

Sustainable Smart Ports

How can we take stock of the SSP status of a port to plan an approach to realize the potential?

Adson Hofman
Robbert Groenen

7 December 2023

Contents

Introduction

- Sustainable Smart Ports
- Methodology & Flow-Chart
- Policy Context (NDC)

Details 5-Step Methodology

- Step 1 – Step 5
- SSP Scorecard





Introduction

Sustainable Smart Ports

*Port that produces/uses/distributes **renewable energy** and **integrate green** and **new technologies** to enable the **energy transition** and enhance energy sustainability of ports, as well as tap into the possibility of distribution of renewable energy.*



1 Energy Transition

What is the current situation and what is the potential for renewable energy generation in the port?



2 Energy Efficiency

How can energy efficiency be improved looking at the current operations in the port area and energy consumption?

Methodology (5 steps)



1

Define Port Community & Port Stakeholders



2

Assessment Current Energy Use in Ports



3

Assess Readiness of the Port for the Energy Transition



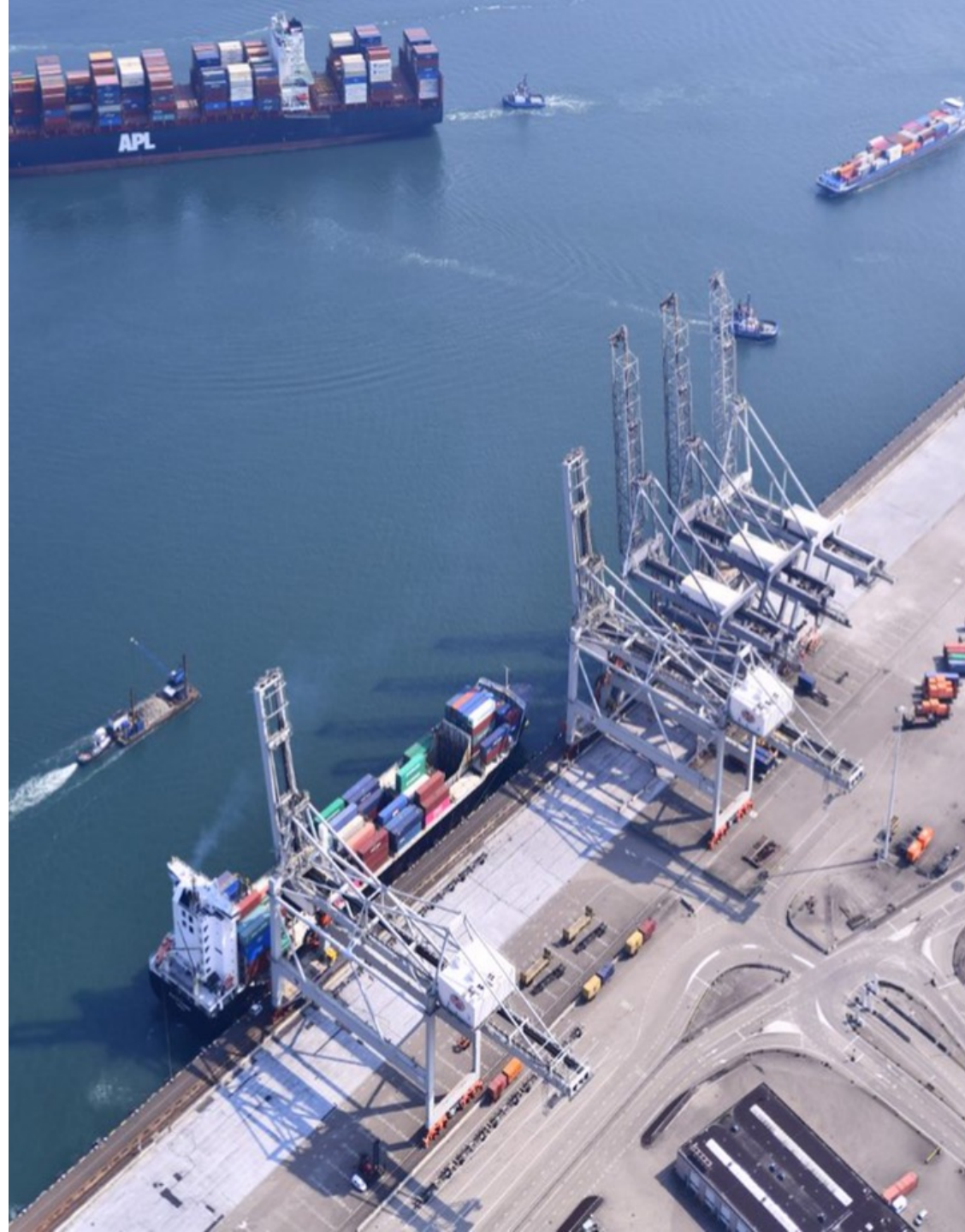
4

Determine Potential Renewable Energy Generation/Procurement

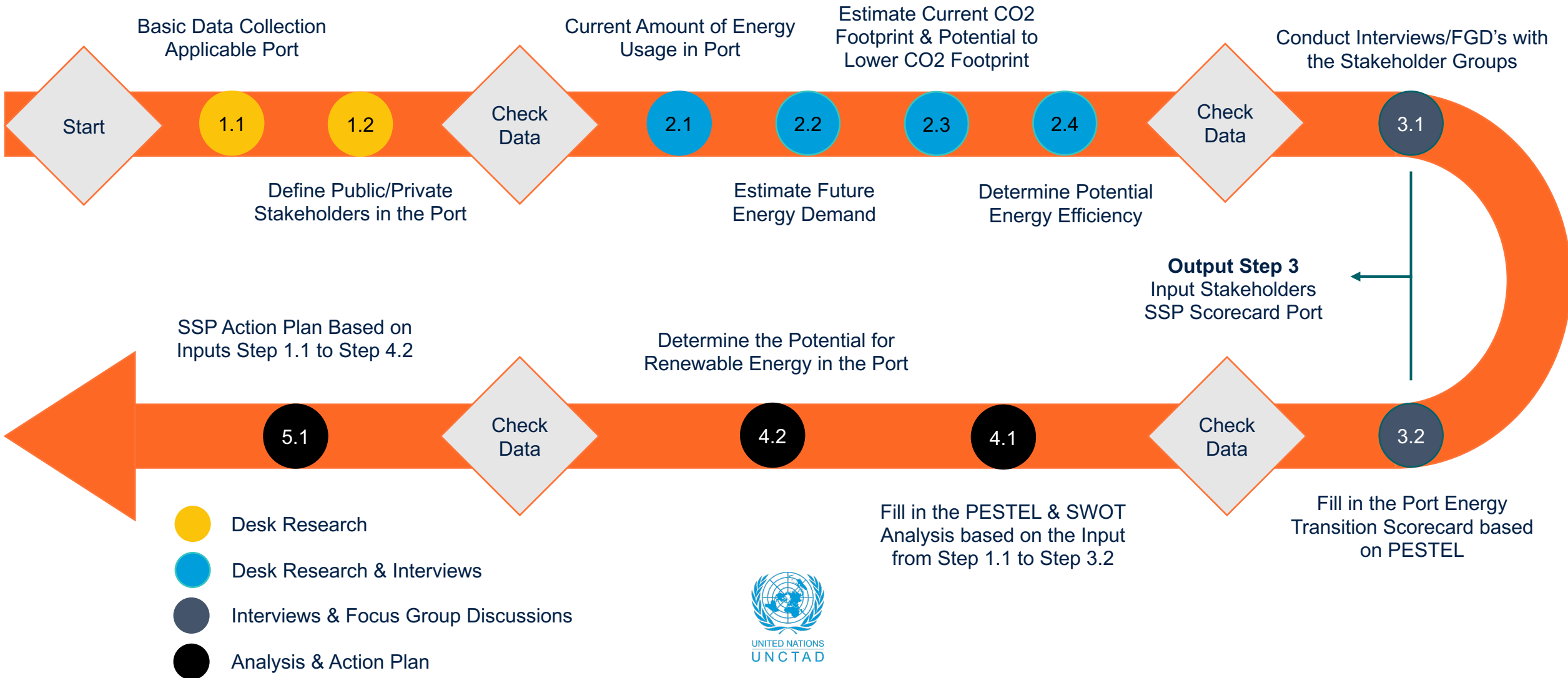


5

Action Plan to Transition towards an SSP



Flowchart Methodology





NDC (Nat. Determined Contri.)

- 1 54 Countries signed the Paris Agreement
- 2 45 Countries have ratified it
- 3 44 African Countries Submitted Their NDCs

Challenges in Resource Mobilization

- 1 Reliable Data Sources
- 2 Comprehensive Sector Analysis
- 3 Targeted Approach: Good understanding of the functions of different actors in the climate finance landscape and the time processes of funds and national budgets

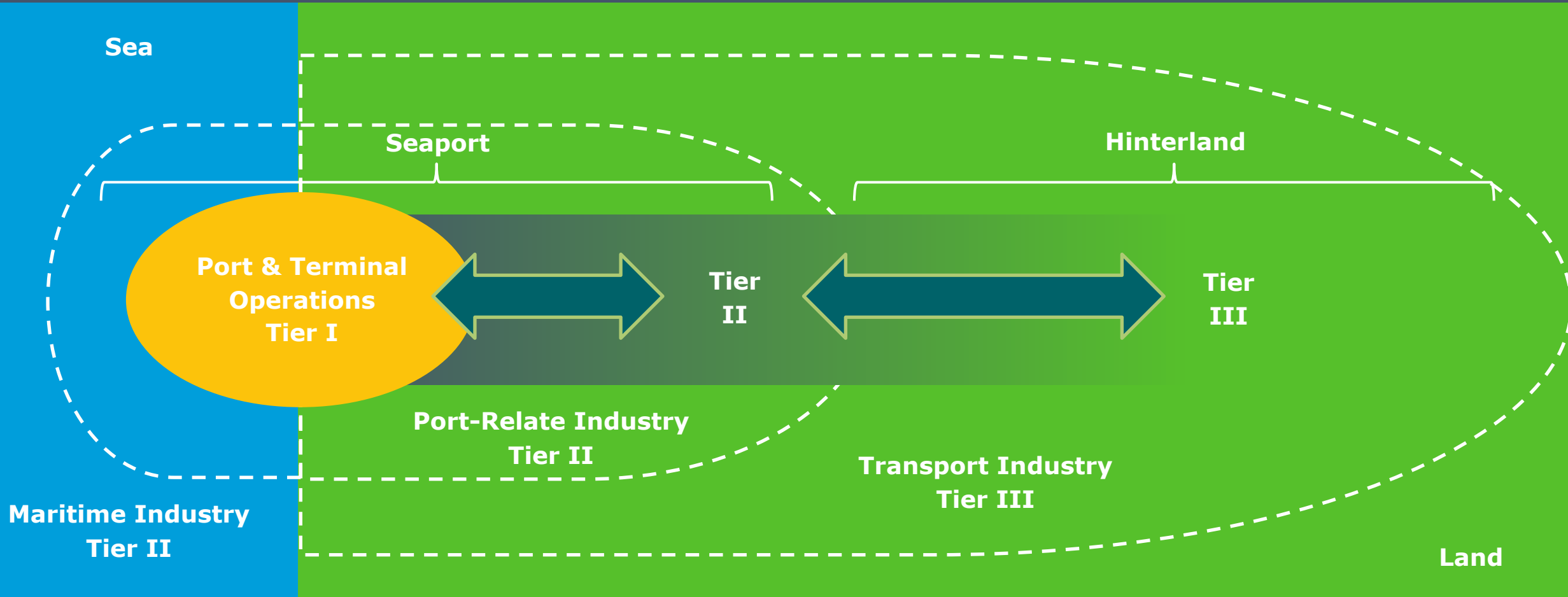


Details 5-Step Methodology



Step 1 | Port Community & Port Stakeholders

Tier IV: Port Facilities (e.g. Port facility buildings/offices, lighting)



Tier V: Governmental Organisations (e.g. ministries), Associations & Others

Step 2 | Current Energy Consumption in Port



Current Energy usage

- Estimate the quantity of energy used (in MWh, KJ, etc.) – Via the energy utility, port authority or via energy users
- Estimate the share of energy use which is electrified
- Estimate how much of the non-electrified can be electrified



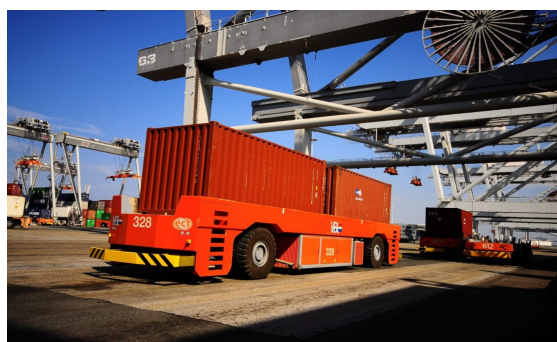
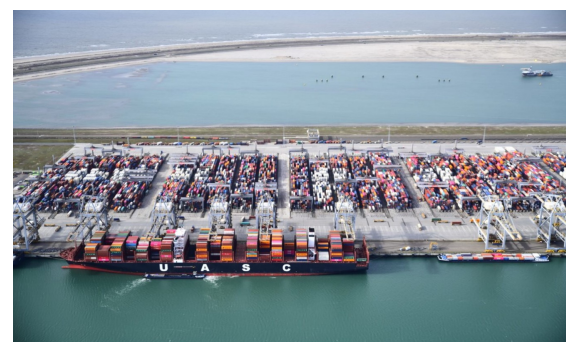
Expected future energy usage

- Expansion of current activities
- New activities planned for the future
- Focus on electricity demand – and green molecules (such as H₂) in case electrification is not possible

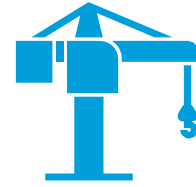
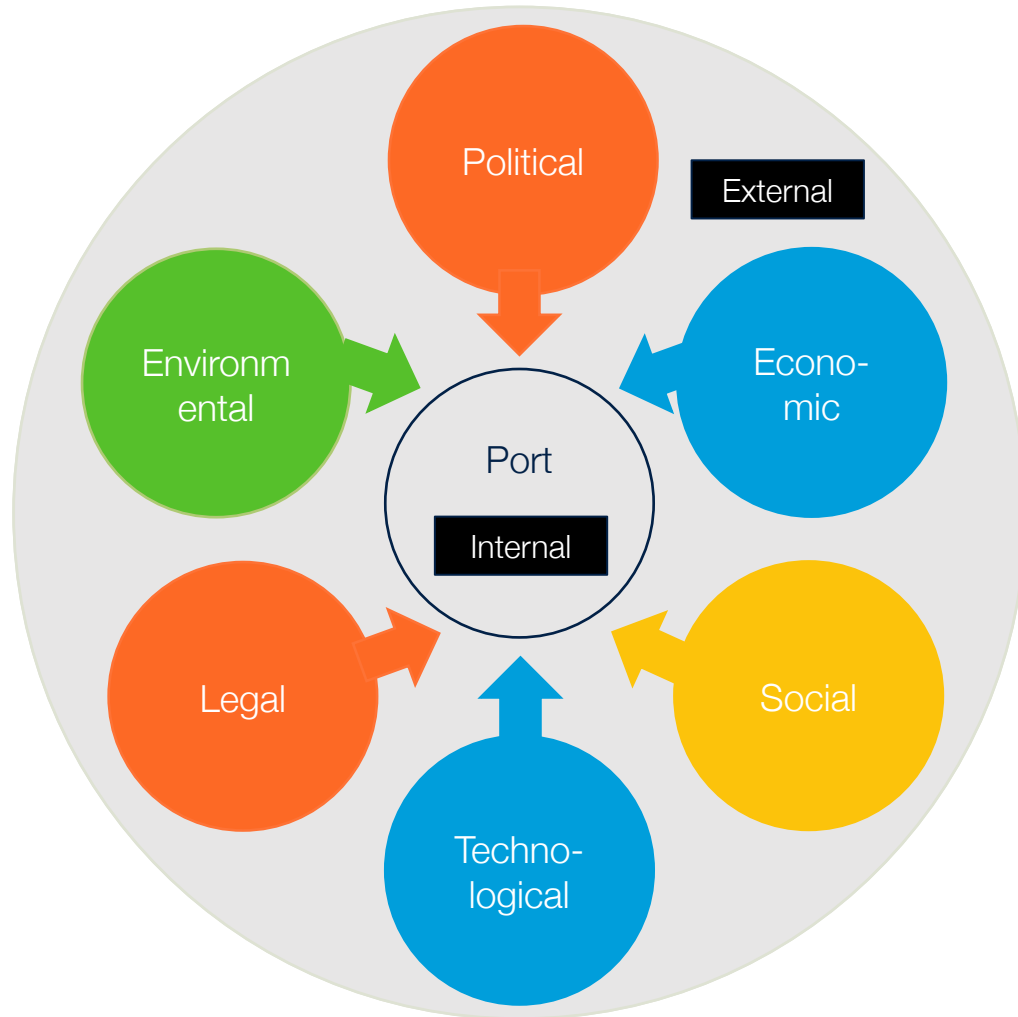


Estimate current and future energy footprint

- Which share of electricity is taken from the national grid? – Use country wide energy mix
- Are any renewables being generated on the premises of the port?
- Is any other energy source used at the premises of the port?
- Are any contracts in place to purchase (green) electricity from third parties?



Step 3 | Current Port Energy Transition Efforts



Ambition of the port

- To use or generate renewable electricity, and to facilitate the national or regional energy transition
- Ambition which can be materialized by the port authority on its own
- Ambition which can only be materialized by the port authority via a collaboration on with external actors



External factors: PESTLE

- Aims to understand the Political, Economic, Social, Technological, Legal and Environmental context
- The result of the PESTLE will determine how fast the port could transition into a sustainable smart port
- Used as input for the SWOT and action plan and one-pager



SWOT analysis

- Use PESTLE as input for Opportunities and Threats, Strengths and Weaknesses are internal features of the port
- Used as input for the action plan and one-pager

Step 4 | Potential Renewable Energy



1

Feasibility to generate, store & use renewable energy at the port's premises

- Feasibility of Wind, Solar, Biomass, and alternative sources (geothermal, hydro, wave & tidal energy)
- Hybrid options – various renewable sources, or renewables combined with fossil fuels
- Various forms of energy storage



2

Agreements with external power generators

- PPAs
- Green tariffs
- Virtual PPAs



3

Business case & Financing

- Stepwise approach to developing the business & investment case
- Income includes electricity sales, sales of equity and subsidies
- Indicators of financial feasibility

SSP Scorecard

Port Info **Results SWOT** **Results PESTLE Analysis** **Potential**



S

- Item 1
- Etc.

W

- Item 1
- Etc.

O

- Item 1
- Etc.

T

- Item 1
- Etc.

Politics & Regulations

Government Policies		
Image of Port – NDC		
Image of Port – NVR		
Role of Transport – NDC		
Role of Transport – VNR		
Role Port Authority		

Economic Context

Input Availability		
Subsidies (Direct)		
Subsidies (Indirect)		
Carbon Taxes		
Incentives Pro. & Usage		
Access to Finance		

Environmental

Current Environ. Impact		
Importance En. Trans.		
Expected Impact RE		
General Bunkering		
RE Bunkering		
Buildings & Lightning		

Social

Third Party Influence		
Public Opinion		
Third Party Initiative		
Liveability		
Skills HRM		
Available Training		
Educational Programs		
Training on ET		
Edu. Programs ET		
Training & Education ET		

Technological

Electrified Equipment		
Adaptability Port		
Distribution Capacity		
Digitization		
AI		

Legal & Regulations

Regulatory Framework		
Permitting/Licensing		
Renewable Energy Reg.		

Total Results PESTLE

Politics & Regulations		
Economic Context		
Social		
Technological		
Legal & Regulations		
Environmental		

Wind Energy Gen.

Wind Resources		
Availability Space		

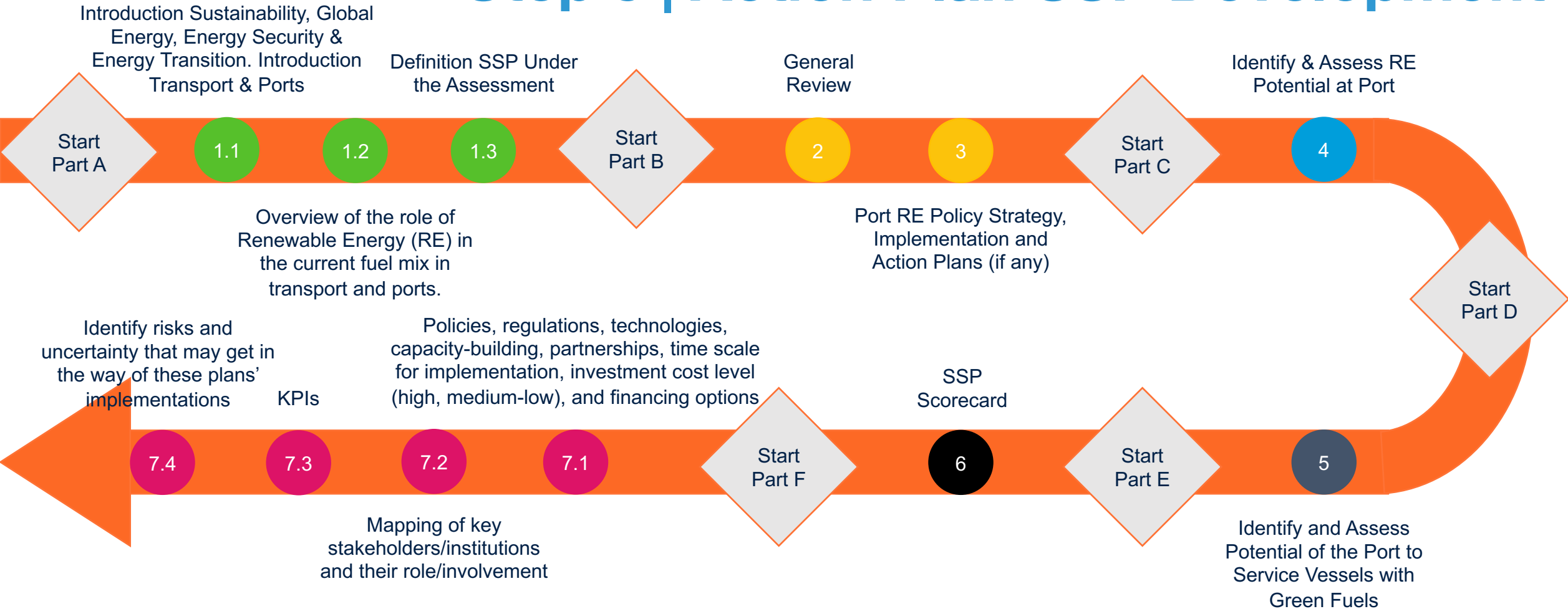
Solar Energy Gen.

Current Env. Impact		
Availability Space		

Other RE Gen.

Biomass		
Mini/Micro Hydro		
Small Scale Geoth.		
Tidal/Wave/OTEC		

Step 5 | Action Plan SSP Development



● General Introduction (Same for all Reports)

● Policy Context

● Identify and Assess RE Potential at Port

● Identify and Assess Potential of the Port to Service Vessels with Green Fuels

● SSP Scorecard

● Proposed Actions/Matrix to Support/Promote RE Development and Implementation in Port

Wrap up

Methodology SSP

5 Steps

SSP Scorecard & Action Plan



Thank you!



UNITED NATIONS
UNCTAD