ECO SLC Sustainability Report 2024

Ports and terminals
moving towards sustainability

ECO SLC
Sustainable Logistics Chain

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Content

EXECUTIVE SUMMARY

Ports, terminals and transport & logistics companies in transition

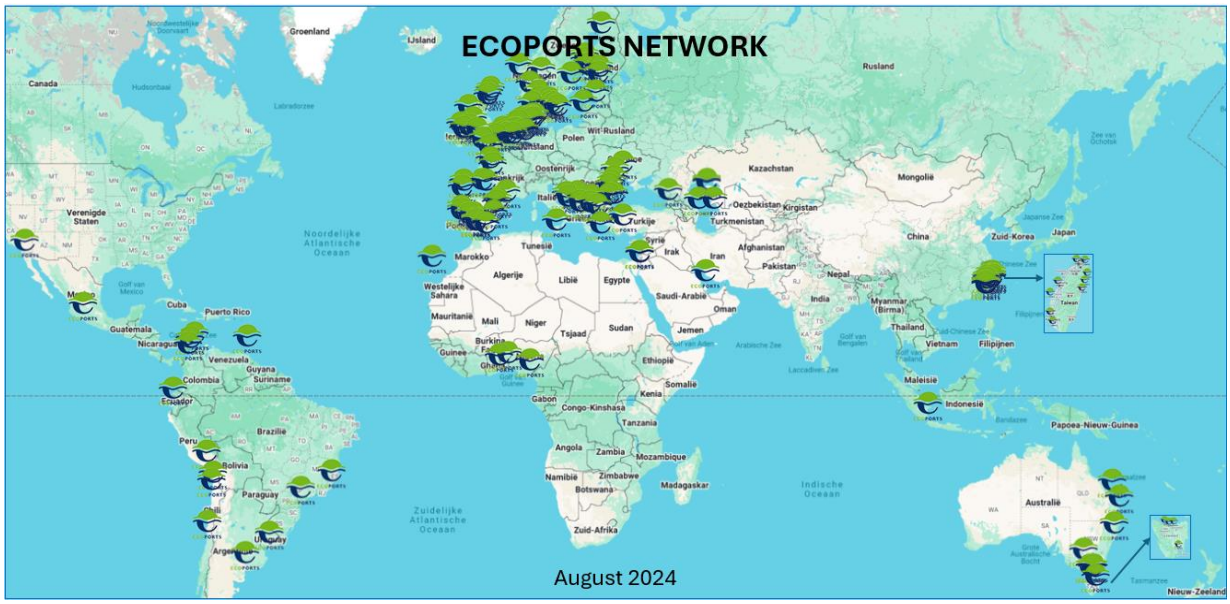
- Ports, terminals and transport & logistics companies are currently in transition towards new sustainable, future-proof business models.
- They face new risks but also new opportunities that are now leading to a change in their strategy with regard to sustainability and long-term continuity of their operations.
- For example, their stakeholders play an increasingly important role in this respect, e.g. financiers (such as governments), insurers and pension funds. These stakeholders impose their own requirements on ports in order to keep their capital risks manageable.
- There are other risks resulting from climate change that could affect the continuity of functioning of ports.

EcoPorts

- EcoPorts is a globally recognised management system for ports and terminals for environment and sustainability as well as economics.
- EcoPorts certification requires ports to be continuously aware of new laws and regulations on the environment and sustainability, as well as international agreements on these such as on climate, and also to act accordingly in practice.
- Their continuous improvement is a requirement to be demonstrated at re-certification with examples of how this has been implemented in practice, for example by indicating that ports which are introducing EcoPorts, are aware of new practical applications that have been successfully introduced or adopted by leading ports and introduce solutions themselves.
- ECOSLC's analysis of the application of EcoPorts in practice by ports and terminals outside Europe shows that the requirement for continuous improvement is clearly being applied in practice, for example by introducing renewable energy in their port and logistics chains or through intensified cooperation with their stakeholders.

Key findings

- The global network of ports and terminals outside Europe which are applying the EcoPorts system in their port management, is growing.
- Ports have shown many new examples for successful practical applications of EcoPorts whilst continuously improving on their performance regarding environmental and sustainability related topics and at the same time their commercial port business.



FOREWORD

To meet the pace of change required in the port sector to address the increasing challenges of our time, a balanced and integrated approach is needed. A list of multi-faceted pressures is mounting, from shifting changes in global trade, stakeholder expectations, technological advancements, and an evolving regulatory landscape, to, of course, a the wide-ranging impacts of changing climate.

Environment is at the core of a sustainability and Environment, Social and Governance (ESG) approach – the models being increasingly adopted by the sector to create long-term value, resilience and meet investor and stakeholder expectations. Our surrounding environment underpins the unique coastal landscape within which we operate, provides the resource commodities we trade, and the resulting economic contribution.

Maintaining a healthy environment, is inherently part of achieving social sustainability – and is critical for economic viability. In the face of a changing climate, we need to understand the interaction of environmental processes more than ever to meet net zero targets, reduce biodiversity loss and mitigate pollution.

'Integrated environmental thinking' needs to underpin every decision-making process. A sustainability framework provides the crucial lens through which we view environmental considerations alongside the social and economic aspects. Increasing demands from financiers and insurers is accelerating along with higher expectations of robust sustainability frameworks and mandatory ESG reporting requirements.

When aligned with sustainable development principles, improved environmental outcomes and emission reductions are possible. Driving the uptake of renewables for example, has the potential to open new markets, diversify trade portfolios and provide renewable energy supply to make electrification of port equipment possible.

This report highlights the state of environment management of our ports and the environmental issues that are most important. Managing air quality, waste, dust, energy and addressing climate change remain in the top 5 environmental issues, which highlights the importance of considering both localised and global impacts.

Over time, the EcoPorts program has reported the top 10 environmental issues facing our industry allowing a 'sector-wide' view on the most pressing environmental issues. The multi-year results allow us to tailor our focus and understand the challenges we face collectively in the sector.

This year's report highlights the critical role for ports to work together to drive transformation.

Holding true to the 'think global, act local' approach, our collective localised actions, can build a global community of inspiration and action. As we know, ports are uniquely positioned hubs in global supply chains to drive the low carbon economy and clean energy, from our regions to the world.

The findings from this EcoSLC EcoPorts report confirm the commitment by ports to protection of the environment, as well as strengthening their role to enhance further environmental values and integration within a sustainability framework.

The continued collaborative dedication and support of EcoPorts EcoSLC and EcoPorts ESPO to the global port sector in facilitating the only international quality standard of EMS dedicated to the port sector, namely the EcoPorts PERS Certificate, is duly acknowledged. The positive impact in terms of environmental management on the global port community may be seen in their respective reports and the benchmark results act as an invaluable resource by which we can motivate action and monitor transformation within the sector.

Renée McGlashan**,**
Strategic Sustainability Leader.
North Queensland Bulk Ports Corporation,
Australia.

1. INTRODUCTION by the Chairman of ECOSLC Foundation

This is the second annual report by ECOSLC on the sustainability of environmental management performance of ports and terminals which are members of the EcoPorts Network outside Europe.

Subject, scope and aims of this report

This report provides insight into key elements of the environmental management system of ports and terminals outside Europe on the basis of their answers to the questionnaire of the Self Diagnosis Method (SDM), which forms the first step in the certification process towards achieving the EcoPorts PERS Certificate.

The scope of the report is formed by data retrieved from the SDM Questionnaires which have been submitted since 2018. In order to identify some trends in the development of the EMS in the ports and terminals concerned, data for four years have been analysed: 2018, 2020, 2023, 2024. The first publication of the results of the analysis was issued last year. This report contains the second publication.

The aim of this report is to indicate the key elements of environmental policies of ports and their implementation of it in practice. Combined with data from previous years trends can be demonstrated in the development and operation of the environmental programmes and the associated environmental management systems (EMS) that are currently being applied by port authorities and terminal operators. Results are based on baseline and benchmark performance. This takes into account compliance with international EMS quality standards, established good practices, delivery of continuous improvement and contribution to the imperative of sustainable port activities and operations.

Transition time: some trends

Major changes in the functioning of the port, transport and logistics sector indicate that a gradual transition is underway towards new organisation and business models. They force ports and terminals to adapt their strategies. Important new risks have emerged such as from climate change, cyber security, availability of sufficient personnel, new types of uncertainties in supply chains. Financing of ports and keeping earning capacity in order, need for in-depth investments with longer payback periods also require extra attention.

At the same time, the impact of the port process on the environment and sustainability must become an integral part of the port's business and investment strategy. In recent years financiers, such as pension funds, insurers and other capital investors, show a growing interest in investing in this change process in the port and transport sector. They require ports to have their house in order and the path to sustainability clear. This introduces more attention for risk management in terms of climate and environmental risks but also in terms of cybersecurity and keeping logistics chains stable. These investors and various stakeholders of ports also demand that ports continuously improve in these areas in order to make the transition successful.

For many ports the transport, storage and handling of energy carriers form the backbone of their operations. Can renewables maintain the existing earnings model?

Many ports are now exploring opportunities for knowledge sharing, financing and risk management. Commercial partnerships are emerging between ports but also between ports and their stakeholders in managing logistics chains the ports are connected with.

This leads to pooling of knowledge and innovations and reducing costs. Meanwhile, ageing in many countries leads to a reduction in availability of personnel. It leads to large investments in automation including artificial intelligence. It can also lead to new commercial activities that can provide alternative income. Examples include participating in energy generation, producing and selling alternative energy carriers, etc.

The EcoPorts environmental management system for ports and terminals

The EcoPorts management system and standard provides port management with a clear methodology for and an independent assessment of its implementation. Among other things, this provides support in shaping a sustainable port policy in terms of the environment and business. More and more ports outside Europe are showing interest in applying this methodology.

The EcoPorts Environmental Management System (EMS) was developed in the 1990s by ports in Europe for ports and terminals with support from universities and Lloyd's Register Netherlands, among others.

The EcoPorts EMS was initially introduced in Europe through a neutral independent organisation. In 2010, the neutral, independent and non-profit driven ECO Sustainable Logistics Chain Foundation (ECOSLC Foundation) was established with the support from these ports and ESPO. Its aim is to introduce the EcoPorts environmental management system in ports and terminals in countries outside Europe. ESPO decided to focus on continuity of EcoPorts in Europe from then on.

ECOSLC Foundation and ESPO work closely together in the implementation of EcoPorts in countries outside Europe and in Europe respectively, including regular joint provision of updates. In addition, ECOSLC cooperates with IAPH and its World Ports Sustainability Program. This was set up, among other things, to raise awareness of global leadership of ports worldwide. To that end WSPS takes initiatives to share their best practices contributing to the United Nations Sustainable Development Goals and empowering port community actors worldwide in engagement with their stakeholders.

The EcoPorts environmental management system and standard consists of 2 Tools: SDM and PERS (Ports Environmental Review System) plus the option of PERS Certification. See more details on page 21. By introducing SDM and achieving the EcoPorts PERS certification ports become members of the Network of EcoPorts certified Ports.

Data and information from EcoPorts Certification

The environmental self-diagnosis SDM allows a port or terminal to provide an up-to-date overview of the elements of its environmental policy and elements of its implementation in practice. SDM results remain confidential. Aggregated data provide however insight into how ports and terminals are seeking to reduce their environmental impact.
An SDM has a validity of 2 years. After 2 years, ports update this overview. The regular updates allow to demonstrate trends in the ports' continuous improvement. SDM is updated from time to time to keep up with new developments in environmental policies of international organisations and of national environmental legislation.

Ports and terminals present their current policies, policy action plan and its implementation in their confidential PERS documents and their related public environmental report. Aggregated data from this last document also contribute to updating SDM to include actual policies and practices.

Port of Bell Bay, Tasmanian Ports Corporation PTY.LTD Australia

Herman Journée
Chairman ECOSLC Foundation, Netherlands

2. RESULTS OF THE ANALYSIS

The analysis and interpretation of the environmental management performance is based on data arising from the responses of 40 ports in 23 countries outside Europe in the EcoPorts Network to the EcoPorts Self Diagnosis Method (SDM). The analysis, carried out and reported in strict confidence, indicates baseline and benchmark performance along with significant trends in terms of environmental management.

The following paragraphs include a number of tables showing data for different years of evaluation. Most of the tables show percentages of positive responses to the topic or questions concerned in the SDM questionnaire. These percentages are calculated by dividing the number of positive responses by the total responses obtained.

2.1. Environmental Management Indicators

The development and application of an effective Environmental Management System (EMS) is a fundamental requirement of any programme designed to deliver environmental protection and sustainability of port activities and operations. The key components of an EMS that make up the procedures and processes required to comply with legislation and regulation, mitigate impacts and achieve sustainability of the port's activity profile, are widely acknowledged and generally incorporated into a systematic framework that provides a coherent pathway for controlling the port's impacts on the environment.

In most EMS's a number of Environmental Management Indicators (EMI's) have been defined. The most important ones are listed in Table 1 below.

	Indicators	2018 (%)	2020 (%)	2023 (%)	2024 (%)
A	Existence of a certified Environmental Management System (EMS) – ISO, EMAS or PERS	92	100	94	95
B	Existence of an Environmental Policy	100	100	100	100
C	Environmental Policy makes reference to international and/or national port environmental policy guidelines	75	84	76	78
D	Existence of an inventory of relevant environmental legislation	100	100	100	100
E	Existence of an inventory of Significant Environmental Aspects (SEA)	100	100	97	100
F	Definition of objectives for environmental improvement	92	95	91	98
G	Existence of an environmental training program for port employees	100	100	100	98
H	Existence of an environmental monitoring program	100	100	100	100
I	Environmental responsibilities of key personnel are documented	100	100	100	100
J	Publication of a publicly available environmental report	100	95	79	83

Table 1. The percentage of positive responses to the main management indicators

Both the baseline data and subsequent trends are positive in terms of declared adoption and practice. The Environmental Policy (B) itself may be described as the primary requirement and the most significant strength because the policy statement drives the whole environmental management programme and the associated Environmental Management System (EMS). It is the lead statement in terms of identifying priorities, highlighting issues, and developing objectives and action plans.

Accessibility to, and promotion of the EMS of a port or terminal to the wide range of stakeholders is important in terms of forming mutually advantageous partnerships and in encouraging collaboration between interested parties ranging from international conglomerates to local communities. It is also a measure of transparency and a willingness to communicate the port's strategic objectives. Hence, the importance of the Policy being available online.

Table 2 below shows that most of the ports included in the analysis are communicating their environmental policy to relevant stakeholders. After a slight dip last year the percentage for this year comes close to 100% again.

2018 (%)	2020 (%)	2023 (%)	2024 (%)
100	100	94	98

Table 2. Communication of environmental policy to relevant stakeholders

In Table 3 below the percentage of ports is shown which post their environmental policy online. Except for the year 2023 the figures are similar to those in table 2. The difference in 2023 may be caused by an inconsistent response by some ports to the questions concerned in the SDM questionnaire.

2018 (%)	2020 (%)	2023 (%)	2024 (%)
100	100	100	98

Table 3. Availability of ports' environmental policy online

The existence of Environmental of Inventories of Legislation (D) and Significant Environmental Aspects (SEA) (E) feature well along with that of Environmental Monitoring which is essential for tracking trends of environmental quality and confirming achievement of targets.

The definition of objectives (F) and provision of training (G) are becoming more established, and certification to a recognized international quality Standard of EMS is sustained.

There are three main internationally recognized standards of Environmental Management System (EMS):

- EcoPorts' Port Environmental Review System (PERS)
- ISO 14001
- Eco-Management and Audit Scheme (EMAS).

Table 4 below shows the distribution among certified ports regarding the environmental standards to which the ports considered in the analysis are certified. In total 71% of the ports are already EcoPorts PERS certified, whilst about 50% of these ports are also ISO 14001 certified.

EMS Certificate	2024 (%)
ISO 14001	29,0
EcoPorts' PERS	36,8
ISO 14001 & EcoPorts' PERS	34,2

Table 4. Breakdown of EMS Certificates by standard.

Port Associations and Organizations, worldwide, recommend that ports and terminals produce a periodic, Environmental Report (J) and/or incorporate information on progress in environmental management into its Annual (Business) report, or equivalent document. Port Authorities are increasingly incorporating

Environment Management into Sustainability Reports. As a port develops its EMS, so it tends to produce annual reports. A well-structured EMS is rapidly becoming well-established across the sector.

Overall performance of key Environmental Management Indicators:

The **Environmental Management Index (EMI)** is a comprehensive metric developed specifically as part of the EcoPorts evaluation process that calculates the overall environmental performance of a port by aggregating the ten environmental indicators presented in Table 1. Each indicator is weighted according to its significance for environmental management.

The EMI is calculated by multiplying the weighting of each indicator with the percentage of positive responses. The final score is derived using the following formula:

Environmental Management Index = A*1,5 + B*1,25 + C*0,75 + D*1 + E*1 + F*1 + G*0,75 + H*1 + I*1 + J*0,75.

The numerical value of each letter represents the percentage of positive responses divided by 100.

The EMI reflects the aggregate score of the environmental performance of ports, taking into account the varying importance of different aspects of environmental management. Table 5 illustrates the evolution of the EMI since 2018.

	2018	2020	2023	2024
Environmental Management Index	9,61	9,79	9,45	9,6

Table 5. Trends of the EMI

The Index is obviously influenced by the number and characteristics of participant ports. Nevertheless, the trends show sustained high performance in terms of application and practice of the key components of EMS. It may be considered reasonable to suggest that ports now joining the network are benefitting from the innovative, progressive and continuously improving good practices set by those ports that initiated such programmes as EcoPorts. The sharing of knowledge and experience throughout the sector via collaborative projects, conferences, stakeholder involvement and training schemes assist in establishing frameworks of EMS as major attributes in achieving sustainability.

Mailiao Industrial Harbor/Mailiao Harbor Administration Corp. Taiwan

Further widening of the scope of port environmental policy

The extent of a Port's Environmental Policy has expanded significantly over recent years as global perspectives, cross-boundary considerations and multi-stakeholder involvement as well as local, site-specific circumstances require the port's EMS to cover an ever-increasing range of concerns. Acknowledgement and increasing awareness of the benefits of an integrated approach to the pursuance of sustainability has led to the ever-increasing number of ports adopting Environment, Social and Governance (ESG) as a common focus for sustainability efforts within the business plan.

Emerging Environmental factors such as the port's and its stakeholder's contributions to reducing greenhouse gas emissions, as well as actions in areas such as waste management and energy efficiency are obviously key considerations in terms of environmental quality including habitat and species protection. By the same token, social factors include human rights, labour standards in the supply chain, and compliance with workplace health and safety rules are closely related. Completing the framework approach is that of governance which refers to a set of rules or principles that define the rights, responsibilities and expectations between different stakeholders in the management of companies. They can be used to balance or align interests between stakeholders and serve as a tool to support a port's on-going environmental management strategy.

Closely linked with the above are the Sustainable Development Goals (SDGs), also known as the Global Goals which were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The 17 SDGs are integrated—they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability. Member ports of the EcoSLC EcoPorts Network recognize the importance of the goals in achieving sustainable commercial and business activities by increasingly referencing to the relevant SDG's in the Environmental Reports and on their websites. See also Table 6 below. Note the priority given to human aspects (5, 6, and 7). It will be interesting to see the trends with time in future reports. Ships trade world-wide, port authorities in one continent advise or operate in partnerships with those in another, and socio-economic considerations are so closely linked in the pathway to sustainability.

Goal	Indicator	2024 (%)
1	No Poverty	**35**
2	Zero Hunger.	**29**
3	Good Health and Well-being	**59**
4	Quality Education	**41**
5	Gender Equality	**71**
6	Clean Water and Sanitation	**71**
7	Affordable and Clean Energy	**71**
8	Decent Work and Economic Growth	**47**
9	Industry, Innovation, and Infrastructure	**59**
10	Reduced Inequality	**59**
11	Sustainable Cities and Communities	**53**
12	Responsible Consumption and Production	**65**
13	Climate Action	**65**
14	Life Below Water	**59**
15	Life on Land	**53**
16	Peace and Justice Strong Institutions	**53**
17	Partnerships to achieve the Goal	**53**

Table 6. Policy reference to UN Sustainable Development Goals

2.2. Environmental monitoring indicators

Monitoring environmental parameters enables ports to evaluate their environmental performance over time because it is difficult to manage that which is not measured. By collecting and analysing data, ports can assess the effectiveness of their environmental management practices, track progress towards sustainability goals, and identify areas for improvement. Regular monitoring provides a basis for evidence-based decision-making and supports the development of targeted strategies for enhancing environmental performance.

Baseline performance in the initial year sets the datum from which progress can be assessed whilst benchmark performance may indicate achievement of targets or compliance with legislation, regulation or quality standards. As will be shown in chapter 3, environmental priorities may change with time depending on a wide range of influences. Nevertheless, an established monitoring programme set within an established EMS framework that allows flexibility and adaptation to changing circumstances can provide, and importantly, demonstrate, the achievement of targets, quality of environment and compliance with legislation. All of which may be considered fundamental to the achievement and maintenance of sustainability.

In most EMS's a number of environmental monitoring indicators have been defined. The most important ones are listed in Table 7 below.

Priority	Indicators	2018 (%)	2020 (%)	2023 (%)	2024 (%)
1	**Air quality**	100	100	97	98
2	**Port waste**	100	100	100	95
3	**Water consumption**	100	95	94	95
4	**Water quality**	100	100	97	93
5	**Noise**	100	100	88	93
6	**Energy efficiency**	100	89	88	90
7	**Sediment quality**	100	84	79	73
8	**Carbon Footprint**	67	68	73	73
9	**Ship waste**	91	84	85	73
10	**Waste recycling**	91	100	85	73
11	**Marine ecosystems**	75	74	76	63
12	**Soil quality**	67	68	67	63
13	**Terrestrial habitats**	58	63	58	55

Table 7. Percentage of positive responses to environmental monitoring indicators

The order of priority monitoring activities *per se* has remained relatively consistent since the survey was initiated in 2018. Air quality (Ranked 1st) is obviously closely related to both climate change and port operations, whilst port waste is both an environmental and economic consideration. Again, water consumption (3rd) may be significant for both industry and communities, along with noise (5th) and energy efficiency (6th). As with other EMS procedures, it will be interesting to see future trends with perhaps more positive efforts in terms of marine ecosystems, soil quality and terrestrial habitats (11, 12 and 13 respectively).

The EcoSLC network of EcoPorts members covers an extremely wide range of global, geographical locations and types of port. Nevertheless, it may be seen as something of an anomaly that apparently fewer ports are experiencing operational changes due to climate change (see Table 8 below). It may be a fact that local conditions have not changed or that degrees of awareness, lack of evidence-based impact, and perceived priorities may perhaps account for the current responses. The number of ports reporting such related impacts may well be expected to rise again in future surveys.

2018 (%)	2020 (%)	2023 (%)	2024 (%)
58	42	45	30

Table 8. Percentage of ports experiencing operational challenges related to climate change

A similar downward trend in positive responses applies to the number of ports apparently adapting their infrastructure in order to increase resilience as shown in Table 9 below:

2018 (%)	2020 (%)	2023 (%)	2024 (%)
75	68	58	58

Table 9. Percentage of ports adapting existing infrastructure to increase resilience

The explanation may indeed be that no discernible impact has arisen from climate change, there is no significant influence to date, or that resources and strategic plans have not yet been committed. It is another indicator that may change with time if global effects of climate change materialise more profoundly.

Even when it comes to considerations of climate change on new infrastructure, member ports are not showing any marked increase in making provisions for such events as shown in Table 10:

2018 (%)	2020 (%)	2023 (%)	2024 (%)
75	74	70	73

Table 10. Percentage of ports considering climate adaptation for new infrastructure

The local characteristics of geography and hydrography, stage of development, commercial profile and resources available may all be factors affecting port plans.

In the SDM Questionnaire ports are asked to identify their major concerns about actual and potential impacts of climate change. The process of compiling such a response raises awareness of priority issues and may assist in the development and operation of the environmental management and sustainability programmes accordingly. As with all other aspects, local, site-specific circumstances and characteristics may well be the dominant considerations.

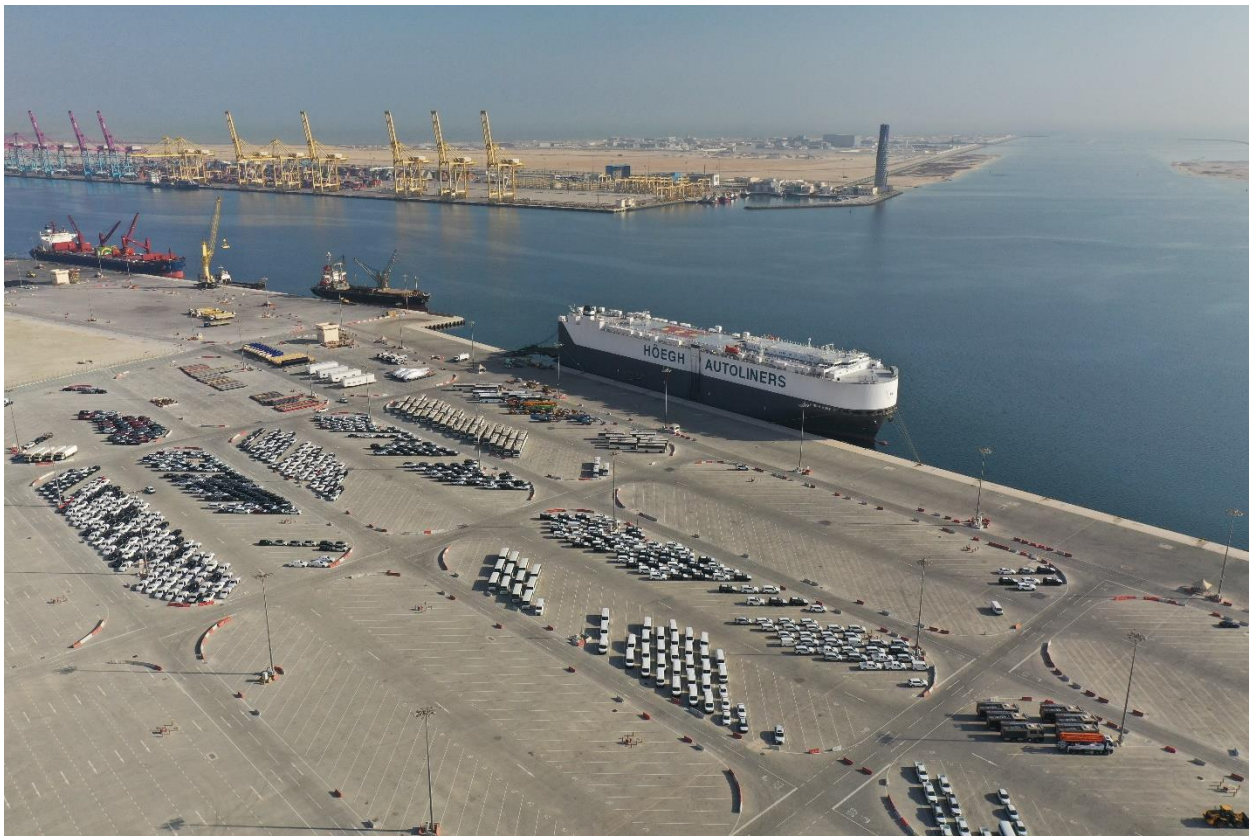
In Table 11 the subjects of main concern about actual and potential impacts of climate change are listed, in order of the rating level.

Indicator	2024 (%)
Damage to marine ecosystems	82
Localised flooding	76
Sea-level rise	76
Damage to infrastructure	71
Drought	65

Coastal erosion	65
Fires	59
Water supply	59
Biodiversity loss	59
Changes in hydrography (including currents)	59
Disease and pests	41
Heat waves/stress	35
Saltwater intrusion	29
Acidification	29
Fisheries failing	24
Coral reef bleaching	12

Table 11. Major concerns from the impact of climate change

It is interesting to note that the highest rated indicator is that of damage to marine ecosystems (82%) which is a genuine concern for environmental quality *per se.* This is followed closely by localised flooding and sea-level rise (both 76%) and damage to infrastructure (71%) which is very much an operational and commercial matter. Again, perceived concerns will vary between ports given their unique circumstances, but the list flags awareness and levels of unease of a wide segment of the sector.



Hamad Port, Qatar

2.3. Top 10 Environmental priorities

The priority list of the major environmental issues is significant for the sector, individual ports, stakeholders and society at large. Identification of important concerns and problems focusses attention, resources and response options for a range of organizations and personnel ranging from legislators to quay-side managers, chain operators to community representatives, and many more from the wide range of stakeholders involved in port activities and operations.

In Table 12 below the Top-10 environmental priorities marked by the ports and terminals participating in the analysis are shown for the four years being analysed.

	2018	2020	2023	2024
1	Air quality	Air quality	Air quality	Air quality
2	Dust	Dust	Garbage/port waste	Garbage/port waste
3	Garbage/Port waste	Climate change	Dust	Dust
4	Energy consumption	Garbage/Port waste	Climate change	Energy consumption
5	Hazardous cargo	Local community	Energy consumption	Climate change
6	Local community	Energy consumption	Water quality	Water quality
7	Climate change	Ship exhausts	Local community	Local community
8	Water quality	Hazardous cargo	Cargo spillage	Cargo spillage
9	Port development Land	Cargo spillage	Hazardous cargo	Noise
10	Port development Water	Water quality	Noise	Hazardous cargo

Table 12. Top 10 Environmental priorities for Members of EcoSLC Network outside Europe

The table shows some consistency (e.g. Air quality) and also change of priority order with time. New issues arise and some topics apparently fall in significance. For the sector, it demonstrates common challenges and scope for collaboration to deal with widespread impacts through partnerships and exchange of knowledge and information. For the individual port it provides focus for the development of appropriate action plans and efficient application of resources to deal with the impacts. Air quality and dust figure strongly and are associated very much with local working and community conditions. Climate change is a wider scale recognition though, of course, it may have profound impacts locally in the present and in the longer term.

It may be deemed a positive indicator that considerations of Local community concerns are consistently in the list. This is mirrored in many Environmental/sustainability Reports where environmental and societal issues are incorporated into the business plan along with reference to training schemes, Open-Days, school activities, monitoring by student groups, community conservation projects and established procedures for complaints and emergency response programmes.

Port of Paranaguá, Brazil

2.4. Green services to shipping

As central nodes in the transport system located at the critical land:sea interface, ports are well-placed to influence the environmental performance of operators and tenants by offering a variety of incentives to minimize the impacts of a range of activities and procedures through reducing maritime emissions of greenhouse gasses and pollutants. The steadily evolving encouragement and facilitation of green services is helping to deliver cleaner and more efficient shipping which in itself is bringing local benefits in terms of air quality, energy consumption and noise, and also contributes to the broader decarbonization of the maritime sector itself.

As with other data in this report, the results of EcoPorts Network of ports outside Europe are derived from their responses to the Green Services to Shipping section of the Self-Diagnosis Methodology (SDM) reported in the following categories:

i) **Onshore Power Supply (OPS):** this service allows ships to connect to shore-based electricity while docked, reducing their reliance on onboard generators and minimizing emissions in the port area. OPS is an essential component in promoting energy efficiency and reducing air pollution from ships.

   OPS offers a significant opportunity for reducing the environmental impact of maritime operations by allowing ships to connect to the electricity grid while docked. This practice enables vessels to power down their auxiliary engines, leading to a reduction in exhaust emissions, particulate matter, noise pollution, and vibrations. The effectiveness of OPS in mitigating these pollutants is well-recognized, but to maximize its environmental benefits, the electricity used must primarily come from renewable sources such as solar and wind power. Both solar and wind energy are crucial, as solar power provides a reliable source during daylight hours, while wind power offers substantial potential for generating clean energy, especially in coastal areas. Emphasizing the use of both solar and wind resources can significantly enhance the overall environmental impact of OPS.

   In Table 13 on the next page a list of OPS related questions in the SDM Questionnaire is shown. It is remarkable to see that the percentage of positive responses on the first question (availability of OPS on one or more berths) is declining over the years. This could however be caused by a lower number of ports included in the 2018 data than in the scope of the following years.

Another observation is that the percentage of ports confirming the planning of OPS facilities in the next two year remains fairly stable.

Indicator	2018 (%)	2020 (%)	2023 (%)	2024 (%)
Is Onshore Power Supply (OPS) available at one or more berths?	83	63	55	55
If yes, what type of OPS is available?				
High voltage*	70	50	56	32
Low voltage*	70	83	78	82
If YES, is OPS provided through:				
By fixed installation*	100	100	100	100
By mobile installation*	20	8	17	14
Does the port plan to offer OPS during the next two years?	33	32	39	35
If NO, Has the port faced any technical challenges with regard to **:				
Unavailable or insufficient grid infrastructure in or surrounding the port	--	--	--	35
Issue with frequency conversion due to the OPS onboard the vessel(s) using a different frequency than what is available on the national grid	--	--	--	30
Insufficient or unavailable grid capacity	--	--	--	23

Table 13. Percentage of positive responses to Onshore Power Supply (OPS) indicators

* The percentages of these indicators are calculated on the basis of the number on ports offering OPS, not on the total number of ports considered in the analysis.

** Data are only available for the year 2024 as this question was not included in earlier versions of the SDM Questionnaire.

ii) **Liquefied Natural Gas (LNG) Bunkering Facilities:** ports providing LNG bunkering facilities support the use of cleaner alternative fuels for ships. LNG has a lower carbon footprint compared to traditional marine fuels, contributing to reductions in greenhouse gas emissions and air pollutants.

In some parts of the sector, the provision of **LNG** bunkering in ports is already seen by many as being crucial for advancing the decarbonization of the shipping industry. LNG is recognized as a cleaner alternative to traditional marine fuels, contributing to reduced greenhouse gas (GHG) emissions and enhanced environmental sustainability. The increasing availability of LNG bunkering facilities in European ports (As of 2024, 48% of surveyed ports offer LNG bunkering, up from 22% in 2016) underscores the sector's commitment to building the necessary infrastructure to support this transition. To date, member ports outside Europe show no uptake but 5% indicate plans exist for the development of LNG bunkering facilities during the next two years. See also Table 14 below.

Indicator	2018 (%)	2020 (%)	2023 (%)	2024 (%)
Is Liquefied Natural Gas (LNG) bunkering available in the port today?	0	0	0	0
If YES, how is LNG bunkered in the port?				
By non-mobile installation*	0	0	0	0

By truck*	0	0	0	0
By barge*	0	0	0	0
Are there currently ongoing LNG bunkering infrastructure projects in the port?	0	5	3	0
Do plans exist for the development of LNG bunkering facilities during the next two years?	0	11	9	5
If NO, Are there any projects under development for infrastructure of other clean fuels?				
Hydrogen	--	--	--	15
Ammonia	--	--	--	15
Biofuels	--	--	--	13
Synthetic fuels	--	--	--	10
Methanol/methane	--	--	--	3

Table 14. Percentage of positive responses to Liquefied Natural Gas (LNG) indicators

* The percentages of these indicators are calculated on the basis of the number on ports offering LNG bunkering, not on the total number of ports considered in the analysis.

iii) **Environmentally Differentiated Port Fees:** these fees incentivize ships to exceed regulatory standards for environmental performance. By offering reduced fees or other financial benefits to vessels that implement advanced green technologies or practices, ports encourage the adoption of sustainable shipping practices.

As shown in Table 15 below, results for 2024 indicate that there is a growing trend to promote sustainable practices through **environmentally differentiated fees** for "green" ships that exceed regulatory standards. These schemes incentivize shipping companies to adopt environmentally friendly technologies and practices by offering reductions on port infrastructure charges. This approach aims to encourage the reduction of emissions, the use of cleaner fuels, energy-efficient technologies, and effective waste management.

Indicator	2018 (%)	2020 (%)	2023 (%)	2024 (%)
Does the port offer differentiated dues for "Greener vessels"?	8	11	6	13
If YES, Does the incentive scheme take into account the following?				
Waste management/segregation*	0	0	50	0
Air emissions (NO_x, SO_x, PM) reduction*	100	100	100	80
GHG emissions reduction*	100	50	50	40
Noise reduction*	0	0	50	20
Environmental certification*	0	0	50	40
Ships with wind assisted*	0	0	0	0
Does the port plan to introduce environmentally differentiated port dues during the next two years?	8	11	21	28

Table 15. Percentage of positive responses to Differentiated dues for "Greener vessels"

* The percentages of the different alternatives are calculated on the basis of the number on ports offering differentiated dues for 'Greener Vessels', not on the total number of ports considered in the analysis.

2.5. Clean fuels for cars and trucks

There is growing recognition of the opportunities to manage air quality and type of energy consumption by making clean fuels for cars and trucks available within the port area. This option highlights the influential role of ports in facilitating the transition to cleaner transport options not only for maritime activities but also for land-based vehicles and other machinery. The data for 2024 provides insight into the current state of infrastructure supporting electric vehicles at ports. 30% of respondents had electricity charging for cars and/or trucks available at the port. Although no availability of hydrogen was reported, there are a range of projects under development for infrastructure of clean fuels including hydrogen (See Table 16).

Indicator	2024 (%)
Is electricity charging for cars and/or trucks available at the port?	30
Is hydrogen fueling for trucks available at the port?	0

Table 16. Percentage of positive responses to clean fuels for cars and trucks

Port Autonome de Cotonou, Benin

2.6. Continuous improvement and sustainability

As part of the SDM process, port authorities are asked to confirm whether or not that the Port's/Terminal's Environmental Policy includes reference to Continual improvement? Across the EcoSLC Network the response is positive which is acknowledged as a strength in the port's periodic review, and it should be noted that it is a requirement of PERS (ISO 14001 and EMAS). For port authorities with a pro-active approach to EMS and associated management programmes, it is a natural transition and enhancement to integrate the strategy of continuous improvement with the objectives of sustainable development. Continuous improvement and sustainability are key concepts in terms of effective forward-planning, and both elements require action plans for effective and demonstrable implementation and attainment. Documentation compiled as part of the Port's certification or re-certification to EcoPorts PERS is required to include statements and evidence that demonstrate aspects of continuous improvement of its environmental programme.

As stated previously, stakeholder trends indicate that a Port's/Terminal's activities and operations, and those of the associated logistics supply chains are increasingly assessed in terms of environmental, ethical, governance and social impacts. With the growing focus on climate change and overall environmental quality, it is no surprise that sustainability now warrants a key position at the heart of business operations. Investors expect businesses to demonstrate a focus on sustainability, and to be mindful of the U.N. Sustainable Development Goals (SDGs). Adopting and implementing a sustainable action strategy as part of the continuous improvement program can lead to business benefits including cost savings and enhanced reputation that in turn may assist with compliance, attracting investors, reducing waste, improving stakeholder and identifying supply chain requirements. The Network Membership is generally working from a well-established baseline in terms of formulating appropriate policies and plans to achieve sustainable development as part of its continuous improvement program.

A major component of sustainability is materiality which means that the port has processes and procedures in place to identify the major Environmental, Social and Governance issues (ESG) significant to their business and operational programme, and therefore determine which factors could lead to negative consequences requiring effective monitoring, control and reporting. Dealt with in a transparent manner, the port or Terminal can formulate strategies that will demonstrate the key requirements of compliance, continuous improvement, and sustainability.

Sustainability is now widely recognized as a business opportunity. While financial profit is a key objective for any business and necessary for survival, a broader focus on people and environment is required for long-term resilience and prosperity. Disclosure of non-financial performance, including Environment, Social and Governance (ESG) factors, are increasingly being required by investors and becoming a mandatory requirement for many companies. Evidence suggests that the most pro-active ports reference UN Sustainable Development Goals (SDG) and report environmental management within this context.

The new indicators for 2024 shown in Table 17 below establish a positive baseline from which future trends may be assessed.

Indicator	2024 (%)
Has the port undertaken a materiality assessment to identify its material environmental issues?	76
Does the Environment Policy of the port consider Environmental Sustainability issues?	76
Has the port undertaken a climate change risk/opportunity assessment?	65

Table 17. Percentage of positive responses to objective of sustainability

3. THE ECOPORTS ENVIRONMENTAL MANAGEMENT SYSTEM FOR PORTS AND TERMINALS

3.1. SDM

The SDM (Self Diagnosis Method) was originally developed as part of an E.C. project some twenty-five years ago by port professionals in collaboration with academics and industry specialists, and designed as a checklist of components that may reasonably be expected in a good practice example of an effective and practicable Environmental Management system (EMS). Its approach incorporates the 'Precautionary Principle', and seeks to assist the Port Authority, Corporation or Terminal Operator to demonstrate that it has 'taken all reasonable steps' in order to comply with its environmental liabilities and responsibilities, and it also contributes to the implementation of risk prevention policy. The method has undergone periodic updating and modification in line with changes in legislation, perceived priorities, and the ever more demanding expectations of the widening group of interested stakeholders along with the demands for sustainability.

3.2. PERS

The SDM was also specifically designed to provide guidelines and recommendations for Port Authorities and Terminal Operators that wish to achieve the International Quality Standard of EMS, EcoPorts PERS (Port Environmental Review System) through a phased, step-by-step approach. PERS remains the only quality standard of EMS dedicated to the port sector. Representatives from major insurance companies state that a port's environmental performance and especially its risk prevention policy is "factored-in" to calculations of premiums; and that standards such as PERS are recognized components of a responsible approach. Such certification may also be a condition for funding to assist port/terminal development.

Port of Newcastle, Australia

The SDM/PERS tool and standard is recognized by:

- American Association of Port Authorities (AAPA.
- African Ports Association Arab Sea Ports Federation
- European Sea ports Organization (ESPO).
- InterAmerican Committee for Ports (Organization of the American States)
- International Association of Ports and Harbours (IAPH)
- Taiwan Ports International Corporation (TIPC)
- United Nations Environment Programme (UNEP).
- World Bank (European Investment Bank, and European Bank for Reconstruction & Development)
- World Ports Sustainability Program (WPSP).

For the purposes of this report the EcoPorts SDM Review and PERS Certification process, Environmental Management is defined as the functional organization necessary to deliver environmental protection and sustainable development to the highest possible standards of compliance and accountability, and thereby assisting authorities and operators to control or mitigate impacts arising from their activities, services and products.

The SDM itself is an integral part of the PERS certification process. As part of the procedure, Authorities and Operators applying for initial certification or periodic re-certification receive a comprehensive review of the current status of their EMS based on an analysis of their declared responses to the SDM questionnaire.

As noted above, the SDM review is configured to assist ports and terminals with a staged development of EMS on a step-by-step basis, and the SWOT analysis (Strengths, Weaknesses, Opportunities and Threats) of its declared provisions and procedures of its Environmental Management Programme is configured to give guidance and advice as to what steps the port/terminal may take in order to achieve, or maintain, the international standard of EMS recognition that is PERS. The GAP analysis indicates the Port's performance relative to the criteria specified by relevant international standards of EMS, and thus the port's responses are examined and compared with the EcoPorts Port Environmental Review System (PERS), ISO 14001 (2015) and the EU Eco Management and Audit Scheme (EMAS).

Port of PT Krakatau Bandar Samudera, Indonesia

4. ECOPORTS NETWORK

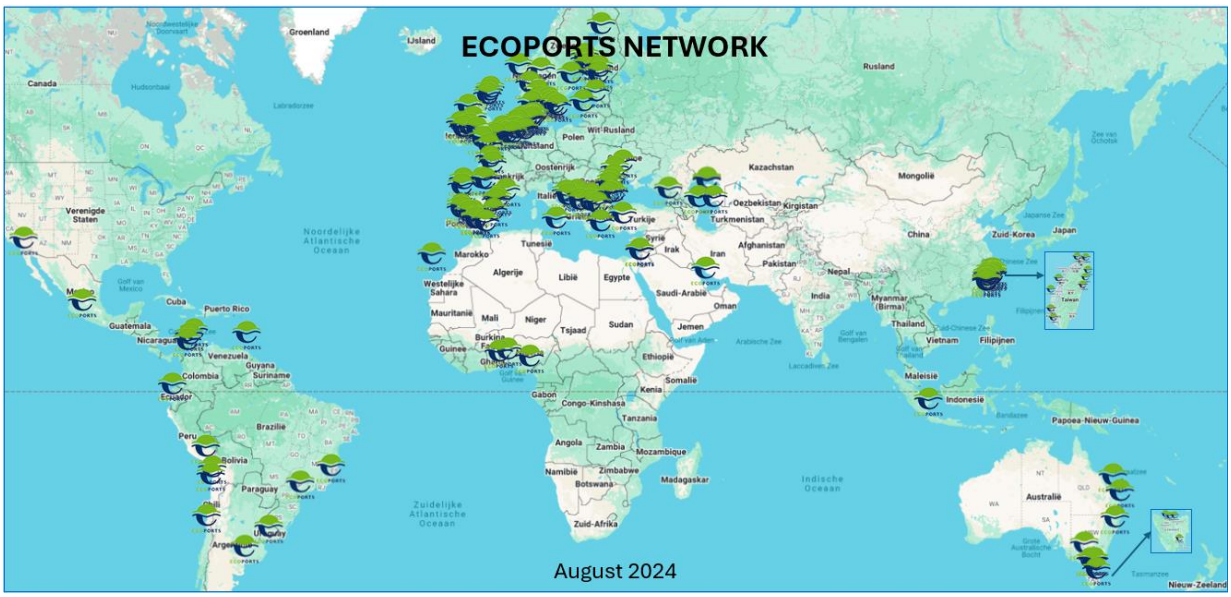
Launched in 1997 by a group of environmentally proactive ports in collaboration with academia, the EcoPorts Network enhances environmental awareness and implementation of good practices through the sharing of knowledge and experience, and the active encouragement of collaboration among ports, in delivering continuous improvement of environmental management.

The EcoPorts Network is administered through two organizations (ESPO and EcoSLC) working within a joint framework in terms of tools, methodologies and the common international quality standard of EMS (PERS).

EcoPorts is the leading environmental initiative within the European port sector. Launched in 1997 by a group of proactive ports in collaboration with academia, it has been fully integrated into the European Sea Ports Organisation (ESPO) since 2011. As the flagship initiative of the European port sector, EcoPorts was designed by ports for ports and terminals, focusing on voluntary self-regulation to demonstrate the sector's capability in managing its environmental responsibilities. The network increases awareness of environmental challenges, aids in regulatory compliance, and upholds high standards of environmental management among its 92 members from 26 countries (as of August 2024).

At the same time the ECO Sustainable Logistics Chain (ECOSLC) Foundation was established in The Netherlands, with the support of this group of ports and ESPO to expand the EcoPorts network to include ports and terminals in countries outside Europe.

EcoPorts EcoSLC: Ports outside Europe are catered for by EcoSLC Foundation (www.ecoslc.eu) which was established in 2010 with the support of the initial research partners and ESPO and started the introduction of the EcoPorts environmental and sustainable management system, and global standard in ports and port terminals in countries outside Europe from 2010/11. The website at www.ecoslc.eu is the gateway for ports and terminals outside Europe to start implementing EcoPorts SDM, EcoPorts PERS and Certification. Administration, review/audit procedures and training options may be arranged and provided by EcoSLC.



5. ON-GOING CHALLENGES AND POSITIVE OPPORTUNITIES

The importance of having an efficient and practicable EMS in place is arguably becoming more important day-by-day as the challenges of controlling and/or mitigating impacts arising from port or terminals activities, products and services become ever more high profile in terms of legislation, regulation and stakeholder expectations.

The range and scope of environmental management responsibilities continues to grow both in measures of area, and the number of topics and issues considered significant. For the sector as a whole, climate change, renewable energy, alternative fuels and the balance between commercial and economic realities, and the objectives around environmental protection within a viable business model are influencing policy objectives and strategic plans.

The same issues and a vast range of impacts, arising from other aspects both actual and potential, require active management by local port authorities and terminal operators on a 365 days - 24/7 basis taking into consideration both day-to-day scheduled, routine activities and the unexpected incident or emergency.

Traditional environmental management has become more complex given the recognition of the need to integrate environmental concerns with those of health, safety and security plus the requirement to demonstrate continuous improvement on sustainability. The drive for net-zero and the concept of sustainability are now well-established policies with objectives, targets and timelines being key components of political, economic, and social agendas. Operating procedures and impacts of the logistics chain are now established as fundamental considerations of the EMS and associated programmes.

Updated awareness and appropriate responses to the growth in the number of items in the inventories of legislation and significant environmental aspects (SEAs) add to the challenges faced by environmental managers. Given the plethora of stakeholder interests that need to be taken into account and the intense interest of the press and social media whenever an incident or accident occurs, it is more important than ever that aspects that may impact on the environment directly or indirectly, which may be beneficial or adverse, are adequately identified and managed accordingly. The tests of significance, namely i) Aspects for which the Port Authority/Terminal has strict liability or responsibility in law, ii) those over which (as a landlord) they may reasonably be expected to be able to bring influence to bear (e.g. over tenants/operators), and iii) aspects that are deemed to be of local, regional or national importance, need to be accurately identified and managed accordingly. The inventories are fundamental components of established quality standards.

It may be suggested therefore, given the range of global and local challenges imposed by the wide scope, and changing dynamics and priorities of the significant aspects, that port environmental management continues to operate in a state of almost constant transition as compliance, demand for transparency and expectations bring the port's/terminal's EMS under increased scrutiny.

There is merit, therefore, in the maintenance and operation of a practicable and efficient EMS based on a generic framework of good practice and compliance with standards for the sector yet is sufficiently flexible to be adapted and applied to the unique circumstances (in terms of commercial profile, geography, hydrography and culture *etc)* of the individual port or terminal. The EcoPorts approach facilitates such a model.

As shown in the previous sections, environmental management programmes of member ports and terminals are increasingly demonstrating an integrated approach to their liabilities and responsibilities by incorporating considerations of environment, society, and governance into their overall policy on sustainability and reporting procedures through compliance, good practices and proactive initiatives.

ANNEX I: LIST OF EcoPorts NETWORK MEMBERS

The 40 EcoSLC EcoPort Network port members of 2024 sample are:

TIPC-Kaohsiung
TIPC-Taichung
TIPC-Taipei Port
TIPC-Hualien
ADministración Del Sistema Portuario Nacional Ensenada, S.A. DE C.V.
Puerto Ventanas S.A.
TIPC-Keelung
Mailiao Industrial Harbor / Mailiao Harbor Administration Corp.
Administracion del Sistema Portuario Nacional Lázaro Cárdenas, S.A. de C.V.
TIPC-Suao
Port of Anping TIPC
Terminal Internacional del Sur
Terminal de Contenedores de Cartagena S.A.
Sociedad Portuaria Regional de Cartagena S.A.
Port of Paranaguá
Hamad Port
Ho-Ping Industrial Port Corporation
Empresa Portuaria Antofagasta
Port of Newcastle
Geelong Port
Tema port
Ortadogu Antalya Liman İsletmeleri A.S.
Port of Burnie, Tasmanian Ports Corporation
Port of Bell Bay, Tasmanian Port Corporation
Port of Hobart - Tasmanian Ports Corporation
Porto do Açu
NLNG Terminal
JSC NC “Aktau Commercial Sea Port”
Jordan Industrial Ports Company
Riverport S.A.
Andipuerto Terminal - Andipuerto Guayaquil S.A.
Port of Brisbane Pty Ltd
Gladstone Ports Corporation
Puerto de Tocopilla SQM
Port Autonome de Cotonou