NCoEGPS
National Centre of Excellence in Green Ports & Shipping

सत्यमेव जयते
Ministry of Ports, Shipping & Waterways
Government of India

SAGARMALA
PORT-LED PROSPERITY

Green Port Performance Index (GPPI)

Measuring Progress, Powering Green Transformation

(October 2025, Rev-O)







Green Port Performance Index

"Measuring Progress, Powering Green Transformation"

(October 2025, Rev-O)

Ministry of Ports, Shipping and Waterways
Government of India

Contents

1. Introduction 4
2. Objectives and Benefits 4
3. Applicability 4
4. Definitions 4
5. GPPI Framework 5
6. Awards and Recognition 5
7. Designated Agency 5
8. Review of GPPI 6
9. Table 1: Green Ports Performance Index 7
10. Calculation Methodology 8
11. List of Abbreviations 10

1. Introduction

1.1 India's Nationally Determined Contribution (NDC) outlines the country's commitments to addressing climate change. India has declared its goal to achieve net-zero emissions by 2070 and aims to reduce its carbon emissions intensity by 45% by 2030, compared to 2005 levels.

1.2 In alignment with these national targets and the Maritime Amrit Kaal Vision 2047, which envisions a sustainable, green, and technology-driven maritime ecosystem, the Ministry of Ports, Shipping and Waterways (MoPSW) introduces the Green Port Performance Index (GPPI). The index provides an objective framework to measure the environmental performance of ports and track their decarbonization journey.

1.3 The GPPI builds upon the principles of the Harit Sagar Guidelines, which promote ecosystem restoration, carbon neutrality, and responsible port development. It will serve as a strategic tool to evaluate emissions originating from Indian ports and aligns with globally recognized methodologies for assessing green port credentials, enabling inter-port comparisons based on the sustainability performance.

1.4 Through this initiative, India seeks to benchmark its ports against international standards, drive continuous improvement and accelerate adoption of best practices in sustainable port operations—advancing the nation's transition towards a green and resilient maritime future.

1.5 The framework organizes 13 identified indicators into three major objectives: Climate Change, Environmental Health, and Ecosystem Vitality.

2. Objectives and Benefits

2.1 Tracking Green Transition: The GPPI can help ports track their progress towards reducing their environmental impact. This can be done by comparing the GPPI scores over time and across ports.

2.2 Monitor and Control Emissions: The index will help to establish a standardized approach for calculating emissions and implement effective measures to reduce it.

2.3 Assess the Environmental Impact of Visiting Ships: The GPPI will help to evaluate the environmental footprint of vessels calling at the port.

2.4 Strategize and Incentivize: The GPPI can help ports to develop strategies to reduce the environmental impact of shipping traffic by identifying the types of ships that have the greatest environmental impact and to target these ships with incentives to reduce their emissions.

2.5 Enhance Global Competitiveness: Strengthen the competitiveness of Indian ports by aligning them with international green standards, showcasing leadership in sustainable port practices on the global stage.

3. Applicability

3.1 All operational Indian Ports notified under Indian Ports Act, 2025.

3.2 Assessment to be done annually (in April for the preceding financial year).

4. Definitions

4.1 **Scope 1 GHG Emissions**: Scope 1 GHG emissions refer to the direct GHG emissions that an organization releases into the atmosphere from sources it owns or controls. These include emissions from fuel combustion in boilers, furnaces, vehicles, machinery, and the organization's own facilities,

equipment, and transportation fleet. Such emissions are a direct result of the organization's operational activities and are critical in assessing the environmental impact of its logistics and supply chain operations.

4.2 **Scope 2 GHG emissions**: Scope 2 GHG emissions encompass the GHG emissions resulting from the generation of purchased electricity consumed by an organization. These emissions arise from electricity that is purchased or otherwise brought into the organizational boundary.

(It is important to note that Scope 2 emissions physically occur at the facility where the electricity is generated, even though the consumption takes place within the organization's operations. Understanding Scope 2 emissions is crucial for evaluating the indirect environmental impact associated with the organization's energy use.)

4.3 **Scope 3 GHG emissions**: Scope 3 GHG emissions refer to all other indirect GHG emissions that are a consequence of the organization's activities but originate from sources not owned or controlled by the organization. This reporting category includes emissions from various external sources, such as third-party transportation providers (e.g., trucks) and waste-to-energy (WtE) operations. Scope 3 emissions can encompass a broad range of activities across the supply chain and are essential for a comprehensive understanding of the organization's broader environmental impact. Tracking and managing these emissions help identify opportunities for collaboration and improvement in sustainability practices beyond the organization's direct control.

5. GPPI Framework

5.1 The GPPI framework includes 13 indicators based on their merit, into three major objectives: Climate Change, Ecosystem Vitality, and Environmental Health. Each indicator has been chosen based on its specificity, measurability, and relevance to accurately reflect the sustainability performance of ports. The primary focus is on output-based indicators, which ensure the achievement of tangible environmental results. In scenarios where direct output measurement is challenging or impractical, relevant input parameters have been identified. However, the overall assessment is predominantly output-focused to maximize environmental impact. The list of the 13 indicators categorized into the 3 objectives along with their weightages is given in Table 1.

5.2 The values of indicators 1 to 8, and 13 shall be converted to a percentile basis which will then be multiplied by the corresponding weightage of the indicator. This standardization will harmonize parameters expressed in different units, enabling their aggregation into a composite score that can be used to rank ports objectively.

5.3 The GPPI is a dynamic framework, subject to continuous improvement and evolution. It will be progressively enhanced by incorporating additional parameters and refining methodologies as new metrics are identified and validated for inclusion.

6. Awards and Recognition

6.1 The GPPI scores will also serve as the basis for instituting a new category—'Best Port in Sustainability' under the various recognition and awards instituted under the Ministry of Ports, Shipping, and Waterways, such as the 'Sagar Ratna Awards' at the India Maritime Week, and the 'Sagar Shrestha Samman' awards for the Major Ports. All participating ports will be eligible for nomination, with recognition granted to those demonstrating exemplary performance in environmental sustainability and green port initiatives.

7. Designated Agency

7.1 The National Centre of Excellence for Green Ports and Shipping (NCoEGPS), established at TERI, New Delhi, will serve as the designated agency for data collection, validation, and GPPI calculation. As the technological arm of MoPSW, NCoEGPS provides policy, research, and cooperative support in advancing green shipping and sustainable port development.

8. Review of GPPI

8.1 Ministry of Ports, Shipping and Waterways (MoPSW) may renew/amend/modify the provisions of this GPPI, as and when required in consultation with stakeholders.

Table 1: GPPI framework with indicators across categories along with their weightages

Category	Parameter	Type	Units	Weightage within Category	Category Weightage	Net Overall Weightage
Climate change	Scope 1 GHG emissions per tonne of cargo	Output	tCO_2e	30%	70%	21%
	Scope 2 GHG emissions per tonne of cargo	Output	tCO_2e	30%		21%
	Scope 3 GHG emissions per tonne of cargo	Output	tCO_2e	30%		21%
	Energy consumption per tonne of cargo	Efficiency	kWh/tonne	10%		7%
Ecosystem vitality	Percentage of freshwater consumption (of total water consumption)	Input	%	40%	20%	8%
	Percentage of dredged material repurposed for land reclamation or construction	Input	%	10%		2%
	Percentage of green cover	Input	%	10%		2%
	Percentage of sewage treated on site	Input	%	40%		8%
Environmental health	Air quality (SO_x, NO_x, PM_{10}, $PM_{2.5}$, O_3, Pb, CO, NH_3, benzene, benzopyrene, As, Ni, etc.)	Output	Binary (0 or 1 based on environmental compliance report to CPCB)	15%	10%	1.5%
	Harbour water quality (pH, dissolved O_2, faecal coliform, BOD, COD, Hg, Pb, temp, TDS, conductivity, nitrate, turbidity, Salinity, etc.)	Output		15%		1.5%
	Noise level (LA_{eq} continuous noise level, LA_{max} noise level, noise level DG set)	Output		15%		1.5%
	Effluent discharge (STP) (pH, COD, BOD, TSS, nitrate, NH_3, Fecal coliform, etc.)	Output		15%		1.5%
	Percentage of monitors installed (CAAQMS, OCEMS, CMWQMS, noise monitors)	Input	%	40%		4%
			Total		**100%**	**100%**

9. Calculation Methodology

9.1 Scope 1 emissions per tonne of cargo

Scope 1 components	
Direct emissions arising from owned or controlled stationary sources (cranes, DG sets, cargo-handling equipment) that use fossil fuels and/or emit fugitive emissions)	Fuels
	Refrigerants
Direct emissions from owned or controlled mobile sources (cars, trucks, forklifts, tugs, and other port crafts)	Passenger vehicles
	Delivery vehicles
	Harbour vessels

$$\frac{[(Fuel_1 \times EF_1) + (Fuel_2 \times EF_2) + \ldots (Fuel_n \times EF_n) + (Refrigerants \times EF_r) + (WtE \times EF_w)]}{\text{Total cargo handled in tonne}}$$

Where Fuel is measured in litres & EF is fuel or refrigerant-specific emission factor in CO_2 eq per litre

WtE: Waste used for generating energy

EF_w is the emission factor of the waste used for generating energy

9.2 Scope 2 emissions per tonne of cargo

Scope 2 components	
Location-based emissions from the generation of purchased electricity	Electricity
	Electricity for EVs

$$\frac{\text{Conventional Power used or purchased in kWh} \times EF_p}{\text{(Total cargo handled in tonnes)}}$$

Where EF_p is the emission factor of the electricity generation depending upon grid mix/mode of generation in CO_2 eq per kWh

Note: Different sources of conventional power have different EF. Ports to provide the breakup. If unavailable, an average emission factor will be considered.

9.3 Scope 3 emissions per tonne of cargo

Scope 3 components	
Fuel- and energy-related activities	Fuel consumed by vessels while in port alongside
	Fuel consumed by trucks while in port
Waste generated in operations	Waste (disposed to municipal corporation or landfill within or outside port)

$[(Fuel_1 \times EF_1) + (Fuel_2 \times EF_2) + \ldots (Fuel_n \times EF_n) + (\text{Waste disposed} \times EF_w)]$
(Total cargo handled in tonnes)

Where fuels burnt by vessels is in port in cubic metres (m^3) and EF is fuel-specific emission factor in CO_2 eq per m^3.

9.4 Energy consumption per tonne of cargo

[Total fuels consumed (converted to kWh) + Total electricity consumed (purchased + self-produced) in kWh]
(Total cargo handled in tonnes)

Note: Different fuels have different conversion factors to $k_w h$. Ports to provide the breakup of sources of conventional power.

9.5 Percentage freshwater consumption (of total water consumption)

Freshwater taken from municipal corporation, rivers, lakes,in m^3	×100
Total water consumed from all sources including recycled or treated wastewater in m^3	

9.6 Percentage of dredged material repurposed for land reclamation or construction

9.7 Percentage green cover:

Area under green vegetation (acres)	×100
Total land area owned by the port (acres)	

9.8 Percentage sewage treated on site:

Sewage treated within port (m^3)	×100
Sewage generated in port (m^3)	

9.9 Air quality (SO_x, NO_x, PM_{10}, $PM_{2.5}$, O_3, Pb, CO, NH_3, benzene, benzopyrene, As, Ni, etc.)

Scoring shall be binary (0 or 1), determined by the submission of the compliance report and its formal acceptance by the CPCB or the respective SPCB.

9.10 Harbour water quality (pH, dissolved O_2, faecal coliform, BOD, COD, Hg, Pb, Temp, TDS, conductivity, nitrate, turbidity, salinity, etc.)

Scoring shall be binary (0 or 1), determined by the submission of the compliance report and its formal acceptance by the Central Pollution Control Board (CPCB) or the respective State Pollution Control Board (SPCB).

9.11 Noise level (LA_{eq} continuous noise level, LA_{max} noise level, Noise level DG set)

Scoring shall be binary (0 or 1), determined by the submission of the compliance report and its formal acceptance by the CPCB or the respective SPCB.

9.12 Effluent discharge (STP) (pH, COD, BOD, TSS, Nitrate, NH_3, faecal coliform, etc.)

Scoring shall be binary (0 or 1), determined by the submission of the compliance report and its formal acceptance by the CPCB or the respective SPCB.

9.13 Percentage of continuous real-time monitoring systems installed vis-à-vis the required number:

No.of CAAQMS, OCEMS, CMWQMS and Noise monitors installed (calibrated and approved)	×100
No.of required CAAQMS, OCEMS, CMWQMS and noise monitors as per guidelines	

10. List of Abbreviations

GHG	Greenhouse gas
WtE	Waste-to-energy
tCO_2e	Tonne of carbon dioxide equivalent
kWh	Kilowatt-hour
EF	Emission factor
CAAQMS	Continuous ambient air quality monitoring system
OCEMS	Online continuous emission monitoring system
CMWQMS	Continuous marine water quality monitoring system
STP	Sewage treatment plant
COD	Chemical oxygen demand
BOD	Biological oxygen demand
TSS	Total suspended solids
NH_3	Ammonia
LA_{eq}	Equivalent continuous noise level
LA_{max}	Maximum noise level
DG	Diesel generator
O_2	Oxygen
Hg	Mercury
Pb	Lead
As	Arsenic
Ni	Nickel
TDS	Total dissolved solids
SO_x	Sulphur oxides
NO_x	Nitrogen oxides
PM_{10}	Particulate matter ≤10 micrometres

$PM_{2.5}$	Particulate matter ≤2.5 micrometres
O_3	Ozone
CO	Carbon monoxide
MC	Municipal corporation

Summary

The Green Port Performance Index (GPPI) represents a pioneering effort by the Ministry of Ports, Shipping and Waterways (MoPSW) to objectively assess and promote environmental sustainability across Indian ports. By integrating measurable indicators under Climate Change, Environmental Health, and Ecosystem Vitality, the GPPI serves as a benchmark for evaluating ports' decarbonization progress. It enables data-driven decision-making, helping ports identify emission hotspots, monitor their environmental footprint, and align with India's national targets for net-zero emissions by 2070. The framework encourages continuous improvement, innovation, and adoption of global best practices. Through recognition and awards, it also motivates ports to invest in green technologies and operational efficiency. As India positions itself as a leader in sustainable maritime development, the GPPI provides the foundation for transparent, comparable, and forward-looking assessments that accelerate the nation's green transition in port operations.

NCoEGPS
National Centre of Excellence in Green Ports & Shipping

सत्यमेव जयते
Ministry of Ports, Shipping & Waterways
Government of India

SAGARMALA
PORT-LED PROSPERITY