



Guidance on Shore Side Electricity

*to Port Authorities and
Administrations*

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EMSA Workshop on Alternative Fuels and Power Solutions for Shipping and Ports

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Documents



PART1

Equipment & Technology

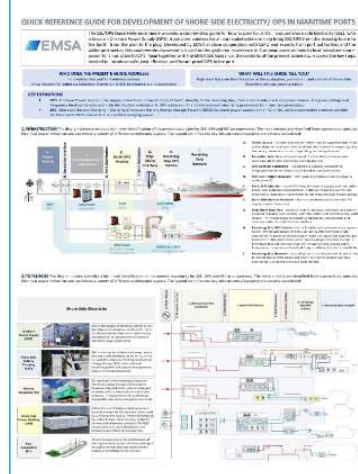
OBJECTIVE:
Introduction and Overview of Equipment and Technologies available SSE infrastructure projects



PART2

Planning, Operations and Safety

OBJECTIVE:
Support to Project, Implementation and Operation of SSE facilities.
Safety Assessment



QUICK-GUIDE

Quick-Reference Guide on SSE development

OBJECTIVE:
Provide “summary-guide” support on development of SSE projects

Contents

Part	Chapters
Part 1	1. Scope, Applicability & Definitions
	2. SSE General Blocks Architecture
	3. SSE Infrastructure & Equipment
Part 2	4. SSE Options
	5. Regulatory Framework
	6. Responsibilities
	7. Project and Feasibility
	8. Operation
	9. Safety

Project Development Timeline

	Q1	Q2	Q3	Q4
2019			Initial Discussion/Identification of the Need (Sustainable Ports Forum) Expert Group on Sustainable Ports	DG-MOVE REQUEST Ref. Ares(2019)6092735 - 02/10/2019 Kick-Off meeting Brussels
2020	INITIAL SCOPING 1st PARTICIPATION IN SSE for OPS (contribution to IMO OPS Guidelines – participation in Working Group for OPS Guidelines (SSE6))	Initiate technical exchange with IEEE and participation in technical committees/ events/ meetings SSE Guidance Part 1 - Technology	Drafting Work – PT1	Drafting Work – PT1 Presentation of Initial Results at EPF-SPS
2021	Part 1 - Consultation Concept Papers for Part 2 EMSA SSE Workshop 26 March	Part 2 – Online Survey SSE Guidance Part 2 - Planning, Operations and Safety	Drafting Work – PT2 Presentation of Initial Results at EPF-SPS	Part 2 – Consultation
2022	EMSA SSE Guide Finalization Publication	MSC105 – Approval of the IMO OPS Guidelines		
	FuelEU and AFIR regulations under negotiation (EP and Council) – OPS/SSE requirements under negotiation			

1. Scope

Objective: Present all elements covered in the SSE Guidance – Port side, Interface and Ship Side

2. Blocks

- Identification of elements common to SSE installation in different configurations for shore power
- General Description of the functional elements in SSE installations.
- Coverage from Power Source to Receiving Ship, across the different infrastructure elements

3. Equipment

4. SSE Options

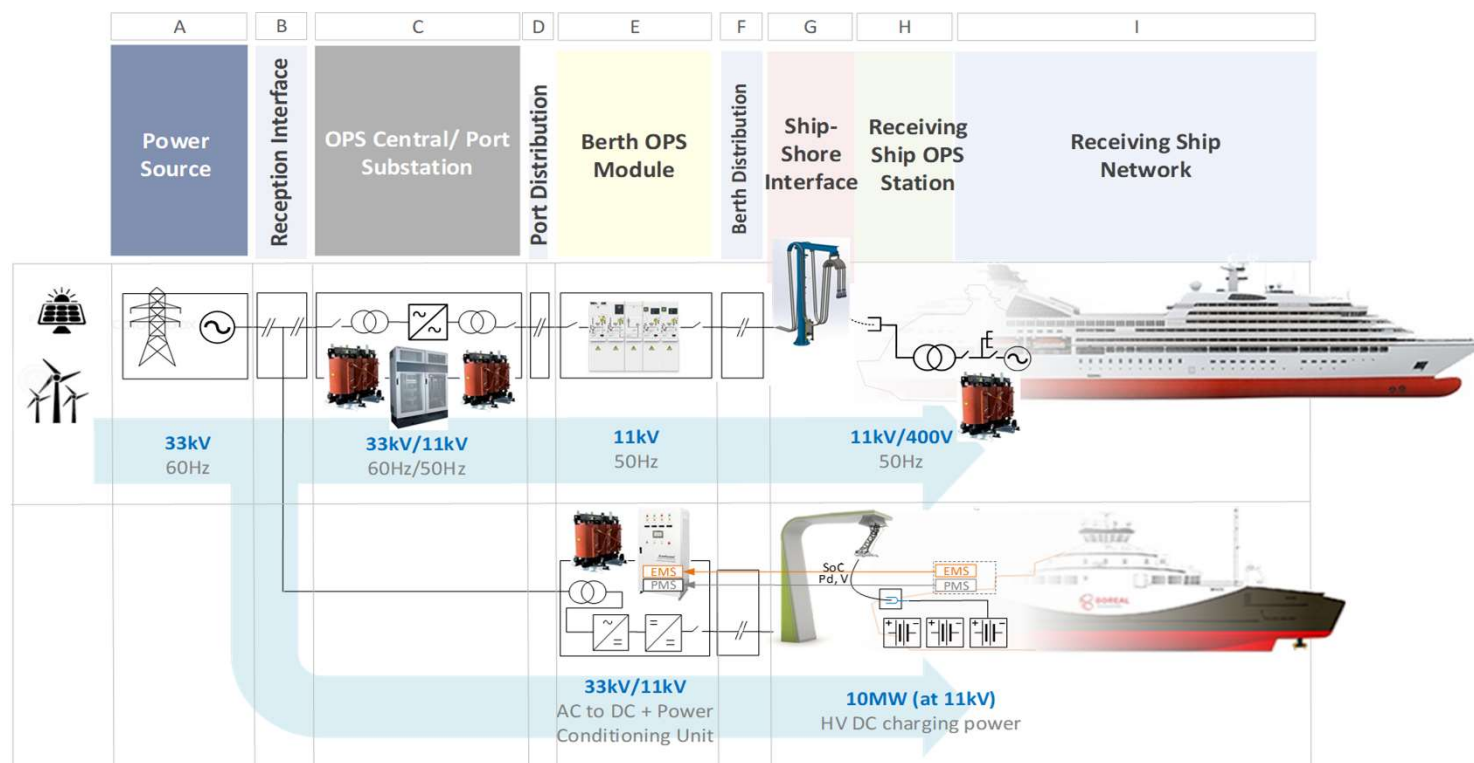
5. Regulatory Framework

6. Responsibilities

7. Project and Feasibility

8. Operation

9. Safety



1. Scope

Objective: Identify and describe all main blocks of a typical reference SSE system

2. Blocks

- Identification made at equipment-level
- Breakdown of SSE system block with a view to best address regulatory framework, project and safety aspects.

3. Equipment

4. SSE Options

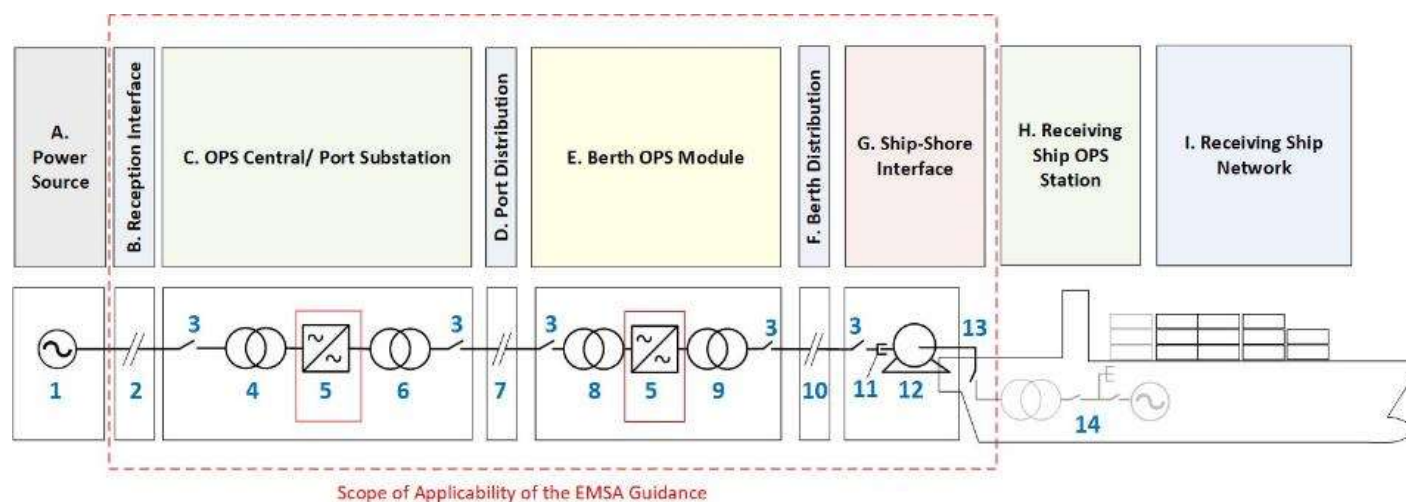
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A. Power Source - A shore connection system can be supplied either from the national grid or a local port internal distributed energy system, through a power frequency conversion or not, depending on the application.

D. Port Distribution Network – Port-scale distribution (either above or underground)

F. Berth Distribution Network – Berth-scale distribution (close to OPS supply shore connection)

B. Reception Interface – Connection of the Port Grid to the external upstream utility grid. Electricity custody transfer

E. Berth OPS Module – Local OPS Module, close to supply point at berth – Shore-side protection transformer, (optional Frequency Converter), Step-down/Protection Transformation for required ship voltage supply.

G. Ship-Shore Interface - Shore-to-ship connection, interface, and control equipment (cable reel, sockets, communication and control wires, earth relays) – All mechanisms to ensure compatibility, connectivity and communication included in the interface.

C. OPS Central/ Substation – including Step-Down Transformer, Frequency Converter, Main Circuit Breaker and Earth Switch

H. Receiving Ship OPS Station- Circuit breaker and onboard receiving earth switch. Where applicable (if ship's voltage is different from shore connection voltage) an onboard transformer to adjust the high voltage electricity to the ship's main switchboard voltage; this transformer is preferably located near the main switchboard in the engine room.

1. Scope

Objective: Describe the main equipment elements present in SSE systems with a view to promote familiarization with the SSE components

2. Blocks

- For each equipment block, highlight the functional role and technical challenges
- List standards and best practices in relation to the equipment-specific elements .

3. Equipment

4. SSE Options

5. Regulatory Framework

6. Responsibilities

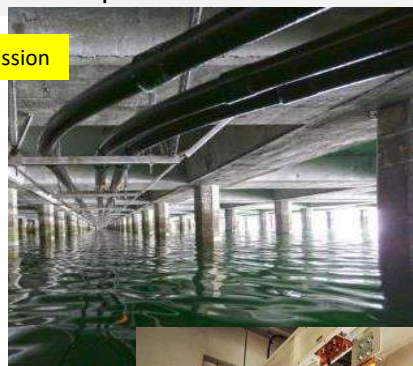
7. Project and Feasibility

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Power Transmission



Power Conditioning/ Transformers



Electrical Energy Storage



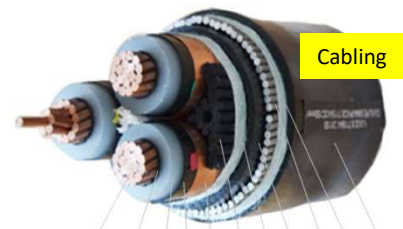
Frequency Conversion



Microgeneration



Interconnectivity



Cabling



Cable Management Systems



OPS modular substations

1. Scope

2. Blocks

3. Equipment

4. SSE Options

5. Regulatory Framework

6. Responsibilities

7. Project and Feasibility

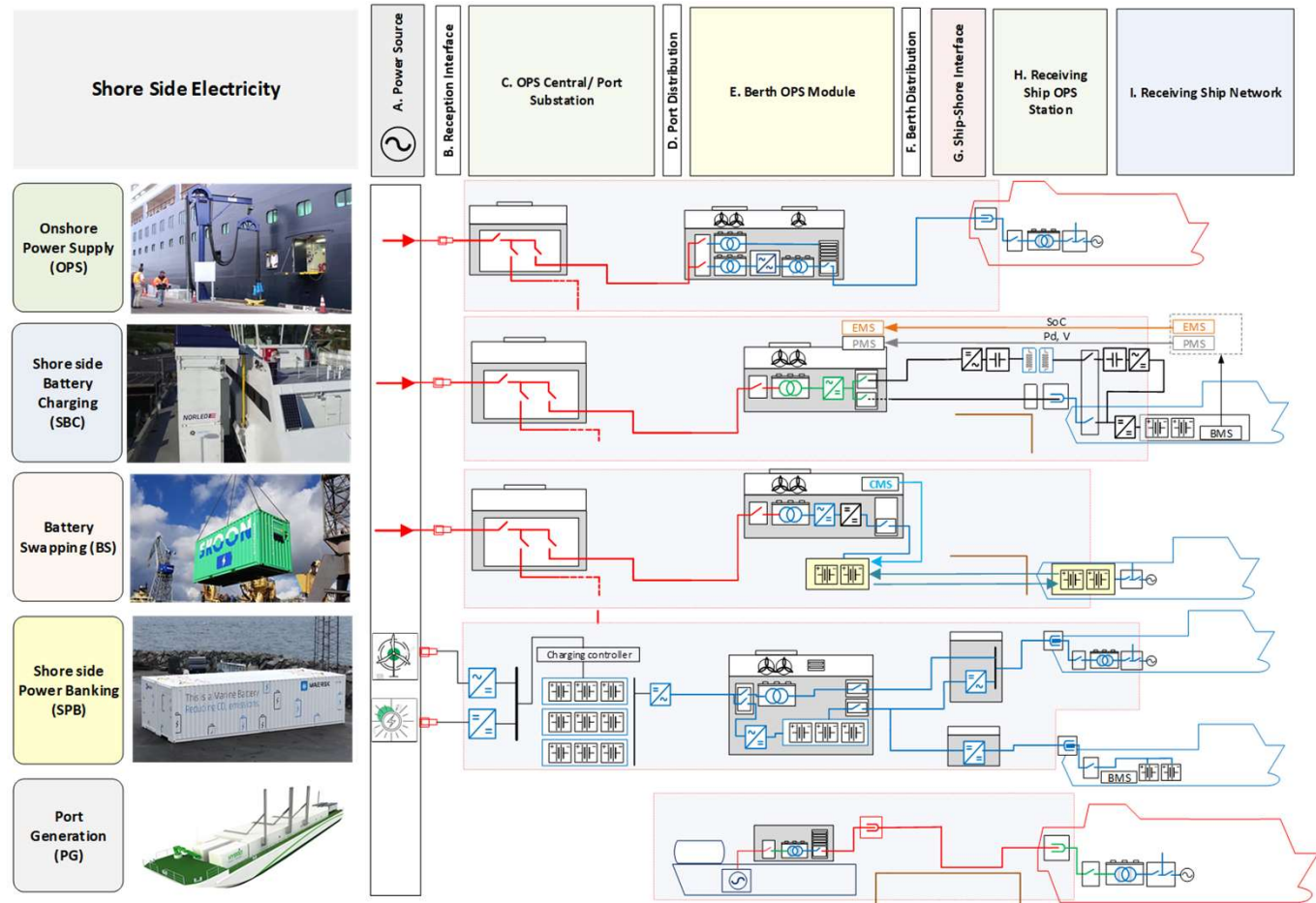
8. Operation

9. Safety

General Configuration – SSE Installations

Objective: Describe some of the possible topologies for shore-power, including OPS and Battery Charging arrangements

- Demonstrate the large variety of possible topologies for SSE systems.
- Provide a break-down of SSE systems into element components for different arrangements.
- Support identification of the applicable regulatory framework and safety assessment.
- Highlight opportunities for SSE arrangements to meet different user requirements and port specificities.



Part Chapters Interconnectivity and Interoperability - Standardization

Part 1

1. Scope

Objective: Describe the relevant regulatory framework for different SSE systems.

2. Blocks

- Describe regulatory framework, including regulations and technical standards
- Identify missing elements in the regulatory framework (see below)

3. Equipment

4. SSE Options

5. Regulatory Framework

SSE Type		Interconnectivity	Interoperability	Data Communication	International/EU Regulatory
OPS	HVSC	IEC 62613-2:2016	IEC/IEEE 80005-1	IEC/IEEE 80005-2	IMO OPS Guidelines EU AFID
	LVSC	IEC 60309-5	IEC/IEEE 80005-3	IEC/IEEE 80005-2	Missing (IEC/IEEE 80005-3 under development)
	LVSC - IW	EN 15869-2:2019 (up 125A) EN 16840: 2017 (above 250A)		Possible application of IEC/IEEE 80005-2	CCNR CESNI – ES-TRIN2019
	Recreational Craft/ Marinas	IEC 60309-2	tbd		
SBC	SBC-AC As OPS – ship- side charging.	IEC 60309-5/ IEC 62613-2 AC connection	IEC/IEEE 80005 series As OPS – ship-side charging.	Possibility for future development for IEC/IEEE 80005-2 or ISO15118	Missing
	SBC-DC	Not yet standardized	Not yet standardized		Missing

6. Responsibilities

7. Project and Feasibility

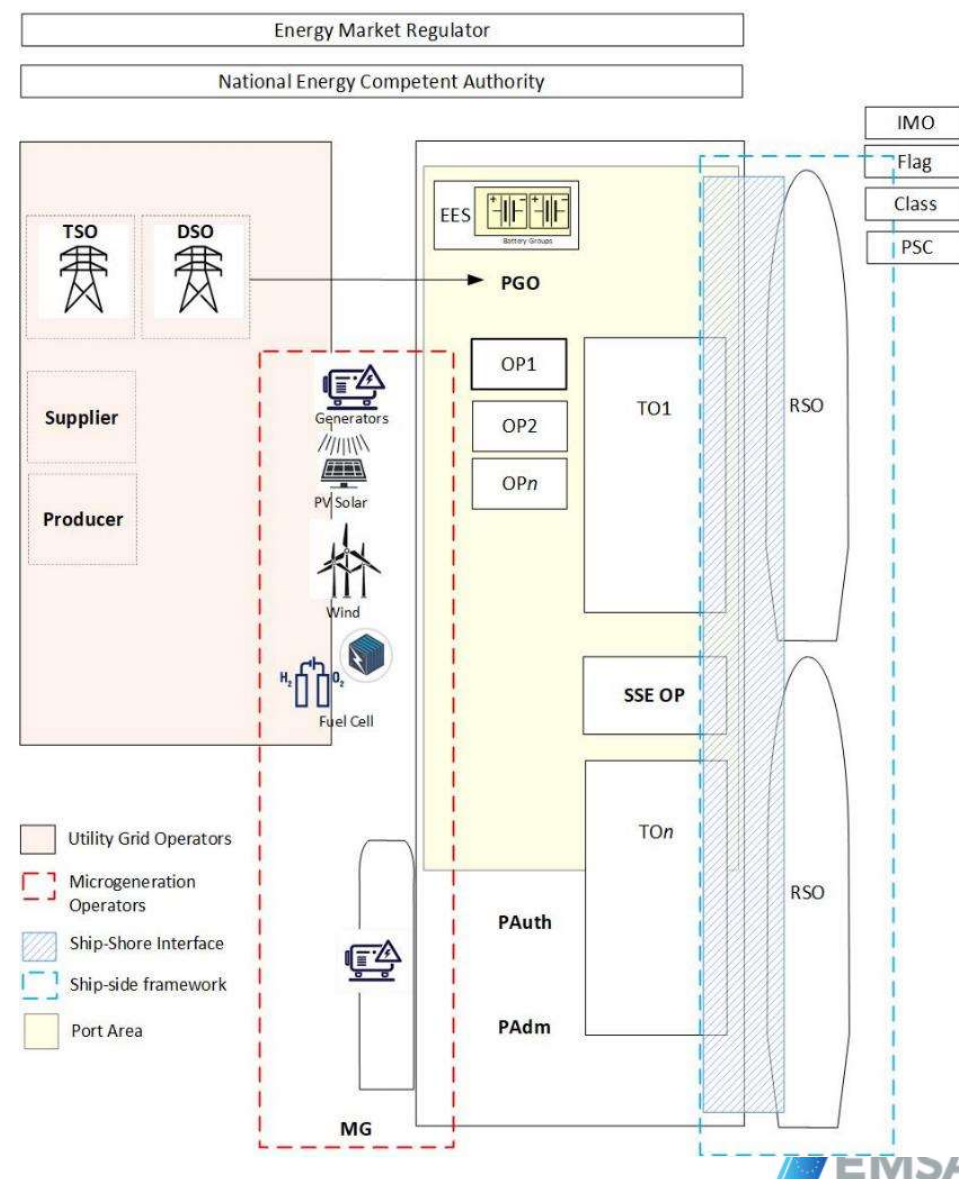
8. Operation

9. Safety

Part 2

Objective: Provide a high-level identification of stakeholders involved in SSE projects, decision-making and operation.

- Identify the different stakeholders involved in SSE projects, decision-making and operation.
- List the key responsibilities associated to different stakeholders, with a focus on Port Authorities.
- Facilitate the identification of the relevant parties that should work together in SSE projects development and implementation.



1. Scope

2. Blocks

3. Equipment

4. SSE Options

5. Regulatory Framework

6. Responsibilities

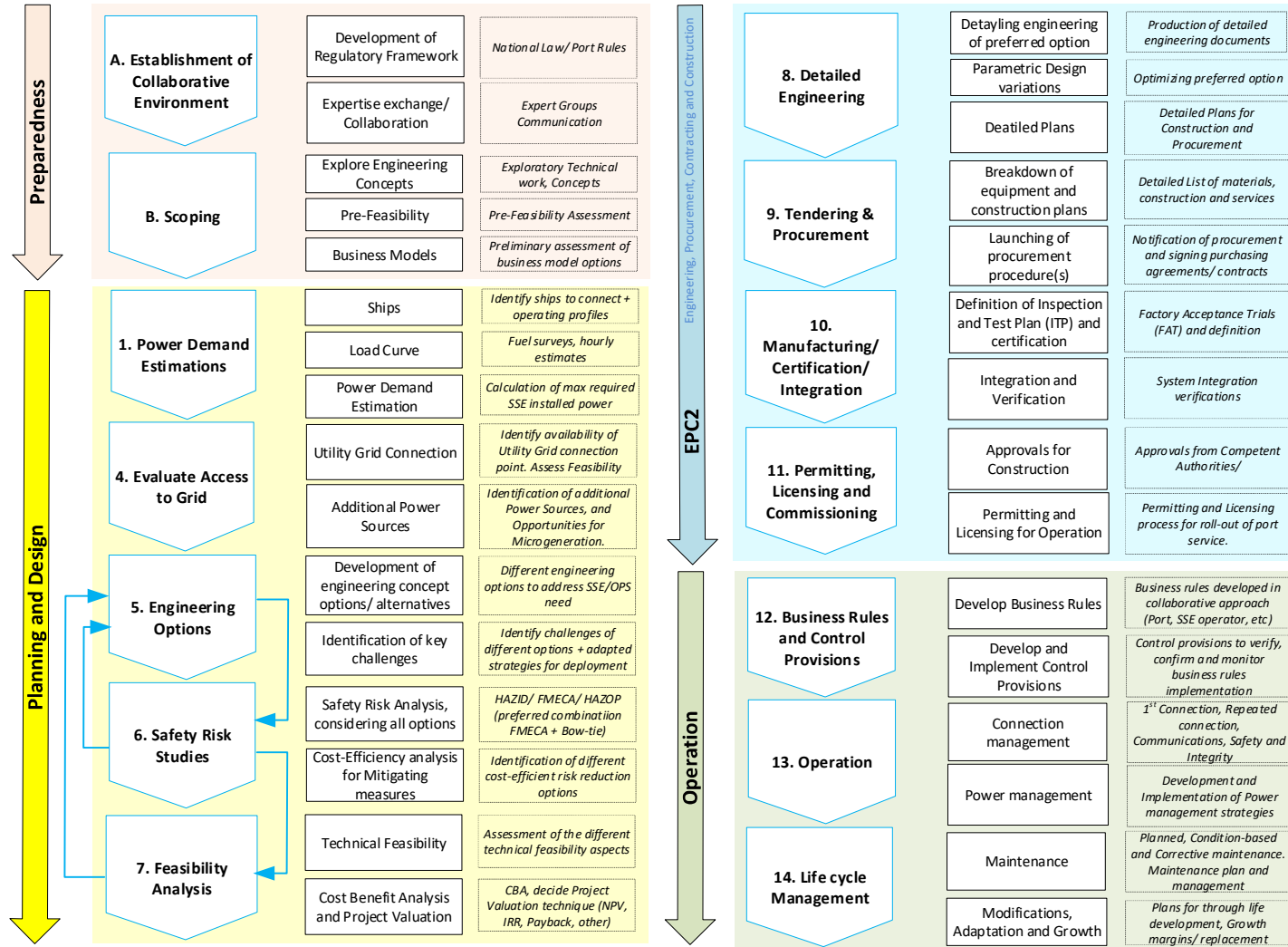
7. Project and Feasibility

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9. Safety

Objective: Break-down of the Life Cycle for SSE Projects.

- Identify the different steps relevant for SSE Project, from the first stages of project development to actual operation of the systems.



1. Scope

2. Blocks

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7. Project and Feasibility

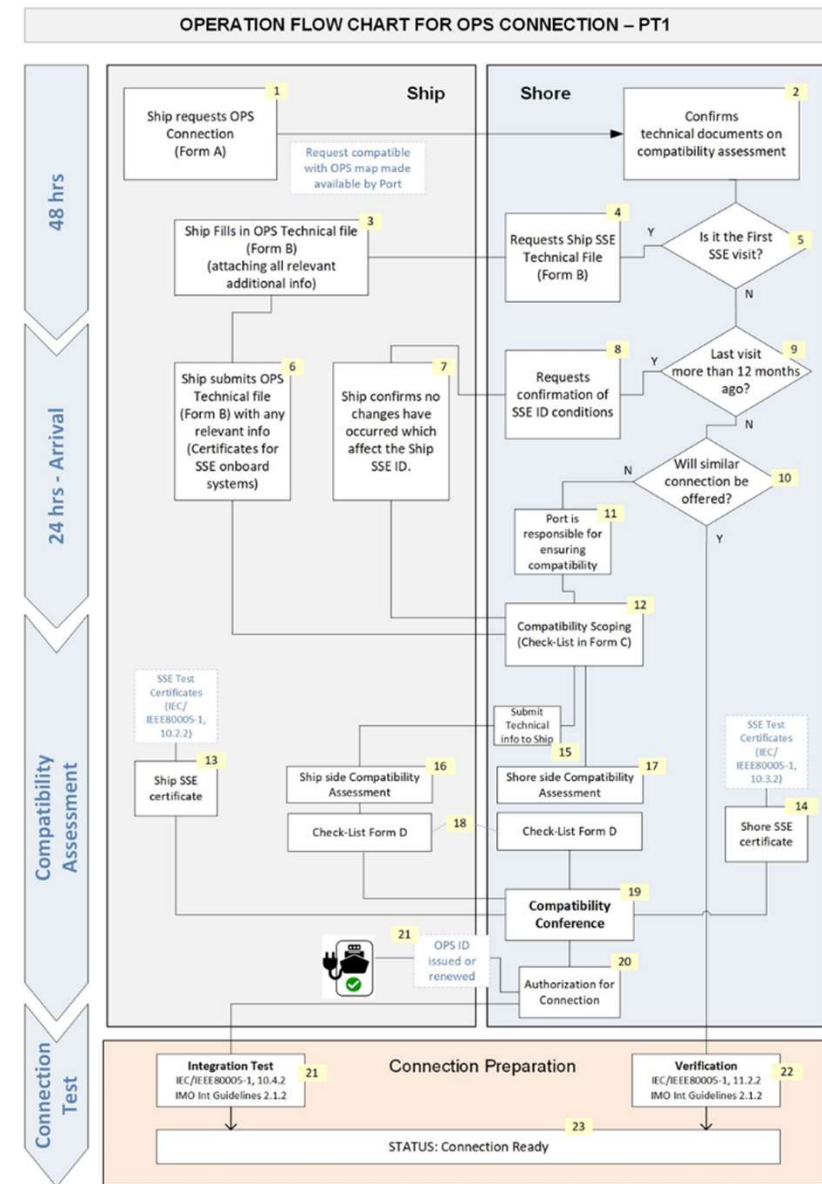
8. Operation

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Objective: Provide relevant elements to support SSE operation procedure, in complement to IMO OPS Guidelines

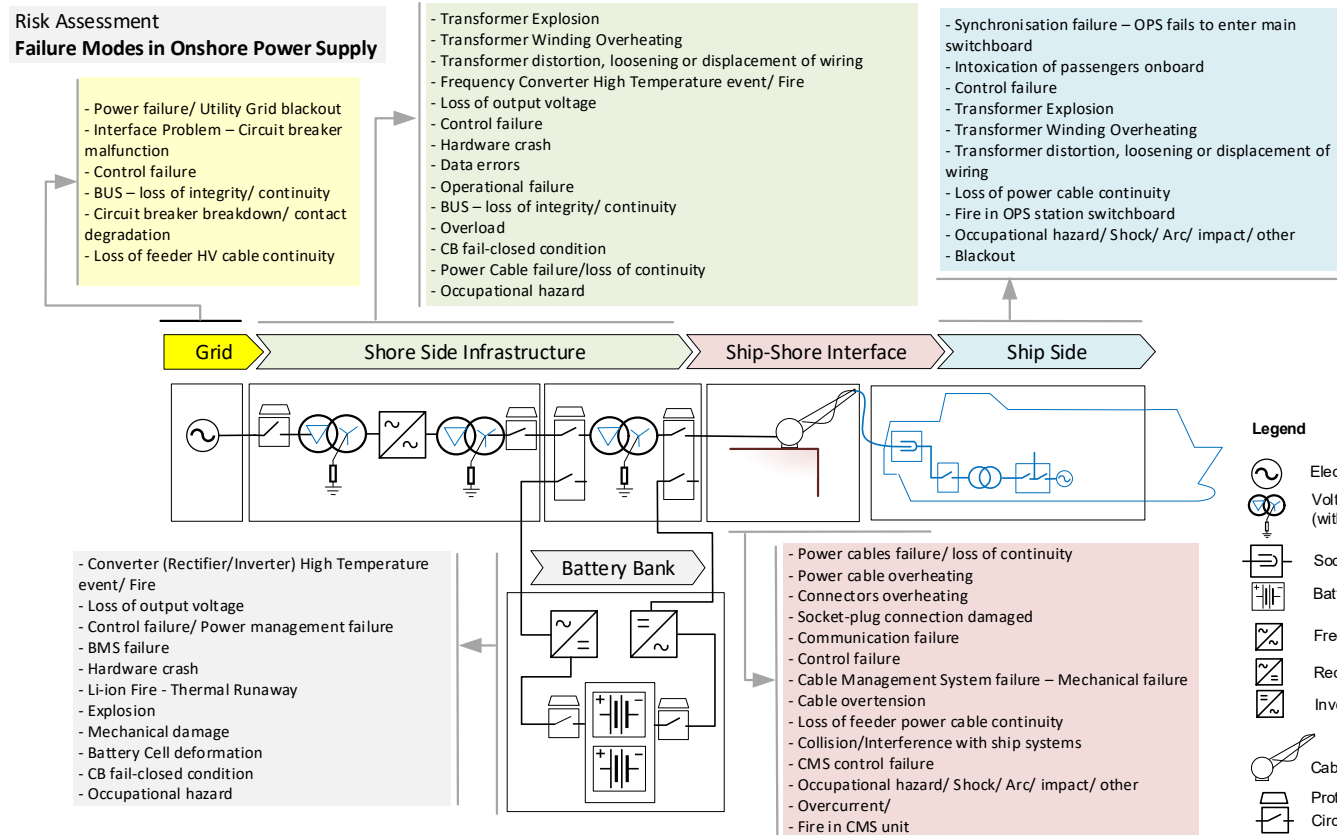
- Uses the same structure of the IMO OPS Guidelines in terms of Operation breakdown.
- Provides diagram flow-charts for operation of SSE systems in parallel or “black-out” connection.
- For Battery Charging includes concept for operation in less detailed description (less mature framework).

OPS Operation – Conceptual Layout



Objective: Identify hazards and Scope for Risk Assessment of SSE systems.

- Description of different failure modes in SSE systems
- Proposed scope for risk assessment



Many Thanks

