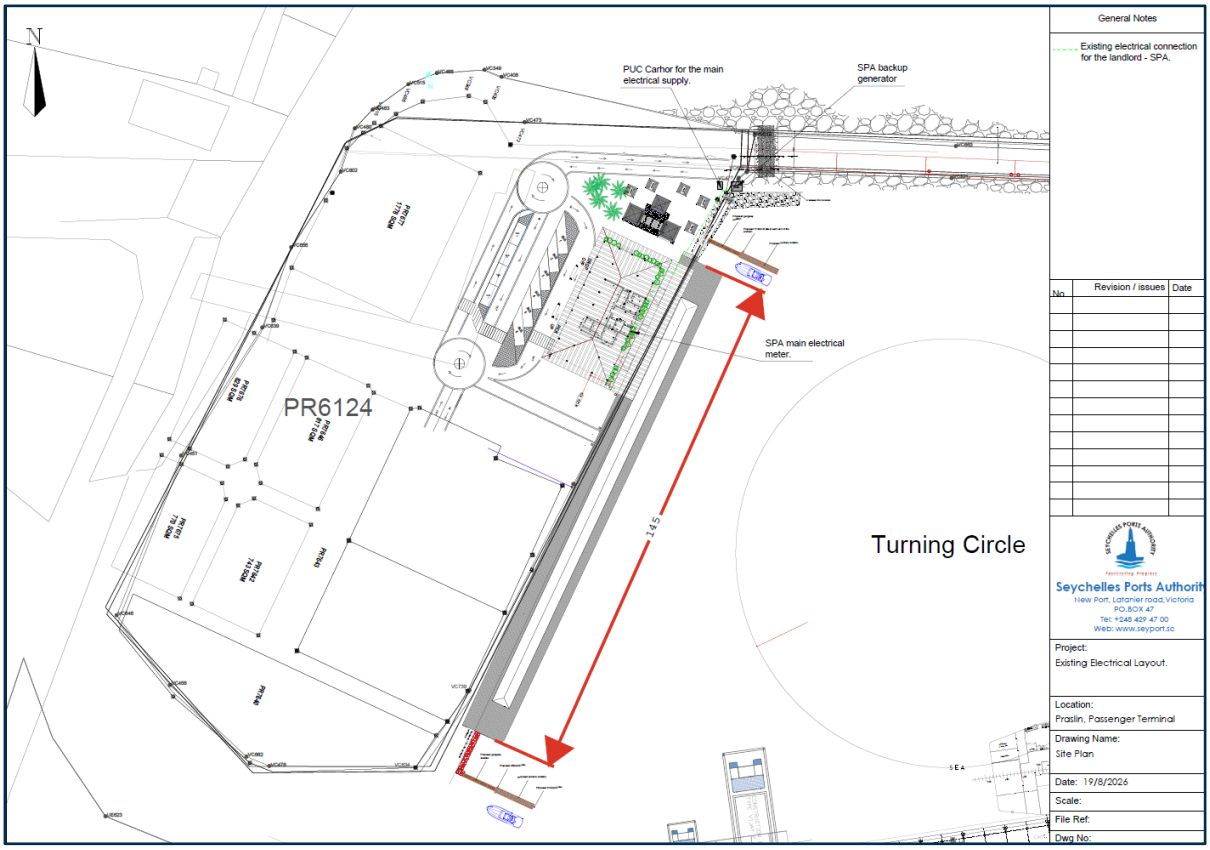


Figure 3 Master plan of the Ero Passenger Terminal at Praslin

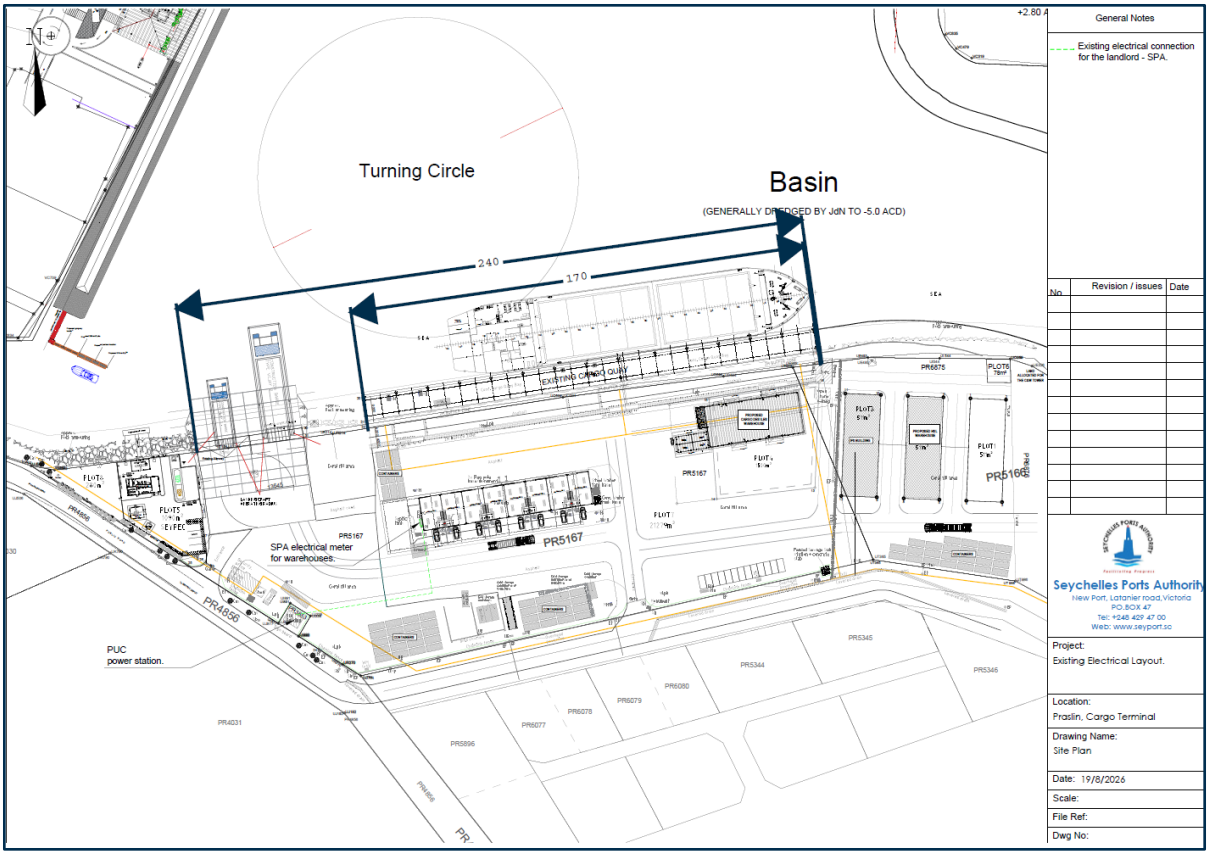


Figure 4 Master plan of the Eve Island Cargo Terminal at Praslin

Operational data

Ferry traffic consists of services operated by Cat Cocos (Mahé-Praslin-La Digue) and ferries operating between Praslin and La Digue only. In total, approximately seven ferry port calls take place per day of which three calls come from Cat Cocos. Ferry operations are characterised by relatively short port calls, typically around 30 minutes, which limits the practical application of shore power during regular passenger operations. No ferries remain berthed overnight at the quay. However, Cat Rose vessels regularly remain at anchorage overnight and have indicated an interest in shore power during waiting periods and maintenance activities.

Inter-island cargo operations take place on a scheduled basis, with approximately 12 vessel calls per week arriving from Mahé. Cargo vessel port calls are generally significantly longer than ferry calls. Regular calls are approximately 13 hours, mainly coming from MV Ahroha II and Seaview Enterprise, and overnight stays are approximately 25 hours. Half of the time a general cargo vessel stays overnight. These are mostly the MV Espoir and Pegasus.

Table 4 provides an overview of vessel call characteristics and the potential hours for OPS connection per vessel type. Overnight stays represent the minimum realistic OPS potential, as vessels remain alongside long enough to justify shore power connection. The maximum OPS potential additionally includes all non-overnight port calls (‘regular’ port calls) exceeding one hour, which are not connected currently but are considered technically feasible for OPS connection.

These overnight berth occupation periods and long ‘regular’ port calls create favourable conditions for the application of shore power. OPS opportunities at Ero Passenger & Eve Island Cargo Terminals are primarily driven by cargo vessel operations, while ferry-related opportunities are mainly limited.

Table 4 Operational data Ero Passenger & Eve Island Cargo Terminals (Praslin)

Vessel category	**Typical port call duration**	**Typical overnight stay duration**	**Percentage of nights that vessels stay simultaneous overnight** 0/1/2 vessels	**Sum of hours overnight port calls** *(min OPS potential)*	**Sum of hours port call > 1h but not overnight**	**OPS potential hours per year** *(max OPS potential)*
Ferry	0,5	-	100 / 0 / 0	585	584	1169
General cargo	13	25	52 / 45 / 3	5184	580	5764

Existing shore power infrastructure

No shore power infrastructure is currently available for ferry operations. During stakeholder consultations, ferry operators expressed interest in the installation of shore power facilities, particularly for use during maintenance periods and longer waiting times. Stakeholders indicated that shore power is generally not required during overnight stays because vessels do not remain alongside the quay.

For inter-island cargo vessels, a shore power connection is already available. The existing installation consists of a 32 A, 230/400 V, 50 Hz three-phase connection with an estimated maximum power rating of approximately 22 kW. The connection is currently used on an operational basis by vessel operators, who are responsible for connection and disconnection activities themselves. Another shore power connection is available for harbour craft approximately 50m land inwards from the landing craft ramp. This is also a 32 A, 230/400 V, 50 Hz three-phase connection.

Although the existing infrastructure demonstrates operational familiarity with shore power, the available capacity is relatively limited and may not be sufficient to accommodate future OPS requirements for multiple vessels or increased onboard power demand.

Table 5 OPS use-case snapshot – Ero Passenger & Eve Island Cargo Terminals (Praslin)

Aspect	**Use-case finding**
Ferry OPS window	Regular calls are typically around 30 minutes and no ferries remain berthed overnight; routine ferry OPS is therefore limited. The identified opportunity is during maintenance periods and longer waiting times. Cat Rose vessels currently remain at anchorage overnight.
Cargo OPS window	Both extended regular calls of approximately 13 hours and overnight stays of approximately 25 hours are suitable for OPS connection. A general cargo vessel stays overnight about half of the time.
Existing connection	General cargo: one 32 A, 230/400 V, 50 Hz three-phase connection, with an estimated maximum rating of approximately 22 kW. A second 32 A, 230/400 V, 50 Hz three-phase

	connection for harbour craft is located approximately 50 m inland from the landing-craft ramp. Ferry: No ferry connection is installed. These are estimated connection powers; no user records or actual measured electricity-consumption data are available in the study.
Spatial and installation feasibility	The approximately 145 m passenger quay can accommodate up to three ferries. The cargo quay is approximately 170 m, increasing to approximately 240 m including the landing-craft ramp, and can accommodate up to four cargo vessels excluding the ramp. The ramp requires operational space for maintenance. Warehouses directly behind the cargo quay may support equipment siting and solar PV, while the passenger terminal is expected to relocate within five years. Final panel positions, spacing and cable routes require coordination with these operational and development constraints.

Key opportunities

- Long cargo vessel dwell times provide a favourable operational profile for OPS.
- Significant number of overnight cargo vessel stays creates substantial OPS utilisation potential.
- Existing cargo shore power connection demonstrates operational experience with OPS. Existing operational experience may support stakeholder acceptance and future uptake.
- No existing shore power infrastructure is available for ferry operations, but ferry operators have expressed interest in future shore power facilities.

Key constraints/risks

- Short ferry turnaround times limit the practical application of shore power during regular port calls.
- Ferries do not remain berthed overnight, reducing OPS utilisation potential.
- Existing shore power connections for general cargo vessels are low-capacity and may not meet future OPS requirements. Existing infrastructure conditions and remaining capacity require further verification.

La Digue Passenger & Cargo Terminal (La Digue)

Introduction

La Passe is located on the western coast of La Digue. The port accommodates both passenger ferry services and inter-island cargo operations. Given the island's strong dependence on maritime transport, La Passe is the gateway for residents, businesses and tourists.

Recent redevelopment works have introduced a dedicated passenger terminal (La Digue Passenger Terminal) and a separated cargo handling area (La Digue Cargo Terminal), reducing operational conflicts between passenger and cargo traffic. The redevelopment also included improved marine access infrastructure, pontoons and vessel berthing facilities, reinforcing La Digue Passenger & Cargo Terminal's role as the primary gateway to La Digue.

Similar to Praslin, publicly available cargo throughput statistics for La Digue are not available. The port is a relatively small domestic harbour whose cargo activity is almost exclusively focused on supplying the island's residential and tourism sectors. Cargo handled at La Passe mainly consists of consumer goods, food products, construction materials, fuel and tourism-related supplies required to support the local economy. Due to the limited availability of land-based transport alternatives and storage facilities on the island, regular maritime deliveries are essential for maintaining daily operations and supporting the tourism sector. Recent port developments have included the relocation of cargo activities to a dedicated cargo area, reducing conflicts between passenger and cargo operations and improving overall operational efficiency.

Planned quay developments and future port expansion projects provide opportunities to integrate OPS infrastructure as part of wider port modernisation efforts.

Terminal layout La Digue Passenger & Cargo Terminal

Recent developments at La Digue Passenger & Cargo Terminal include the relocation of cargo operations to a dedicated cargo area in 2025. The new cargo facility consists of an approximately 50 m long quay and was developed to reduce operational conflicts between passenger ferry services and cargo handling activities. The relocation has improved the separation of passenger and cargo operations.

Further port developments are planned for the coming years. By 2030, the existing La Digue Passenger Terminal which is now 35m long, is expected to be relocated to the same new quay area as the current cargo operations. The planned passenger terminal will consist of an approximately 60 m long quay and will provide sufficient berthing capacity for up to two ferries simultaneously. This future layout will consolidate passenger and cargo activities within a single terminal area and may create opportunities to integrate OPS infrastructure as part of the wider port redevelopment programme.

The jetty currently serving the former La Digue Passenger Terminal is regularly used by catamarans and charter yachts operated by local tourism operators. These vessels frequently remain berthed overnight, creating a potential use case for shore power. While this segment falls outside the scope of the study, it may be worthwhile to consider these users in future OPS assessments and development plans for La Digue.

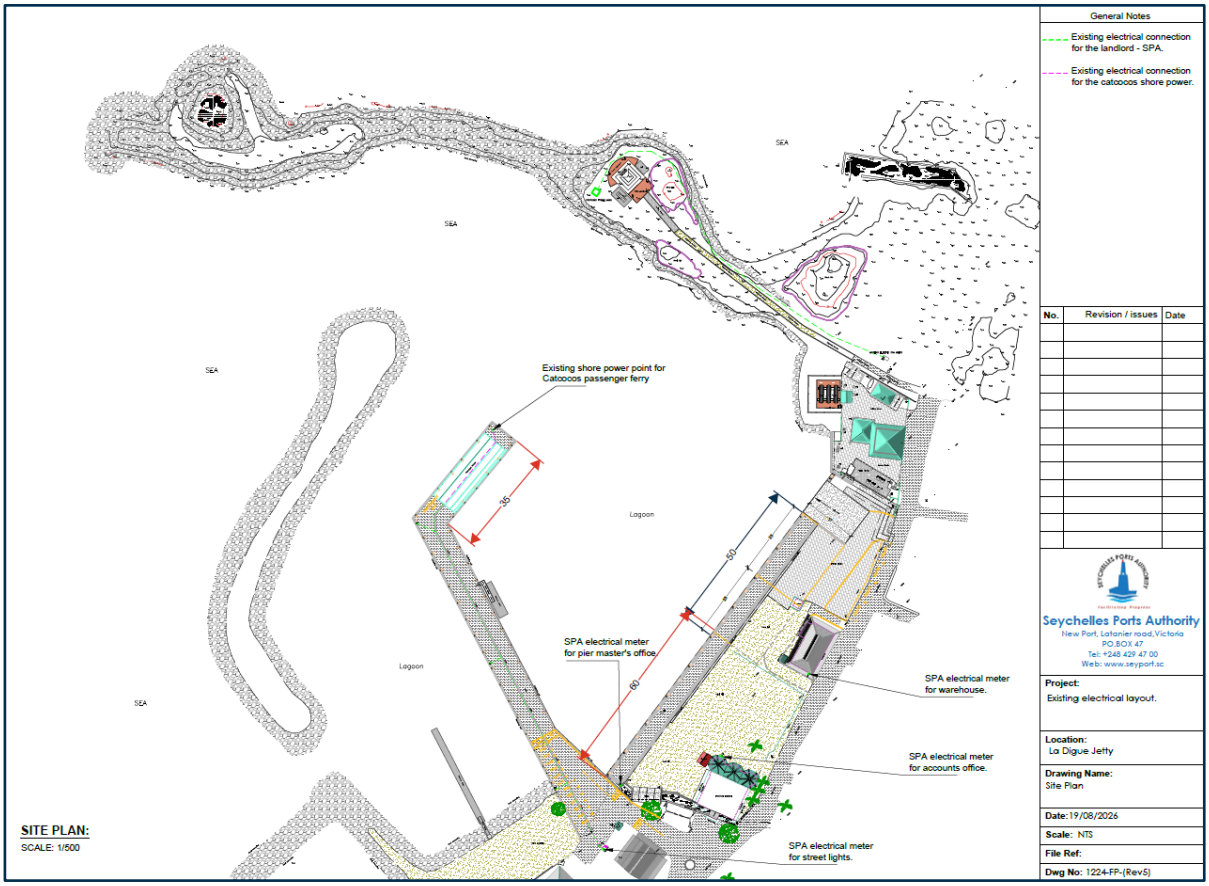


Figure 5 Master plan of the jetty and new passenger/cargo terminal at La Digue. Red = La Digue Passenger Terminal, blue = La Digue Cargo Terminal.

Operational data

Ferry traffic consists of services operated by Cat Cocos (Mahé-Praslin-La Digue) and ferries operating between Praslin and La Digue only. In total, approximately seven ferry port calls take place per day of which three calls come from Cat Cocos. Similar to Praslin, regular ferry operations are characterised by relatively short port calls, typically around 30 minutes, which limits the practical application of shore power during regular passenger operations. However, unlike Praslin, one Cat Cocos ferry remains berthed overnight at La Digue Passenger & Cargo Terminal every day. These overnight stays create a potentially attractive use case for shore power.

Inter-island cargo operations take place on a scheduled basis, with approximately 12 vessel calls per week arriving from Mahé. Cargo vessel operations generally consist of relatively short daytime calls of approximately two hours (mainly by MV Ahroha II and Seaview Enterprise) and overnight stays of approximately 14 hours (mainly by MV Ahroha II, La Belle Seraphina and Seaview Enterprise). The overnight stays represent the most suitable operating window for shore power application, particularly for cooling loads and other auxiliary onboard systems.

Future quay developments and the planned relocation of ferry operations may create additional opportunities to integrate OPS infrastructure as part of wider port development projects.

Table 6 provides an overview of vessel call characteristics and the potential hours for OPS connection per vessel type. Overnight stays represent the minimum realistic OPS potential, as vessels remain alongside long enough to justify shore power connection. The maximum OPS potential additionally includes all non-overnight port calls ('regular' port calls) exceeding one hour, which are not connected currently but are considered technically feasible for OPS connection. The results indicate that both ferries and general cargo vessels have significant OPS potential, with general cargo vessels contributing slightly more potential connection hours due to more overnight port stays.

Table 6 Operational data La Digue Passenger & Cargo Terminal (La Digue)

Vessel category	**Typical port call duration**	**Typical overnight stay duration**	**Percentage of nights that vessels stay simultaneous overnight** 0/1/2 vessels	**Sum of hours overnight port calls** *(min OPS potential)*	**Sum of hours port call > 1h but not overnight**	**OPS potential hours per year** *(max OPS potential)*
Ferry	0,5	14	8 / 91 / 2	4654	4708	9362
General cargo	2	14	43 / 33 / 24	9604	776	10380

Existing shore power infrastructure

An existing shore power connection is available for Cat Cocos ferry operations. The connection operates at 400 V, 50 Hz and is supplied through a 40 A three-phase connection. Based on information obtained during stakeholder consultations with Cat Cocos and Cat Rose, the system provides approximately 20 kW of power and is primarily intended for auxiliary onboard loads during overnight stays. Electricity supply arrangements are currently managed directly between Cat Cocos and PUC. Stakeholders indicated that future SPA-owned OPS facilities would replace the current arrangement and become the dedicated connection point for vessels.

No dedicated shore power infrastructure is currently available for general cargo vessels. During stakeholder consultations (MV Ahroha II), vessel operators expressed interest in future shore power facilities, particularly to support cargo cooling and other onboard auxiliary loads during overnight stays.

Table 7 OPS use-case snapshot – La Digue Passenger & Cargo Terminal (La Digue)

Aspect	**Use-case finding**
Ferry OPS window	Regular calls are typically around 30 minutes and offer limited practical potential. One Cat Cocos ferry remains berthed overnight every day, creating the principal ferry OPS window.
Cargo OPS window	Overnight stays of approximately 14 hours are a suitable window, particularly for cooling and auxiliary loads. Daytime calls are approximately two hours and are included in the report's maximum OPS potential where calls exceed one hour.
Existing connection	Ferry: 40 A, three-phase, 400 V, 50 Hz, providing approximately 20 kW for auxiliary loads during overnight stays.

	General cargo: No dedicated cargo connection is installed. These are estimated connection powers; no user records or actual measured electricity-consumption data are available in the study.
Spatial and installation feasibility	Cargo operations moved in 2025 to a dedicated quay of approximately 50 m. By 2030, the existing 35 m ferry terminal is expected to relocate to the same new quay area; the planned approximately 60 m passenger quay will accommodate up to two ferries. This creates an opportunity to integrate OPS by design, but the consolidated passenger/cargo layout means panel locations, cable routing, spacing and protection must be coordinated with the new terminal design. Cargo OPS will require alterations to the new quay.

Key opportunities

- Presence of overnight ferry stays provides a suitable operational case for OPS.
- A significant number of overnight cargo vessel stays creates substantial OPS utilisation potential.
- Existing ferry shore power connection demonstrates operational experience with shore-side electricity supply. Existing operational experience may support stakeholder acceptance and future uptake.
- General cargo vessel operators have expressed interest in shore power for overnight stays.
- Future quay developments create opportunities to integrate OPS infrastructure from the design stage and are an opportunity to develop an OPS concept aligned with future port development plans.

Key constraints/risks

- No dedicated shore power infrastructure is currently available for cargo vessels.
- Existing shore power connections are low-capacity and may not meet future OPS requirements. Existing infrastructure conditions and remaining capacity require further verification.
- Future port redevelopment may influence the location and configuration of OPS infrastructure.

Comparative scoring assessment

The objective of the scoring matrix is not to rank the ports against each other, but to assess the readiness and feasibility of OPS implementation at each location. Each port is therefore assessed independently against a common set of technical, operational, energy and stakeholder-related criteria. The assessment provides an indication of OPS readiness and highlights the key factors that support or constrain OPS deployment.

Screening criteria

A set of transparent and comparable criteria was developed to assess the three ports uniformly. The ports are scored on the following criteria:

Criterion	Description
OPS demand potential – Ferry	Combination of vessel frequency, dwell time and overnight stays. Higher scores indicate a greater potential for OPS utilisation, driven by the number of ferry calls and expected calls, duration of berth occupancy, availability of overnight stays and expected electricity demand while at berth.
OPS demand potential – General cargo	Combination of vessel frequency, dwell time and overnight stays. Higher scores indicate a greater potential for OPS utilisation, driven by cargo vessel call frequency and future call frequency, berth occupancy duration, overnight stays and onboard auxiliary power demand (e.g. cooling, accommodation and other hotel loads).
Technical feasibility	Compatibility of vessels and practicality of implementation. This includes vessel compatibility with shore power, required retrofit complexity, available space for OPS equipment, cable routing possibilities, berth layout, operational constraints and constructability considerations.
Grid and renewable energy integration	Ability of the local grid to support OPS, proximity to electrical infrastructure, available connection capacity and integration with renewable energy sources. Higher scores indicate fewer grid constraints and greater opportunities for supplying OPS with low-carbon electricity.
Stakeholder readiness	Interest and willingness of vessel operators, SPA and other stakeholders to support and use OPS. This includes stakeholder engagement during the study, expressed willingness to connect vessels, perceived operational benefits and institutional support for implementation.
Future scalability	Ability to expand towards larger OPS systems and future electrification. This includes opportunities for additional connection points, future increases in power demand, compatibility with future battery-electric vessels and alignment with planned port developments.
Strategic relevance	Contribution of OPS implementation to wider port, energy and climate objectives (e.g. emissions impact, alignment with national decarbonisation policies and NDC targets, contribution to future maritime electrification, etc.).
Data availability and quality	Availability, completeness and reliability of data required to assess and design OPS. Higher scores indicate that sufficient and reliable information is available to support technical assessments and reduce uncertainty in future project phases (e.g. port call records, electrical infrastructure / grid data, vessel information, stakeholder input, etc.).

A simple 1-5 scale was used:

Score	Meaning
1	Significant barriers to implementation
2	Challenging
3	Feasible with moderate interventions
4	Good feasibility
5	Highly favourable

Scoring of ports

Table 8 Scoring Inter-island Passenger & Cargo Terminal (Mahé)

Criterion	Scoring	Explanation
OPS demand potential – Ferry	5	Frequent ferry operations combined with substantial overnight stays provide a strong OPS use case. Short daytime port calls limit utilisation during regular operations.
OPS demand potential – General cargo	4	Regular cargo operations and overnight stays create good OPS potential, particularly for cooling loads.
Technical feasibility	4	Existing ferry and cargo shore power infrastructure demonstrates technical feasibility. Infrastructure upgrades for existing ferry shore power connections still require verification. Vessels are already compatible with shore power.
Grid and renewable energy integration	4	Mahé has the most developed energy infrastructure within the Seychelles and as the energy demand from shore power is low, grid integration seems possible.
Stakeholder readiness	3	Existing shore power usage demonstrates familiarity with OPS concepts and stakeholder acceptance. Stakeholders are equipped with shore power connections. On the other hand, the existing electrical infrastructure from Cat Cocos may induce implementation complexity.
Future scalability	4	Expansion plans for the inter-island quay are already in place. Potential future electrification pathways may pose difficulties in terms of grid capacity. Since Mahé is the main inter-island hub it still poses opportunities for future expansions.
Strategic relevance	5	Large concentration of users, high visibility, large potential emissions reduction and strong strategic importance within the inter-island transport network.
Data availability and quality	3	Operational information available from SPA main office. However, it is not easily accessible. No user records of existing shore power systems and limited electricity consumption information. Close contact with vessel operators for stakeholder input. As it is the nation's biggest port, more data is available, e.g. air quality metering stations were installed near the port until very recently.
Average score	**4**	**High OPS readiness**

Table 9 Scoring Ero Passenger & Eve Island Cargo Terminals (Praslin)

Criterion	Scoring	Explanation
OPS demand potential – Ferry	2	Ferry calls are frequent but short and no ferries remain berthed overnight, limiting OPS opportunities.
OPS demand potential – General cargo	4	Long cargo vessel dwell times and frequent overnight stays provide a good OPS business case.

Technical feasibility	4	Existing cargo shore power connection and sufficient berth capacity support implementation. Vessels are already compatible with shore power.
Grid and renewable energy integration	4	As the energy demand from shore power is low, grid integration seems possible. The warehouses at the general cargo quay offer potential for solar panels.
Stakeholder readiness	4	Ferry operators expressed interest in future shore power facilities and already have shore power connections on board. Cargo operators are currently already using shore power. Stakeholders are equipped with shore power connections.
Future scalability	3	Potential future electrification pathways may pose difficulties in terms of grid capacity. Expansion opportunities exist but might be more limited than Mahé.
Strategic relevance	3	Important inter-island node, but lower overall demand and emissions reduction potential than Mahé and La Digue.
Data availability and quality	3	Operational information available from SPA main office. However, it is not easily accessible. No user records of existing shore power systems and limited electricity consumption information. Close contact with vessel operators for stakeholder input.
Average score	**3.4**	**Moderate OPS readiness**

Table 10 Scoring La Digue Passenger & Cargo Terminal (La Digue)

Criterion	Scoring	Explanation
OPS demand potential – Ferry	4	Frequent ferry services combined with daily overnight stays create a highly favourable OPS profile.
OPS demand potential – General cargo	5	Significant overnight cargo vessel stays and long dwell times provide excellent OPS utilisation potential.
Technical feasibility	3	The existing ferry shore power connection demonstrates feasibility, and the new terminal offers possibilities for integrating shore power in the design. Cargo OPS infrastructure is currently absent and requires alterations to the new quay.
Grid and renewable energy integration	4	As the energy demand from shore power is low, grid integration seems possible. Future renewable energy plans (La Digue as part of the 100% RES Islands Initiative and as eco-capital of the Seychelles) appear promising.
Stakeholder readiness	5	Strong stakeholder interest expressed by both ferry and cargo operators. Stakeholders are equipped with shore power connections.
Future scalability	4	Planned quay developments provide an opportunity to integrate OPS from the design stage and future-proof the infrastructure. Potential future electrification pathways may pose difficulties in terms of grid capacity. Expansion opportunities exist but might be more limited than Mahé, but more promising than Praslin.

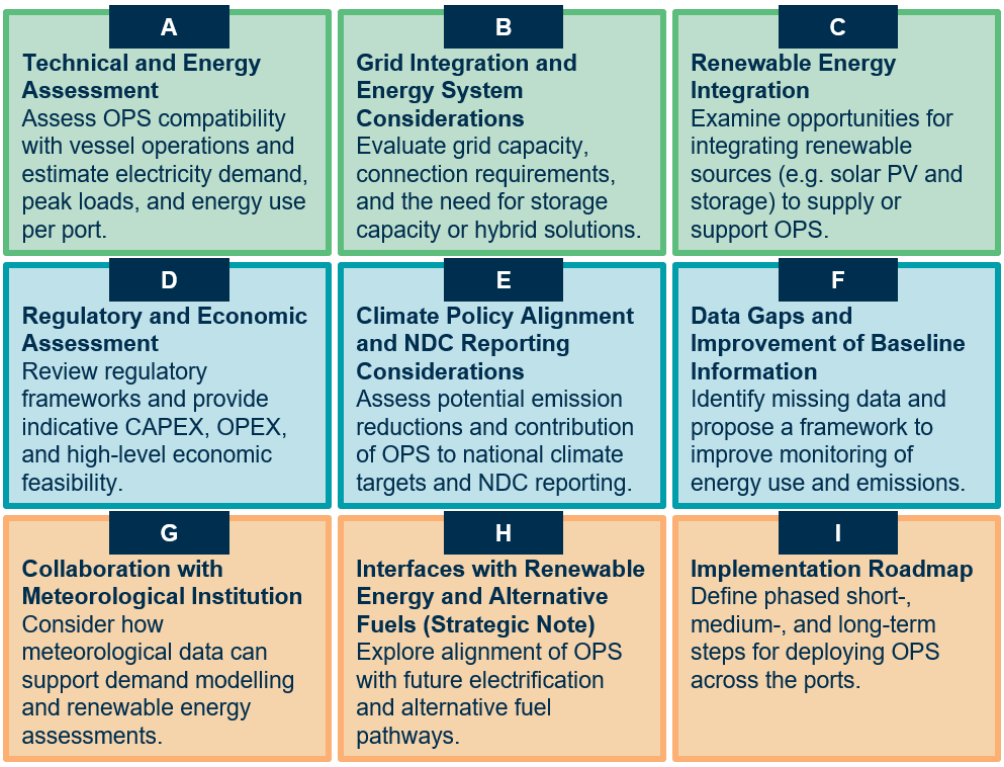
Strategic relevance	4	Strong contribution to decarbonisation objectives and future electrification opportunities of La Digue's net-zero journey.
Data availability and quality	2	Operational information available from SPA main office. However, it is not easily accessible and contains gaps. No user records of existing shore power systems and limited electricity consumption information. Close contact with vessel operators for stakeholder input.
Average score	**3.9**	**High OPS readiness**

Conclusions

The assessment indicates that all three ports present viable opportunities for OPS deployment, although the underlying business cases differ. Mahé benefits from its strategic role as the main inter-island hub, Praslin demonstrates a good cargo-related OPS case, while La Digue combines high stakeholder interest with favourable overnight vessel profiles and future port development opportunities. Overall, the assessment confirms that OPS implementation can be considered technically feasible at all three ports, subject to further verification of grid capacity, vessel requirements and detailed infrastructure design. This is addressed in the Stage 2 technical assessment below.

06. Stage 2 – Technical assessment

The technical assessment consists of 9 main tasks:



Each of these tasks is carried out in the next sections.

Task A: Technical and Energy Assessment

Starting points for OPS systems

During the site visits in week 36 and 37 of 2026 several stakeholders such as ship owners and personnel on board of ships have been interviewed. For each ship category a representative ship has been visited to investigate the ships' on-board engine capacity, both for propulsion as well as auxiliary generator. Results are as follows:

Ferry (Cat Cocos Pride of Praslin):

- Propulsion engines: 2 x 1000kW – Gearbox drive
- Auxiliary engines: 1 x 80kW / 125A

- Connection set-up time: 15 min
- Minimum dwell time threshold for OPS connection: 1 hour
- Vessel crew handles connection
- Safety and operational constraints: OPS cables may not obstruct passenger movements or evacuation routes. Consequently, shore-power connection and disconnection activities cannot be performed during passenger boarding and disembarkation, limiting operational flexibility and available connection time.

General cargo (MV Ahroha II):

- Propulsion engine: 1 x appr. 500kW – Direct drive
- Auxiliary engine / Generator: 1 x 40kW / 63A
- Connection set-up time: 15 min
- Minimum dwell time threshold for OPS connection: 1 hour
- Vessel crew handles connection
- Safety and operational constraints: Cargo handling operations involve frequent forklift, truck and personnel movements on the quay. To avoid operational disruption and safety risks, OPS cables cannot be routed through active cargo-handling areas, meaning connection and disconnection can only take place outside loading and unloading activities.

In the three ports some power connection points do already exist:

- Mahé: 1 x 32A for ferry and 1x 16A for general cargo
- Praslin: 2 x 32A for general cargo
- La Digue: 1 x 32A for ferry

Based on the present connections, the ships' on-board generators and the data provided by the stakeholders the following system capacities have been defined for each individual connection point:

- Ferries: 1 x 125A / 1 x 63A / 1 x 32A @ 400V, 50Hz
- General cargo / landing craft: 1 x 63A / 1 x 32A @ 400V, 50Hz

A connection point will consist of a stainless-steel metal panel in which the sockets with the listed capacity are installed. The sockets are behind a door which can be opened to insert the socket and after insertion the door can be closed again. The cable leaves the socket compartment via a covered cable opening in the bottom of the door. The panel will be free standing, installed on a concrete foundation and equipped with protective measures to protect it against vehicles. The installation should furthermore incorporate appropriate electrical safety measures, including earthing and bonding provisions, (earth-)fault-current protection, emergency isolation facilities in accordance with applicable electrical and maritime safety standards. For the exact number and location of the connection points, see images below.

None of the visited ships uses another voltage or frequency than 400V, 50Hz. The stakeholders have confirmed there is no requirement for other voltage and/or frequency. Therefore, within the ferry and general cargo berths of the ports that are subject to this study frequency and/or voltage conversion will not be foreseen.

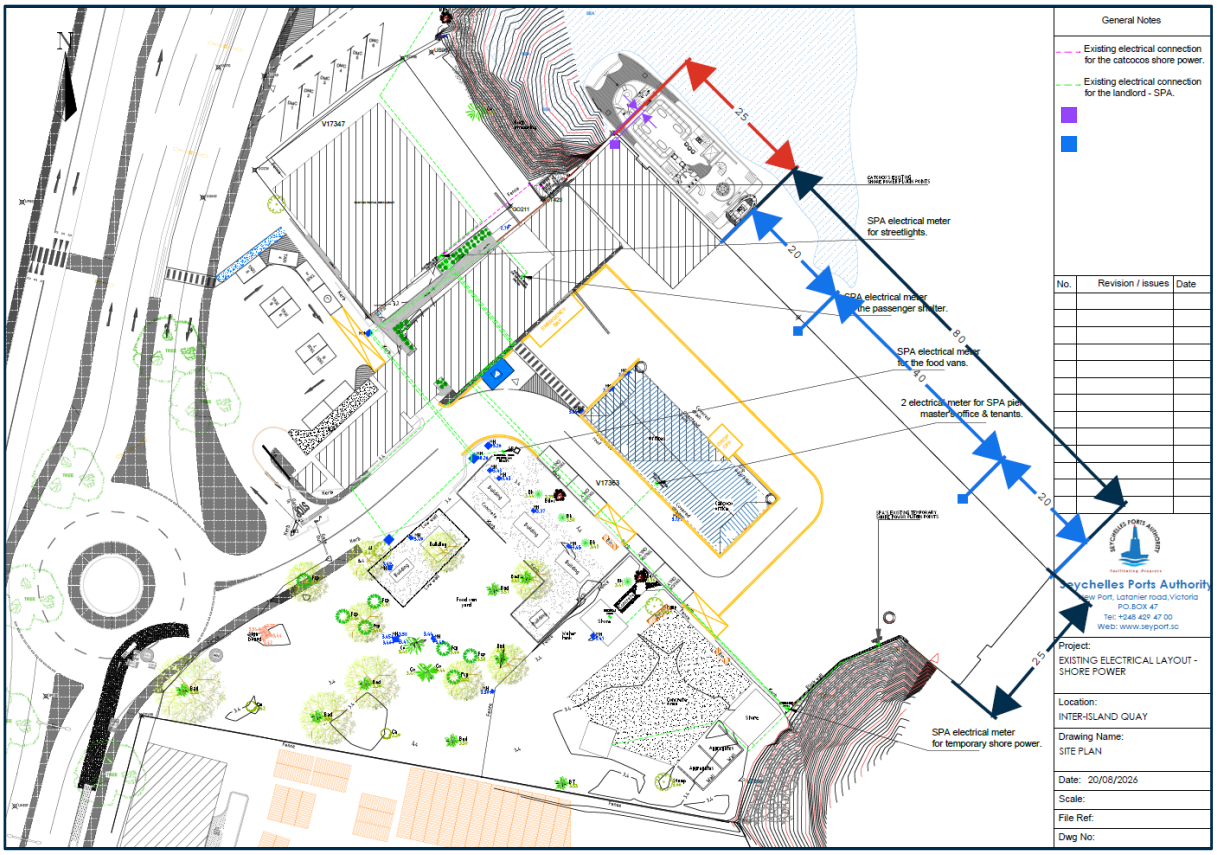


Figure 6 Proposed locations of connection points at the Inter-island Passenger & Cargo Terminal (Mahé)

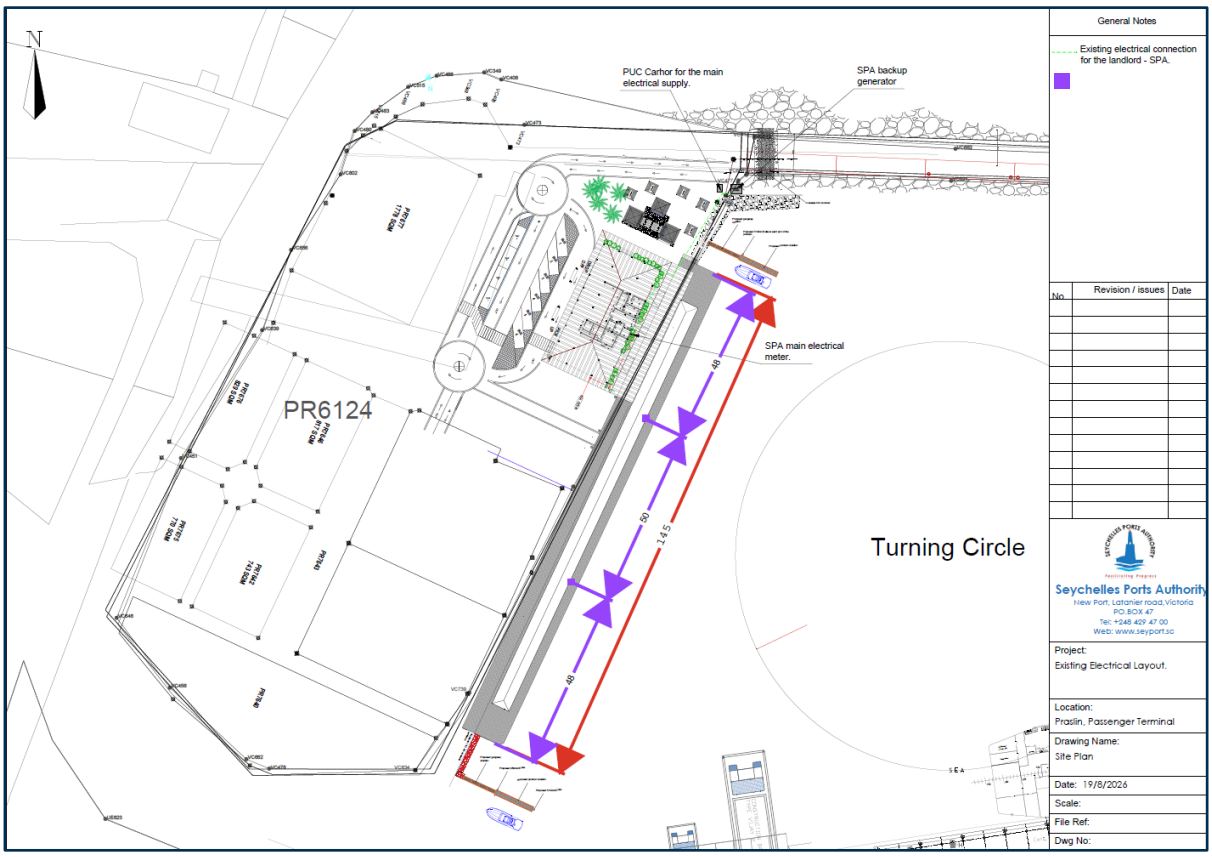


Figure 7 Proposed locations of connection points at the Ero Passenger Terminal at Praslin

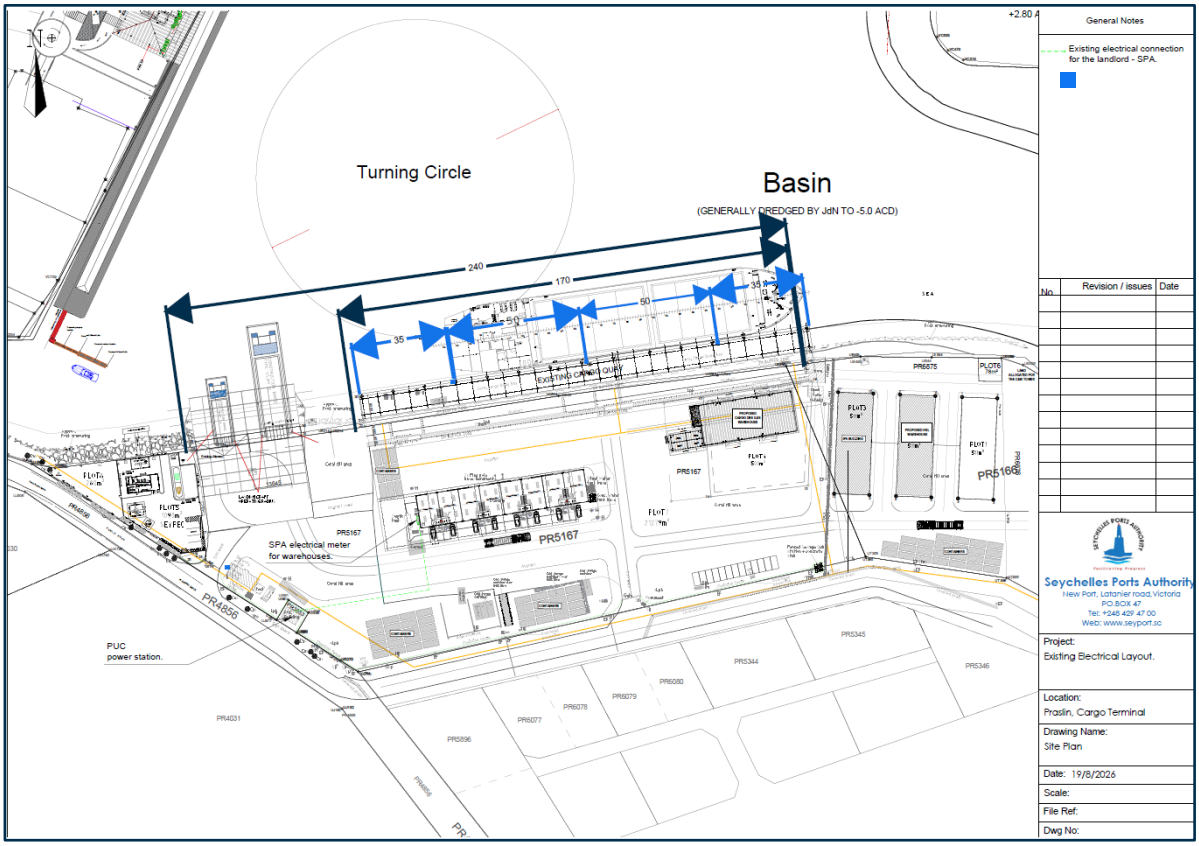


Figure 8 Proposed locations of connection points at the Eve Island Cargo Terminal at Praslin

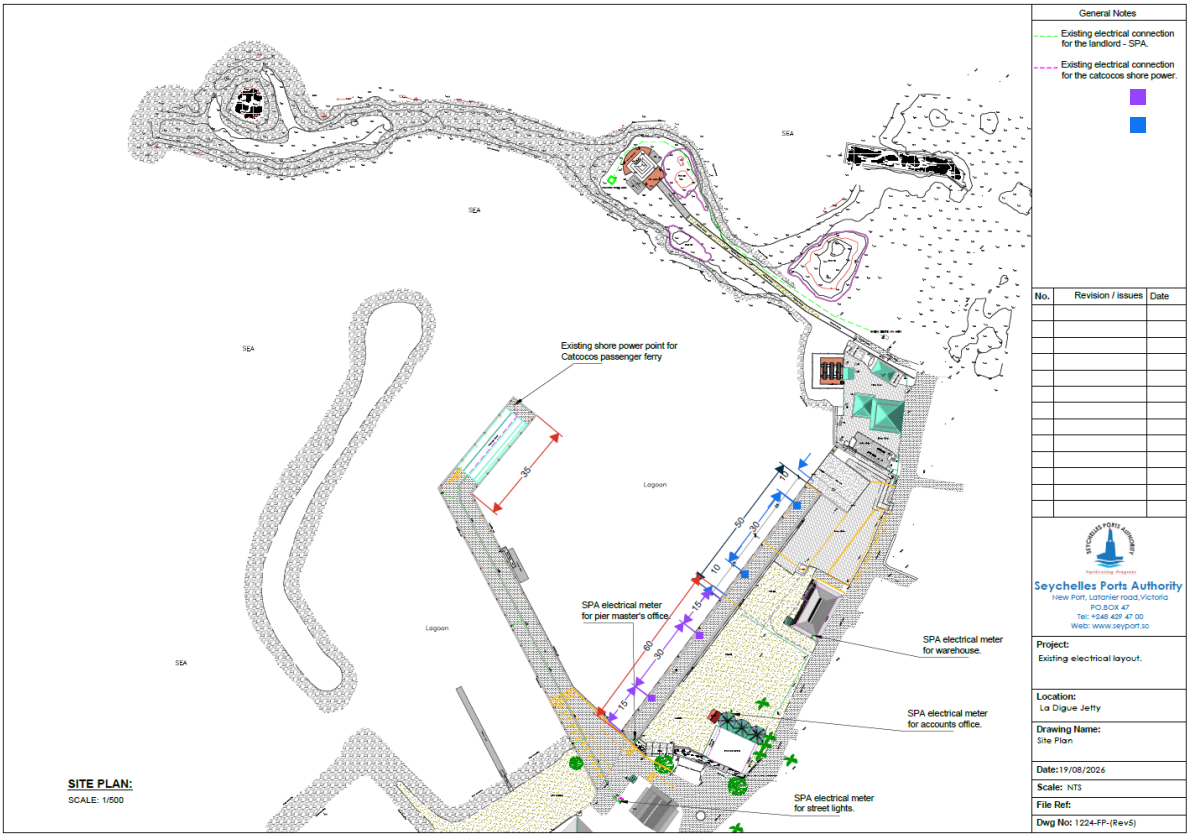


Figure 9 Proposed locations of connection points at the La Digue Passenger & Cargo Terminal

Task B: Grid integration and energy system considerations

Configuration of grid connection

In each port a separate connection to the public grid of PUC will be foreseen, specifically for OPS. The grid connection will be made in a central intake panel. The intake panel is the main distribution board for shore power for the specific port. From the central intake panel power will be supplied to the ship connection boxes which are located on the quay on appr. 1-2 m from the quay wall front. The position of the central intake panel is flexible. It is preferable to locate the panel indoor or at least under a cover. The central intake panel will contain:

- Main circuit breaker of the incoming power supply from PUC;
- kWh meter for accountable measurement of the energy delivered by PUC;
- Outgoing feeders to local connection box;
- kWh meters for accountable measurement of energy delivered to each individual connection box, enabling future billing and energy allocation per vessel or user group;
- Incoming feeders prepared for the connection of future renewable power generation systems;
- Spare capacity within the switchboard and cable routing provisions to facilitate future expansion, including additional connection points or higher-capacity shore-power supplies if demand increases over time;
- Earthing and bonding arrangements, fault-current protection, surge protection devices, and emergency isolation facilities to ensure safe operation and compliance with applicable electrical and maritime safety requirements.

Power supply to the central intake panel will be provided by PUC. The incoming cable will be terminated directly on the main circuit breaker.

The required grid connection capacity has been assessed based on the maximum power intake per connection, taking into account a simultaneity factor 0.5. This simultaneity factor stands for occupation / non-occupation of the connection and for partial load in percentage of the maximum load. Based on experiences from other ports it is expected that the real power intake of individual connection points will nearly always be far below the maximum system capacity.

For the maximum configuration (2 x Ferry / 3 General cargo) this means:

2 x 125A	= 250A
3 x 63A	= 189A
TOTAL	= 439A * 0.50 = 220A

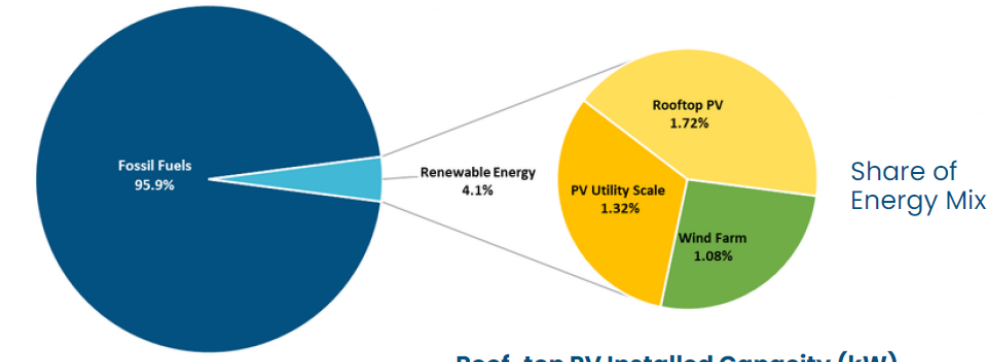
PUC has informally confirmed that it can provide 250 A grid connections at all three ports; the grid connection costs used in the CAPEX estimate still require formal confirmation by PUC.

Task C: Renewable energy integration

OPS only comes with environmental benefits in case the provided electricity comes from a clean source. Especially on remote locations such as Seychelles where fuel must be transported over long distances the application of renewable energy, even at a higher cost level can be commercially interesting. This section describes options for local green power generation and/or the use of green energy from an already existing source.

Renewable energy in Seychelles

The Seychelles electricity system continues to rely predominantly on thermal power generation, with only a relatively small share of electricity being supplied from renewable sources. Electricity production on Mahé is primarily based on heavy fuel oil (HFO), while Praslin and La Digue are supplied mainly by light fuel oil (LFO) diesel generators. The development of renewable energy generation in Seychelles remains relatively limited, despite the country's strong ambitions to reduce its dependence on imported fossil fuels. According to the annual report of PUC, renewable energy currently contributes approximately 4.1% of electricity generation, consisting primarily of solar PV installations (3.0%) and a small contribution of 1.1% from wind energy.



In 2025, rooftop solar PV surpassed the 10 MW mark, reaching a cumulative capacity of **10.3 MW**.

Roof-top PV Installed Capacity (kW)

Sector	Mahe	Praslin	La Digue	Total
Commercial	6,425	969	145	**7,540**
Domestic	2,572	181	59	**2,812**
Total (kW)	**8,997**	**1,150**	**205**	**10,352**

Figure 10 Energy mix of the Seychelles (Source: PUC - Annual report 2025)

The Government of Seychelles has set a target in the Renewable Energy Acceleration Program of sourcing 15% of its electricity from renewable energy by 2030 and is investing in renewable energy generation, battery energy storage systems and grid reinforcement to enable higher levels of renewable penetration. Planned investments include upgrades to the electricity networks on Mahé, Praslin and La Digue, additional solar PV capacity and the deployment of large-scale battery energy storage systems to improve grid stability and facilitate the integration of variable renewable energy sources.

Options for renewable energy integration

For the application of renewable source(s) to provide electricity to the shore power system the following four potential supply pathways were assessed as part of this study:

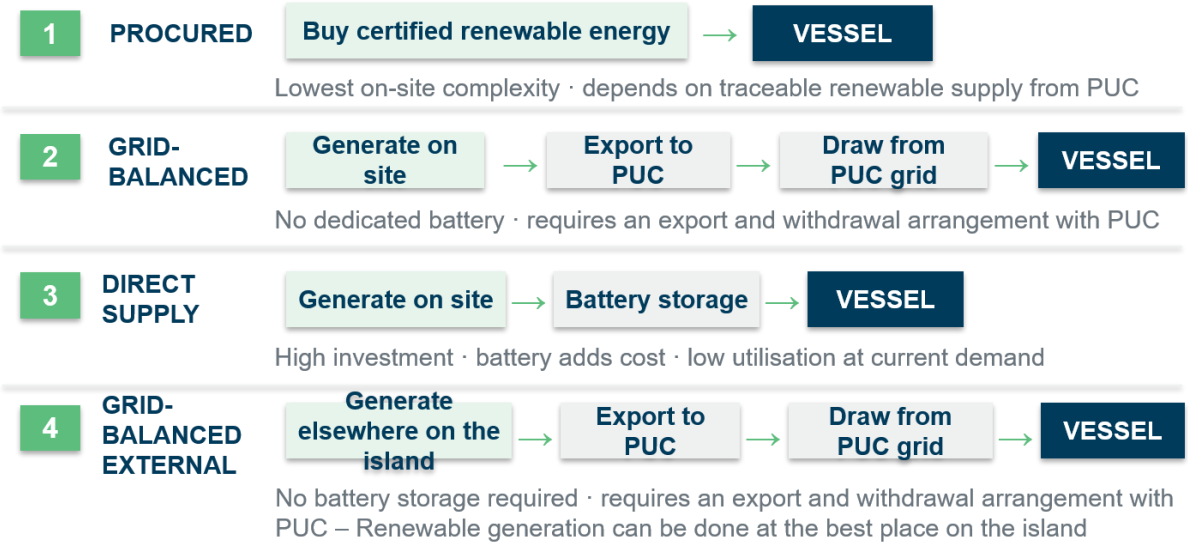


Figure 11 Four pathways to obtain renewable energy for shore power

Consultation with PUC has made clear that options 1 and 4 are currently not available under the existing regulatory and commercial framework. At present, no legal or regulatory framework exists in the Seychelles to support the procurement of certified renewable electricity (Option 1) or to allow third parties to generate renewable electricity at external locations and supply this through the public grid to a specific end-user (Option 4). However, these options should not be considered permanently excluded. Future regulatory reforms, changes in electricity market arrangements or the introduction of renewable energy trading mechanisms could enable these pathways in the longer term. As Seychelles continues to pursue its renewable energy and decarbonisation ambitions, these options may become increasingly relevant and should therefore be reconsidered periodically. The implementation of Option 1 would require the introduction of a certified renewable electricity procurement mechanism (e.g. green tariffs or renewable energy certificates), whereas Option 4 would require regulatory changes enabling third-party electricity supply, energy wheeling and/or virtual power purchase agreements through the public electricity network. These options are therefore considered long-term pathways rather than near-term implementation options

Option 2 is a realistic option although there are some limitations according to PUC: Option 2 is only allowed in case the maximum generation does not exceed 500kW[1]. In this case that would mean a maximum 500kWpeak is the allowed solar system capacity per port. For the shore power demand as calculated below (see Table 11) that would be sufficient. In addition, under the current regulatory framework, customers may install solar PV systems sized to generate up to 100% of their historical annual electricity consumption. However, PUC indicated that commercial solar PV systems are generally assessed against expected consumption levels and that a generation level of

[1] The government of seychelles is actively exploring the possibility of increasing this threshold, and the current limit may therefore be revised in the near future.

approximately 50% of annual consumption is often considered appropriate to limit significant overproduction and electricity export to the grid. As a result, the practical size of a solar PV installation may be constrained not only by the 500kW capacity limit, but also by the annual electricity demand associated with the OPS system. Furthermore, according to PUC, excess electricity exported under the current net-metering scheme is credited at the fuel marginal cost, whereas under the current net-billing framework excess electricity is compensated at 6% of the fuel marginal cost. In both cases, exported electricity has a lower economic value than electricity consumed directly at the moment of generation. The exact compensation mechanism and applicable tariffs are subject to regulatory oversight and may change in the future, as the Utilities Regulatory Commission (URC) is currently evaluating fixed-rate arrangements for net-billing and gross-metering projects.

Option 3 means a system that minimises reliance on the public grid. All energy required for shore power is generated and stored on site of the port. A PUC connection with a small capacity (for example 25A) is only required to maintain essential systems within the shore power system operational during long periods of low sunshine level. For normal operation the expected energy consumption per port is in the range of 0,5 – 2,0MWh per day. To cover a sunless period of 1 week a battery capacity of 5 – 10MWh would be required. One 40-ft container can fit approximately 4 MWh battery capacity, and therefore 3 containers are needed which will cover approx. 100 m^2. A battery enables the port to control and manage the generated electricity, the energy supply to the vessel operators and the excessive energy supply to the grid.

Comparison solar and wind power for supply to OPS

A range of renewable energy technologies could in principle be used to supply electricity to shore power systems. These include solar energy, wind energy and various forms of ocean energy, such as wave energy and Ocean Thermal Energy Conversion (OTEC). However, the objective of this study is to identify renewable energy solutions that are technically mature, commercially available and realistically deployable within the timeframe of an OPS implementation project. Therefore, this assessment focuses on solar and wind energy, which are currently the most established renewable energy technologies in Seychelles and for which reliable resource data, implementation experience and regulatory frameworks are available. While ocean energy technologies may be of interest for the long-term energy transition of Seychelles, their suitability, technical feasibility and economic viability for supplying OPS have not been assessed within the scope of this study.

Wind power

The low share of wind power is related to the limited availability of sites with good wind conditions. The sites where the wind conditions are reasonable are mostly located on places where wind turbines would seriously affect nature and landscape. On the best spot of the island (red area west of Victoria, see Figure 12) wind turbine utilization can theoretically reach up to 30% (Mahé) and 20% for La Digue and Praslin, but these locations are hardly accessible (mountainous area) and sensitive to damage the local nature. Close to the ports the utilization falls to below 10% which makes wind power economically unfeasible. Another aspect is the scale: Commercial wind turbines have in most cases a minimum capacity of 3MW, smaller is economically unfeasible. A 3MW turbine is too large and too costly for the relatively low demand of OPS.

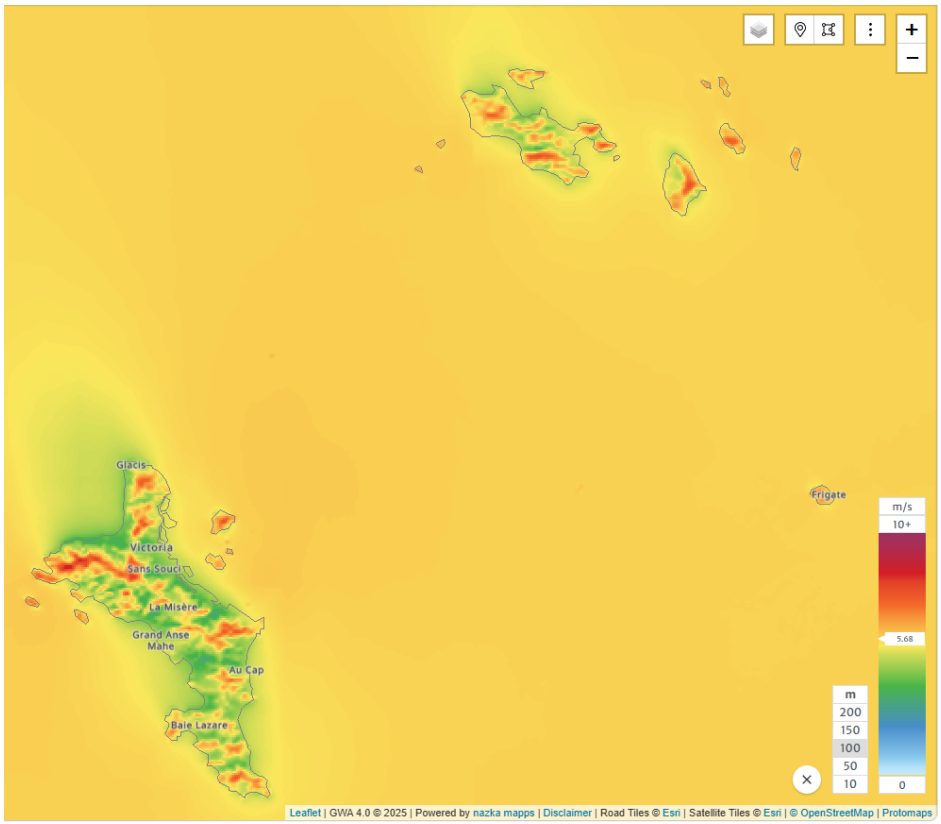


Figure 12 Mean wind speed at 100m height (which equals approximately the axis height of a wind turbine) – Red areas indicate favourable areas for wind energy generation (Source: Global wind atlas - September 2026)

Solar power

Solar power is a realistic option in Seychelles. The average solar radiation intensity results in a yearly power generation of appr. 1.450kWh per kW_{peak} installed (based on current PUC solar farm recordings). Solar power systems can be scaled easy and configurations starting at $1kW_{peak}$ up to > $10MW_{peak}$ can easy be made, In case of the application for shore power the maximum installed capacity is limited by one of the 3 following factors:

- PUC limit for grid feedback which can be used to compensate for power intake (50% compensation) = 500kW;
- Rooftop surfaces and unused land within or adjacent to the port. Rule of thumb: $1kW_{peak}$ requires $10m^2$ free space;
- Yearly power demand per port for shore power. Based on this figure the solar systems power rating per port can be calculated. When the previous factors do not form a limitation, it is recommended to add 20% additional capacity for future growth and additional small consumers.

Based on the estimated occupation rates of the shore power provisions (see Table 2, Table 4 and Table 6) the total electricity demand for OPS has been estimated. The results are listed in the table below. Next step is to calculate the kW_{peak} rating of solar power that is required to generate the full quantity of required electricity. This is translated to a required surface area for solar panels that need

to be positioned within the port (1 kW_{peak} ≈ 10 m^2 solar panel area). This area includes the area of the solar panels itself and additional area around the panels for manoeuvring and maintenance.

Table 11 Total electricity demand for OPS per port

	General cargo Sum of total stays > 1 hr per yr		Ferry Sum of total stays > 1 hr per yr		Total Sum of total stays > 1 hr per yr		
	Hours	kWh / yr	Hours	kWh / yr	MWh / yr	kW_{peak} required	m^2 solar panel required
La digue	10,380	311,400	9,362	374,480	686	473	4,730
Praslin	5,764	172,920	1,169	46,760	220	152	1,520
Mahe IIQ	5,372	161,160	16,097	643,880	805	555	5,550

Based on average power intake of:

- Ferry: 40 kW
- General cargo: 30 kW

Solar power generation:

- kW_{peak} = 1.45 MWh / year

Solar power generation options

Solar power generation near Inter-island Passenger & Cargo Terminal (Mahé)



Figure 13 Opportunities for local solar power generation near Inter-island Passenger & Cargo Terminal (Mahé)

Figure 13 shows some opportunities for local solar power generation within or close to the Inter-island Passenger & Cargo Terminal. Several suitable rooftops are present, and the car parking site can be equipped with covers above the parking spots that provide shade for the cars and consist of solar panels installed on a steel structure.

Total solar power capacity that can be installed this way is approximately 500kW$_{peak}$, which is sufficient to cover the shore power demand completely.

In addition to rooftop and carport-mounted solar PV systems, floating solar PV may provide a supplementary opportunity for renewable electricity generation. During stakeholder consultations, PUC indicated that floating solar PV systems are currently being explored in Seychelles and that suitable lagoon areas may offer additional installation potential. For Mahé, lagoon space in the vicinity of the ferry terminal and parking area could potentially be investigated as an alternative or complementary location for solar PV deployment. Where sheltered lagoon areas are unavailable, near-shore floating solar PV systems may also be considered, subject to environmental, navigational and technical constraints.

Solar power generation near La Digue Passenger & Cargo Terminal



Figure 14 Opportunities for local solar power generation near La Digue Passenger & Cargo Terminal

Figure 14 shows two opportunities for local solar power generation within or close to the La Digue Passenger & Cargo Terminal. Options on rooftops here are very limited. The new to build ferry

terminal might be a good opportunity to install solar panels on its rooftop and the small obsolete island besides the existing ferry terminal could also be used.

Total solar power capacity that can be installed this way is 200 – 250kW$_{peak}$, which is most likely not sufficient to provide all shore power from solar.

Solar power generation near Ero Passenger & Eve Island Cargo Terminals (Praslin)

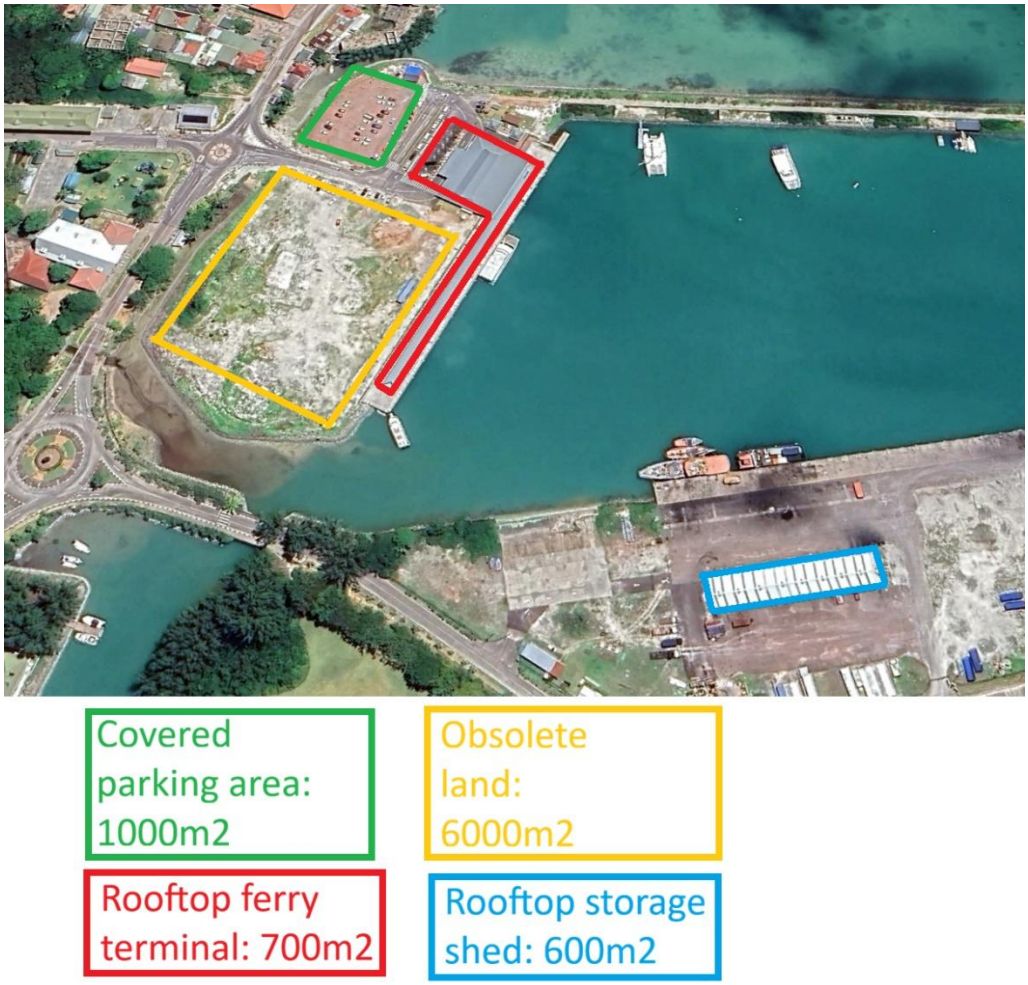


Figure 15 Opportunities for local solar power generation near Ero Passenger & Eve Island Cargo Terminals (Praslin)

Praslin offers several opportunities for the installation of solar panels, see Figure 15. Depending on other development plans for the area one or more of the above shown options can be used. In total these four locations will be able to generate sufficient solar electricity to cover the shore power demand completely.

Task D: Regulatory and economic assessment

Regulatory assessment

Regulatory and institutional framework

The successful implementation of OPS in Seychelles relies on cooperation between several key stakeholders. SPA is expected to play the central role in the ownership and operation of shore power infrastructure within the port area, while the PUC will be responsible for supplying electricity through the national grid. The SMSA is responsible for maritime safety and has already developed a Shore Power Safety Standard, providing a regulatory basis for the safe implementation and operation of OPS systems. No significant regulatory barriers were identified that would prevent the deployment of shore power in the selected ports.

Technical standards and compliance requirements

OPS installations should be designed and operated in accordance with internationally recognised standards, most notably the IEC 80005 series for shore-to-ship power supply systems. In addition, all electrical installations must comply with all applicable national electrical safety standards, regulations and utility requirements. Vessel operators intending to use shore power will need to ensure that onboard electrical systems are compatible with the connection type that is present in the shore power system. Any adaptations on board the ship, such as the installation of a galvanic separation transformer, need to be made by the ship owner in advance of connecting to OPS. Compliance with both national and international standards will help ensure safe, reliable and interoperable OPS operations.

Permitting and approval requirements

Implementation of OPS will require coordination with relevant authorities throughout the design and construction process. Grid connection approvals will need to be obtained from PUC. Construction permits may be required depending on the nature and scope of the works. Environmental permitting requirements and planning approvals are expected to be limited due to the relatively small footprint of the proposed systems. Early engagement with the relevant authorities will help streamline the approval process and reduce implementation risks.

Table 12 Indicative permitting and approval checklist

Permit / approval	Responsible authority	Remarks
Grid connection approval	PUC	Required for new or upgraded electricity connections
Electrical design approval	PUC / electrical inspectorate	Verification of compliance with national electrical standards
Port works approval	SPA	Approval for construction within the port area

Construction permit	Relevant planning authority	Depends on the nature and scale of civil works
Environmental screening / permitting	MECENR	Requirement to be confirmed during detailed design
Shore power safety approval	SMSA	Compliance with the SMSA Shore Power Safety Standard
Operational procedures approval	SPA & SMSA	Connection, disconnection and emergency procedures
Renewable energy integration approval (if applicable)	PUC	Required for PV systems, batteries or grid feedback arrangements

The exact permitting requirements should be confirmed during the detailed design phase, as the final requirements depend on the selected OPS configuration, connection capacity and renewable-energy integration concept.

Electricity supply and tariff framework

Electricity supplied to vessels through shore power installations will be sourced from the national electricity network operated by PUC. The economic attractiveness of OPS will depend in part on the electricity tariff applicable to port users and how this compares to the costs of onboard diesel generation. The procurement of renewable electricity is essential to ensure the environmental benefits of shore power and support national decarbonisation objectives. Prior to commissioning, clear arrangements should also be established for electricity metering, billing and cost recovery.

An additional regulatory aspect that requires further assessment is the role of SPA in the sale of electricity to vessel operators. During stakeholder consultations it was noted that the provision and sale of electricity may require a regulatory framework similar to the one currently being developed for electric vehicle charging infrastructure. At present, these regulatory developments are primarily focused on road transport. However, if SPA is expected to operate OPS infrastructure and invoice vessel operators for electricity consumption, clarification may be required from the URC regarding any licensing, registration or electricity supply obligations applicable to maritime charging services. It is therefore recommended that SPA engage with URC during the next project phase to ensure that future regulations adequately address the requirements of shore power and the electrification of maritime transport.

Ownership, operation and liability

Several ownership and operational models can be considered for shore power systems in Seychelles. Regardless of the selected model, responsibilities for operation, maintenance and commercial management should be clearly defined between SPA, PUC and other stakeholders. Particular attention should be given to liability arrangements during vessel connection and disconnection activities, which represent a shared responsibility between the port and vessel operators. Procedures for maintenance, defect handling and invoicing should be formalised through stakeholder agreements before the systems become operational.

- **Operational procedures:**
  - Ship connection and disconnection procedure: Clear procedures should be established for the safe connection and disconnection of vessels from the shore power system. This is a shared responsibility between the port authority and vessel operators, with each party responsible for specific operational and safety checks. The procedure should define the sequence of actions, communication protocols, responsibilities and required documentation. It should also include contingency measures for emergency disconnections and abnormal operating conditions. All users should receive appropriate training before using the OPS system. Although this is formally not a part of the shore power project it is important to provide guidance to ship owners, who want to use shore power, so that they know what measures they have to take onboard to use shore power in a safe and reliable way.
  - Metering and invoicing: The responsibility for metering electricity consumption and invoicing users should be clearly defined before commissioning of the OPS system. Different arrangements are possible, each with its own advantages and operational implications. See Table 13 for the most common options for ports worldwide. For the Seychelles inter-island ports, options 1 to 3 are considered particularly suitable, but this is ultimately for the port to decide. Based on the decision arrangements with the implicated stakeholders should be drawn up.
  - Defects handling procedure: A clear procedure should be established for reporting, recording and resolving defects to minimise disruption to OPS operations. Roles and responsibilities of the port authority, OPS operator, maintenance contractor and vessel operators should be clearly defined. The procedure should include response times for different types of defects, communication protocols during outages, and escalation paths for critical failures. All incidents and corrective actions should be logged to support continuous improvement and asset management.
- **Safety protocols:** Safety is of course a key-issue when operating a shore power system. The SMSA has therefore developed a Shore Power Safety standard, which will become a standard requirement for both construction and operation of shore power installations in Seychelles.
- **Maintenance plans:** Shore power systems require regular preventive maintenance to ensure safe and reliable operation. Maintenance activities should include inspections of cables, connectors, switchgear, protection systems and metering equipment, as well as periodic testing of safety functions. Responsibilities for maintenance, spare parts management and emergency repairs should be agreed before commissioning. For Seychelles, consideration should be given to a long-term maintenance contract and maintaining a stock of critical spare parts to maximise system availability.

Table 13 Options for arrangement of metering and invoicing

Options	Description	Advantages	Disadvantages
Option 1: Subscription or user contract model	Frequent users, such as regular ferry operators, can enter into a long-term agreement with the port authority. A fixed monthly or annual fee covers access to OPS, with or	• Predictable revenues for the port. • Predictable costs for regular users.	• Less suitable for occasional users. • Requires periodic review to ensure costs

	without additional consumption-based charges. For Seychelles, this model may be particularly relevant if the inter-island ferry operators become one of the primary OPS users and the general cargo vessels are also reoccurring visitors.	• Reduced administrative effort.	remain aligned with actual electricity consumption.
Option 2: Integration into port dues	Electricity costs can be included within existing port tariffs, either as a fixed OPS surcharge per call or as a differentiated harbour due for OPS users. This model is often suitable when vessels have similar energy demand profiles and OPS utilisation can be reasonably estimated.	• Simple billing process. • No separate invoicing procedure required. • Predictable costs for vessel operators.	• Consumption is not directly linked to actual usage. • Risk of cross-subsidisation between users. • Less incentive for efficient electricity consumption.
Option 3: Manual invoicing by the port authority	The port authority records electricity consumption from the energy meters and invoices vessel operators directly after each connection or on a periodic basis. For smaller ports with a limited number of regular users, this can be a practical starting point before introducing more advanced systems.	• Simple implementation with limited initial investment. • Full control over tariffs and customer relations. • Suitable during the initial years when OPS utilisation remains relatively low.	• Higher administrative workload. • Increased risk of invoicing errors. • Less efficient when usage volumes increase.
Option 4: Automated metering and billing system	A dedicated digital management platform automatically records electricity consumption, calculates charges and generates invoices. Access to the shore power system can be linked to user accounts, RFID cards or online reservations, while consumption data is stored automatically. This solution is generally preferred when frequent vessel calls and higher utilisation rates are expected.	• Accurate and transparent billing. • Minimal administrative effort after implementation. • Provides detailed operational data and utilisation statistics. • Easily scalable as OPS usage grows.	• Higher upfront investment. • Requires IT integration and system maintenance.
Option 5: Outsourced service provider	Under this model, a specialised third-party operator is responsible for meter readings, energy accounting, invoicing and user support. Vessel operators receive invoices directly from the service provider, while the port receives either a concession fee or a predefined share of revenue. This model is increasingly common for smaller ports where OPS is not considered a core business activity. This option is not yet available in the country.	• Lowest administrative burden for the port authority. • Professional management of billing and customer support. • Scalable solution when user numbers increase.	• Additional service fees reduce net revenues. • Less direct control over customer relationships and tariff setting.

Regulatory readiness summary

Overall, Seychelles appears to be well positioned to support the implementation of OPS. The key institutions required to facilitate deployment are already in place and have clearly identifiable responsibilities. Furthermore, the SMSA Shore Power Safety Standard provides an important regulatory foundation for the safe construction and operation of shore power installations. As a result, the main challenges are expected to relate to the development of commercial arrangements rather than the need for significant regulatory changes.

Economic assessment

Investment costs for OPS per port (CAPEX)

The order of magnitude of costs for the supply and installation of a shore power system in each port has been estimated, based on references from comparable projects. Because several items within the shore power system still need to be worked out in further detail in this stage, an estimate with an accuracy of -35% / +50% can be prepared. The costs as listed in the table below include delivery and installation of the materials and components, costs for engineering and design, project management and supervision are shown as a percentage of the hardware- and construction costs.

Table 14 Estimated investment costs OPS per port

Item	Specification	Costs Mahé and La Digue		Costs Praslin	
		EUR	SCR	EUR	SCR
PUC grid connection (data PUC) *Praslin requires two connections*	250A @ 400V	53.300	890.000	106.600	1.780.000
Main distribution board with grid power intake and metering	1 x 250A Incoming 2 x 125A Outgoing 3 x 63A Outgoing 1 x 16A Outgoing Including cover / prefab room	40.000	668.000	“ ”	“ ”
Shore power connection panels	2 x 125A / 63A / 32A 3 x 63 / 32A Including concrete foundation	60.000	1.002.000	“ ”	“ ”
Installation costs including cabling and civil works	Max. 50m cable per connection panel	50.000	835.000	“ ”	“ ”
Engineering, Design & Project Management (= 20%)		40.000	668.000	51.320	857.000
TOTAL		**243.300**	**4.063.000**	**307.920**	**5.142.000**

Solar PV investments have not been included in the CAPEX estimate presented above. The installation, ownership and operation of solar PV systems are assumed to be part of a separate project and may be implemented and financed by a third party. During stakeholder consultations, PUC indicated that electricity generated by a solar PV system could be supplied at an indicative cost of approximately USD 0.10/kWh (approximately EUR 0.09/kWh, equivalent to around SCR 1.5/kWh).

Note that this is cheaper than the existing PUC commercial rate, which starts at 0,27 EUR / kWh (4,56 SCR / kWh). This value has been used as an input assumption for the economic assessment and business case evaluation presented in the following sections.

Operational costs per port (OPEX)

After completion of the construction the shore power system will be operated by SPA. The operations and maintenance of a shore power system come with periodic costs and utilization dependent costs. An indicative estimate of these yearly costs is provided here in Table 15.

Table 15 Yearly operational costs OPS per port

Item	Specification	Costs Mahé and La Digue		Costs Praslin	
		EUR	SCR	EUR	SCR
Periodic maintenance	Yearly maintenance 5%	12.000	200.000	15.000	251.000
Depreciation and interest costs	10% of total investment	24.000	401.000	31.000	518.000
Unforeseen repair / replacement		5.000	83.000	5.000	83.000
Personnel costs	Connection & disconnection of ships Administration & Invoicing	40.000	668.000	40.000	668.000
TOTAL		**81.000**	**1.353.000**	**91.000**	**1.520.000**

Business model for shore power operations

The calculation in the previous section gives an indication of the yearly operational costs. Costs for the provision of electricity are not listed here, because these depend strongly on how electricity is either generated and / or purchased. The only profit from a shore power system is the sales margin on electricity and potentially a connection fee per ship. The business case presented in this study assumes that all electricity supplied through the OPS system originates from renewable energy sources. During daytime operations, vessels connected to OPS can be supplied directly with renewable electricity generated by the associated solar PV system. During night-time operations, when no solar power is being generated, electricity is supplied through the public grid. The renewable electricity generated during the day is compensated through the existing PUC net-metering arrangement, allowing daytime renewable energy generation to offset electricity consumption at other moments. Under the current framework, approximately 50% of the value of the generated electricity is lost in the offsetting process. Nevertheless, the proposed OPS tariff remains sufficient to maintain a positive operating margin.

Forecasted electricity sales per port has been estimated at approximately 550MWh per year, which means that the sales margin must be at least 145 EUR / 2.420 SCR per MWh.

When the sales price becomes too high the use of shore power becomes unattractive and ship owners might decide not to connect. Reference is always the cost of generating electricity on board from diesel. Rule of thumb for the maximum shore power tariff is a kWh price of 25% of the diesel price per liter. Historically the diesel price in Seychelles is variating between 1.2 – 1.5 EUR / 20 – 25

SCR per liter. This means that the maximum shore power tariff should not exceed 0.3 EUR / 5 SCR per kWh.

It should be noted that, based on the vessel inspections and stakeholder consultations, most regular ferry and general cargo vessels are already equipped with shore-power connections and can technically connect to the proposed OPS system. As a result, no significant vessel retrofit programme is anticipated and the investment requirements discussed in this chapter primarily relate to port-side infrastructure rather than vessel modifications.

Incentives and uptake mechanisms

Although OPS is technically feasible, its success will ultimately depend on vessel operators choosing to connect. International experience shows that ports often complement OPS investments with financial and operational incentives to encourage uptake, particularly during the initial years of operation. Potential measures for Seychelles include:

- Reduced port dues for OPS users, whereby vessels connecting to shore power receive a discount on harbour dues or berth fees.
- Preferential berthing arrangements, allowing OPS-capable vessels priority access to suitable berths.
- Introductory electricity tariffs, whereby SPA temporarily absorbs part of the operational costs to establish OPS usage.
- Subscription agreements for regular users, such as ferry and cargo operators, providing a discounted tariff in exchange for a minimum annual electricity consumption.
- Financial support for vessel retrofits, assisting vessel owners with the installation of onboard equipment required for shore power compatibility.
- Recognition within national sustainability programs, linking OPS use to broader maritime decarbonisation objectives and future environmental requirements.

At present, no specific regulatory obligations requiring vessels to connect to OPS have been identified in Seychelles. Therefore, the initial uptake of OPS is expected to depend primarily on the economic attractiveness of shore power compared to onboard diesel generation. Over time, the Government of Seychelles and relevant authorities may consider introducing stronger incentives or environmental requirements if further reductions in port-related emissions become a policy objective.

Task E: Climate policy alignment and NDC reporting considerations

Climate policy alignment

Seychelles has established ambitious climate and energy objectives that support the implementation of OPS. Under its NDC 3.0 (2026–2035), Seychelles aims to reduce greenhouse gas emissions by 23.1% below business-as-usual levels by 2035, including a 30% reduction in the transport sector, and to achieve net-zero emissions by 2050. In addition, SPA's Sustainability Policy & Action Plan

includes targets such as Green Port Certification by 2030, 100% renewable energy by 2035 and net-zero port operations by 2040.

The implementation of OPS at Seychelles' inter-island ports directly contributes to these ambitions by enabling vessels to switch off onboard auxiliary diesel generators while berthed and instead use electricity supplied from the shore. As renewable electricity generation increases over time, the environmental benefits of OPS will further improve. This aligns with the broader national objective of reducing reliance on diesel-based electricity generation and increasing renewable energy penetration throughout the country.

In addition, the project supports the sustainability ambitions of SPA by reducing emissions associated with port activities and vessel operations. Previous OPS studies undertaken for Seychelles highlighted the potential environmental benefits in terms of reduced greenhouse gas emissions, air pollution and noise pollution from shipping activities in the port environment.

Emission reduction assessment

Shore power is mainly applied to reduce the emission of CO_2. In addition to greenhouse gas reductions, OPS can contribute to improved local air quality through reductions in NO_x and particulate matter (PM) emissions. Furthermore, the elimination of auxiliary engine operation at berth reduces noise levels within the port environment, creating benefits for port users and nearby communities. Based on the quantity of electricity consumed the avoided emissions can be calculated.

Without shore power the ships at berth use their on-board diesel generators and their emissions depend on the generator load, the running hours and the environmental class of the diesel engine. To calculate the avoided emissions the example of the Cat Cocos ferry Pride of Praslin is used for the ferries, at which an onboard vessel assessment was performed during the study. The ferry has two on-board diesel generators (one operational and one stand-by) and each generator has a Cummins 6BT5.9-G2 diesel engine. To calculate the avoided emissions the example of the general cargo vessel MV Ahroha II is used for the general cargo vessels, at which an onboard vessel assessment was performed during the study. The vessel has two on-board diesel generators (one operational and one stand-by) and each generator has a Cummins 6CTA8.3(M) diesel engine.

CO_2 emission depends on the generator load and the engine efficiency and is linear to the fuel consumption. CO_2 emission can be calculated via two methods:

- Well-to-Wheel (WTW): Includes emissions related to fuel production and transport: 3,26kg CO_2 / Liter diesel;
- Tank-to-Wheel (TTW): Includes only the local emissions caused by burning the fuel: 2,64kg CO_2 / Liter diesel.

Taking into account that the use of diesel in Seychelles requires a long transport route it is reasonable to use the WTW method.

When considering the emissions of Cat Cocos' Pride of Praslin as reference for all ferries the emission savings can be calculated with their specific engine reference figures. The fuel consumption of the Cummins 6BT5.9-G2, operating at 40kW (= 50% load) = 11 litres per hour, which corresponds to 0.275 Liter per kWh. The engine type of the Pride of Praslin complies with IMO Tier II (year of build 2011), which means that its maximum emissions are:

- CO_2: 1 kWh = 3.26 * 0.275 = 896 gram
- NO_x: 1kWh = 6 gram
- PM: 1kWh = 0.2 gram

When considering the emissions of the MV Ahroha II as reference for all general cargo vessels the emission savings can be calculated with their specific engine reference figures. The fuel consumption of the Cummins 6CTA8.3(M) at berth is approximately 9-10 litres per hour at approximately 35kW, which corresponds to 0.271 Liter per kWh. The engine type of the Ahroha complies with IMO Tier I (year of build 2002), which means that its maximum emissions are:

- CO_2: 1 kWh = 3.26 * 0.271= 885 gram
- NO_x: 1kWh = 10.4 gram
- PM: 1kWh = 0.4 gram

Assuming that 100% renewable energy is used for shore power the total emission savings are:

Table 16 Emission reduction assessment

	MWh / year	CO_2 kg / year	NO_x kg / year	PM kg / year
Mahé	805	719.509	5.538	193
Praslin	220	195.217	2.081	78
La Digue	686	611.235	5.484	199

Contribution to NDC objectives

Domestic inter-island ferry services fall within the transport sector and can therefore contribute to national emission reduction efforts. Domestic maritime transport is considered within the transport component of the national climate agenda, whereas international maritime activities (such as bunkering) are generally treated separately. OPS can therefore be considered a practical and immediately available measure to support the decarbonisation of domestic maritime transport. The environmental benefits are expected to increase over time as Seychelles continues its transition towards a more renewable electricity system and progresses with investments in renewable energy generation, grid reinforcement and battery storage.

To facilitate integration into future climate reporting and NDC monitoring, the emission assessment results are presented in a reporting-ready format (see Table 16). To support future monitoring and reporting, the following indicators are recommended:

- Annual electricity supplied through OPS (kWh/year)
- Number of vessel connections to OPS per year
- Vessel hours connected to OPS per year

- Estimated fuel displaced (litres/year)
- Annual CO_2 emissions avoided (t/year)
- Optional: annual NO_x and PM reductions

These indicators are consistent with the monitoring approach proposed in the study scope and provide a practical basis for future climate reporting and tracking of OPS performance.

Task F: Data gaps and improvement of baseline information

Data availability and quality and data gaps

The availability and quality of baseline data were assessed as part of this study to determine the reliability of the technical, economic and environmental analyses. Overall, the cooperation and data received from stakeholders was positive. SPA, vessel operators and other stakeholders were willing and able to share operational and technical information, allowing the study to be completed despite several data limitations. Stakeholder engagement during the site visits and interviews was particularly valuable in validating assumptions and improving understanding of vessel operations.

During the study several inconsistencies were identified in the database, including incomplete vessel call records and discrepancies in timestamp formats between the three ports. As port call frequency and dwell time are key inputs for determining OPS utilisation and energy demand, these data issues create some uncertainty in the OPS business case and may result in some eligible vessel calls not being included in the analysis. Where possible, the data was reviewed and corrected manually. While improvements to the underlying data management processes are recommended, the identified inconsistencies did not materially affect the overall findings and conclusions of this pre-feasibility study. To improve future assessments, it is recommended to standardise port call registration procedures across all three ports, including the use of a consistent timestamp format and vessel identification methodology.

Detailed vessel energy consumption data was provided by vessel operators for the general cargo fleet, enabling a relatively robust assessment of their electricity demand. However, equivalent operational data for the ferries was not available, requiring the use of assumptions and benchmark values derived from a public source and information derived from stakeholder interviews.

At present, no structured database currently exists to track vessel emissions, electricity consumption or broader environmental performance indicators at the three inter-island ports.

Data management recommendations

The study demonstrated that sufficient information is available to perform a screening-level assessment of OPS feasibility. However, improvements in the collection and management of vessel activity, energy consumption and emissions data are recommended to strengthen integration of

maritime transport into national climate reporting. Future monitoring would benefit from reporting maritime transport emissions as a separate sub-category within the transport sector. This would improve visibility of the environmental impact of the sector and enable better tracking of the benefits resulting from OPS implementation.

To support future monitoring and reporting, SPA should gradually establish a Port energy and emissions monitoring framework. This framework should include annual vessel calls by vessel type, vessel dwell times and berth occupancy data, electricity supplied through OPS (kWh), the number of OPS vessel connections, estimated fuel displaced, annual CO_2 emissions avoided and the renewable share of electricity supplied. If relevant, the framework could also include the monitoring of NO_x and particulate matter reductions.

To facilitate this, the following actions are recommended:

- Standardise port call registration procedures across Mahé, Praslin and La Digue.
- Establish a central database for energy use and OPS performance data.
- Introduce standard reporting templates for ferry and cargo vessel operators.
- Ensure collection of electricity consumption data through metering when OPS is implemented.
- Assign clear responsibility within SPA for data collection, verification and reporting.
- Evaluate the implementation of an AIS-based vessel monitoring system to automatically track vessel arrivals, departures, berth occupancy and port calls, and integrate this information with future OPS performance monitoring.

Implementing these measures will improve the quality of future decision-making, facilitate monitoring of OPS performance and create a stronger basis for port sustainability reporting and potential future NDC-related reporting activities.

Task G: Collaboration with Meteorological Institution

The seasonal variation in temperature and sunshine in Seychelles is quite limited. The power demand of ships (air conditioning is the major consumer on board) will therefore hardly be subject to seasonal fluctuation. On the renewable power generation side there is also not so much seasonal effect. Sunny and cloudy periods are observed over the whole year with only minor fluctuations. The shore power systems as described earlier will be designed to handle the demand in case of the highest ambient temperature. For the dimensioning of solar power generation systems, the yearly average sun-radiation has been used. Depending on the presence of clouds the actual power output may vary significantly, but these variations can hardly be predicted and occur throughout the year. Collaboration with a Meteorological Institution is therefore not considered necessary for the design and operation of the shore power systems at this stage.

Task H: Interfaces with renewable energy and alternative fuels

The maritime sector is currently exploring several decarbonisation pathways, including renewable fuels such as green methanol, ammonia, hydrogen and biofuels, alongside direct electrification. For deep-sea shipping, alternative fuels are generally considered the most promising solution because of their higher energy density and ability to support long sailing distances. For short-sea and inter-island transport, however, direct electrification is increasingly emerging as the preferred solution. Electric propulsion offers significantly higher energy efficiency, lower operational costs and lower maintenance requirements than internal combustion engines. Furthermore, electricity can be generated domestically from renewable sources, whereas alternative fuels such as green methanol, ammonia or hydrogen would need to be imported or produced locally at considerable cost and scale. Given the relatively short sailing distances between Mahé, Praslin and La Digue, the presence of fixed ports where charging infrastructure can be provided, and the national ambition to increase renewable electricity generation, electrification is considered the most suitable long-term decarbonisation pathway for the Seychelles inter-island ferry network.

Regarding the given geographical situation with relatively short sailing distances of inter-island traffic, the use of full electric propulsion systems for ships can become an actual reality in the coming years. The technology for electric ship propulsion is available, and several examples of electric sailing ferries and cargo ships can be found in Europe. The first ships sailing on emission free alternative fuels such as ammonia and methanol are also already in service. For application in inter-island context in the Seychelles these alternative fuels are less attractive because they cannot be produced locally on a cost-effective scale.

Electric sailing has initially been assessed for ferries only, as ferries operate on fixed and predictable routes between Mahé, Praslin and La Digue, allowing charging infrastructure to be concentrated at a limited number of locations. Furthermore, ferries have relatively high annual operating hours and fuel consumption, resulting in a greater emissions-reduction potential and a stronger business case for electrification than the smaller and more diverse cargo vessel fleet. The existing ferries, such as the Pride of Praslin of Cat Cocos, have a mechanical propulsion system where the onboard diesel engines drive the ships' propellers via a gear box. This drive concept makes conversion to electric sailing complicated and expensive. Converting such vessels to full electric propulsion would require replacement of the main propulsion system, installation of electric motors and power electronics, modification of the vessel's electrical distribution system, and the integration of a large battery system. This makes conversion to electric sailing technically complex and economically unattractive compared to designing a new vessel specifically for electric operation. Another problem is the battery volume and the weight of the onboard battery. The existing ferries are most likely not equipped to handle the weight and provide a safe space for the batteries. Full electric sailing is therefore not feasible before replacement of the ferries.

It should be noted that this assessment is based on a high-level screening of the current ferry fleet. A future electrification programme would require a vessel-specific technical and economic assessment, considering factors such as route profile, energy consumption, charging strategy, battery size, available onboard space, vessel stability, remaining vessel lifetime and replacement planning. Such an assessment may demonstrate that certain vessel types are more suitable for electrification than others and could identify opportunities to optimise charging requirements through operational measures such as intermediate charging or reduced sailing speeds.

Assume the new ferry with full electric propulsion system is in place: One sailing Mahé – Praslin – La Digue including return trip will require appr. 8MWh of battery energy. If the stop time in Mahe is 1hr (during daytime) a charging system with a capacity in the range of 8 - 10MW will be required. This indicates that a charging facility for electric sailing ships is of a completely different order than the earlier described shore power system. A fast-charging system, which is inevitable for this application operates a Direct Current (DC) voltage up to 1.500V and is powered via a dedicated transformer/rectifier directly from a Medium Voltage (MV) grid connection. Future electric sailing will make the shore power connections for ferries obsolete, as soon as all ferries are fully electric.

Providing the 8MW from renewable source within the port is currently not feasible, simply because there is not sufficient renewable generation potential in the port (insufficient rooftop surface or unused land available for solar panel installation). When full electric sailing ferries are considered to be implemented, options 1 and/or 4 from Figure 11 become inevitable. Only enabling of renewable electricity to be produced at the most suitable location on each island and transferred to the port via the public grid makes this option viable.

It should be noted that the above assessment represents an indicative upper-bound scenario intended to illustrate the order of magnitude of future charging requirements for fully electric ferry operations. The estimated 8 MWh represents the required energy for a complete return voyage between Mahé, Praslin and La Digue. In practice, the installed battery capacity would need to be larger to provide operational reserves, account for battery degradation and maintain sufficient safety margins. The existing ferry fleet is not designed to accommodate battery systems of this scale and would require significant modifications or replacement by purpose-built electric vessels. Furthermore, the charging concept presented above assumes that the full energy requirement is charged during a stopover in Mahé. This has been adopted as a simplified reference scenario, as concentrating charging infrastructure at a single location is most likely the most operationally and economically attractive option, while Mahé also offers the greatest opportunities for renewable energy generation and energy storage. Alternative charging strategies, including intermediate charging at Praslin and/or La Digue, could significantly reduce both the required onboard battery capacity and the peak charging power at Mahé. Similarly, operational measures such as optimised sailing speeds may reduce overall energy consumption. The optimal combination of vessel design, battery capacity, charging locations, and charging power should therefore be assessed as part of a dedicated vessel electrification study.

Task I: Implementation Roadmap

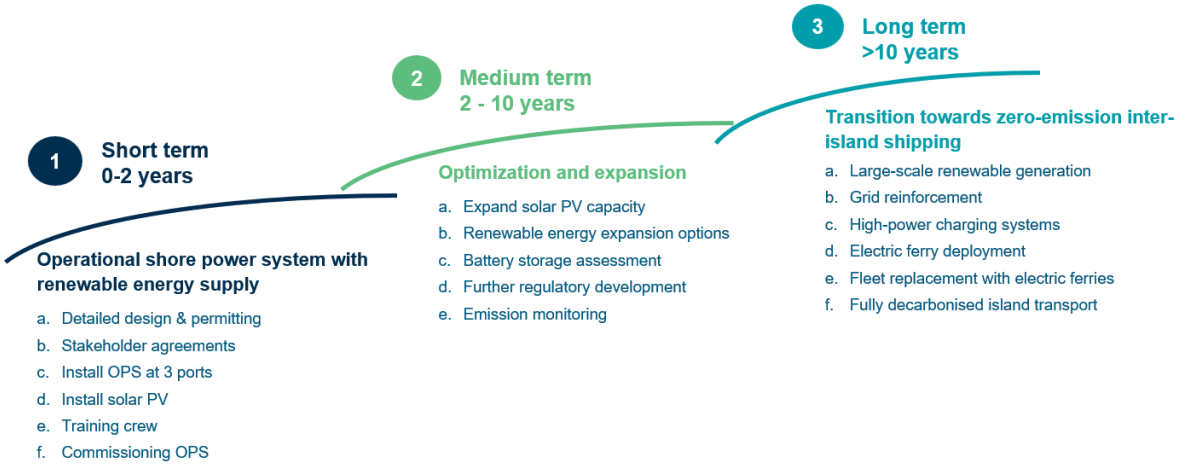


Figure 16 Implementation roadmap

Short term

The implementation of OPS for ferries and general cargo vessels sailing on the inter-island routes can be initiated in the short term. The first step towards implementation is securing the required grid connections with PUC for all three ports. Once the required connection capacities, connection locations and delivery timelines have been confirmed, the detailed design phase can commence. During this phase, the concept designs presented in this study should be further developed into tender-ready designs, including final verification of electrical loads, vessel requirements, civil works, safety systems and integration with the local electricity network. In parallel, all required permits, approvals and environmental clearances should be obtained, while arrangements with PUC for grid connection delivery and net-metering of solar PV should be formalised. Upon completion of the design and permitting phase, procurement documents can be prepared, and a contractor can be selected to construct and commission the OPS systems.

Secure stakeholder agreements between SPA, PUC, vessel operators and relevant authorities. Before the OPS is in commissioning, it is important that the operational processes around OPS connection are clearly defined in cooperation with stakeholders and that all potential users are instructed correctly. The stakeholder agreements should include operational procedures (ship connection and disconnection procedure, metering and invoicing and the defects handling procedure), safety protocols and maintenance plans (from Task E, Table 16 and recommended indicators). Also establish an emissions baseline in cooperation with the stakeholders (as their input is required). Use the recommended template and indicators from Task E for this.

Following contractor appointment, OPS systems can be installed at the three ports. In parallel with OPS deployment, solar PV systems should be installed. Based on the assessment in this study (see Task C, ‘Solar power generation options’), rooftop and carport solar PV systems offer the most realistic short-term opportunity to increase renewable energy generation within the ports. Prior to commissioning, training should be provided to port personnel, maintenance staff and vessel crews.

This training should cover operational procedures (connection and disconnection procedures), safety requirements, emergency response actions and reporting procedures. This is currently non-existent in the Seychelles, and therefore a comprehensive OPS training and competency programme should be developed. In addition, SMSA should continue the development and implementation of the national shore power regulatory framework, including operational guidance, inspection requirements, responsibilities of port and vessel operators, and procedures for certification, auditing and enforcement where applicable.

After completion of installation works, the systems should undergo testing and commissioning to verify technical performance, safety functions and operational readiness before entering service.

Medium term

Once the initial OPS systems are operational, the focus should shift towards increasing utilisation and maximising environmental benefits with the outlook on electric sailing possibilities. Focus first on maximising the existing solar panel system within the port (easy wins). Renewable energy integration should be expanded where technically and economically feasible.

Depending on developments within the Seychelles electricity sector, opportunities may arise to increase local renewable generation, integrate battery storage systems and further reduce the carbon intensity of electricity supplied to vessels. If OPS utilisation within the ports increases, additional investments in renewable energy and energy storage may become commercially attractive.

A structured monitoring programme should be established to track electricity consumption, vessel connections, fuel displacement and emission reductions. The medium-term phase should also include a review of the regulatory and commercial framework surrounding OPS operation. As experience is gained, adjustments to tariff structures, billing arrangements and maintenance contracts may be necessary to ensure efficient operation and financial sustainability. In addition, developments in renewable energy legislation may enable alternative renewable electricity supply models that are currently not available.

Long term

In the long term, OPS should be integrated into a broader strategy for the decarbonisation of maritime transport. Vessel replacement programmes may create opportunities for hybrid-electric or fully electric ferries, significantly increasing electricity demand at the ports. Future OPS infrastructure should therefore be designed and operated with sufficient flexibility to support higher-power charging requirements when required. This can require grid reinforcement in the long term.

The long-term objective should be to create an integrated energy ecosystem in which port infrastructure, renewable energy generation and vessel electrification mutually reinforce each other. This ensures that investments made today remain compatible with future developments and continue to contribute to the decarbonisation ambitions of both the maritime sector and Seychelles as a whole.

Recommendations for a follow-up detailed feasibility study

While this pre-feasibility study demonstrates that OPS appears technically feasible at all three ports, a subsequent feasibility study is recommended to further develop and validate several key assumptions. Particular attention should be given to:

- Detailed grid-capacity assessments and confirmation of available connection capacity at each port;
- Detailed electrical load profiles of individual vessels;
- Verification of actual shore-power utilisation rates and connection windows;
- Detailed renewable-energy and battery-storage integration studies;
- Development of the preferred commercial model, tariff structure and cost-recovery mechanism;
- Assessment of vessel-owner willingness-to-connect and long-term OPS uptake rates;
- Detailed permitting and regulatory review;
- Asset-management, maintenance and lifecycle-cost assessment;
- Future charging requirements for hybrid and fully electric vessels;
- Detailed business-case and sensitivity analysis, including electricity prices, diesel prices and future renewable-energy scenarios.

Appendix

A1 Stakeholder consultations overview

Stakeholder	Consultation date	Participants
Harbour masters – Site visit Inter-island Passenger & Cargo Terminal (Mahé)	31 August 2026	SPA, Haskoning
Harbour masters – Site visit Ero Passenger & Eve Island Cargo Terminals (Praslin) and La Digue Passenger & Cargo Terminal (La Digue)	2 September 2026	SPA, Haskoning
Vessel operator – MV Ahroha II	1 and 7 September 2026	SPA, Haskoning
Vessel operator – Cat Cocos	2 September 2026	SPA, Haskoning
Vessel operator – Cat Rose	2 September 2026	SPA, Haskoning
Vessel operator – Landing craft vessel	7 September 2026	SPA, GIZ, Haskoning
Public Utilities Corporation (PUC)	3 September 2026	Energy engineers PUC, Haskoning
Seychelles Maritime Safety Authority (SMSA)	8 September 2026	Chief Executive Officer SMSA, GIZ, Haskoning
Ministry of Transport	9 September 2026	Chief Technical Advisor for the Seychelles electric mobility project, SPA, GIZ, Haskoning
MECENR	9 September 2026	PS Energy and Climate change, SPA, Haskoning
United Nations Industrial Development Organization (UNIDO)	10 September 2026	Energy and Climate finance expert UNIDO, GIZ, Haskoning


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