

# Port Environmental Management Insights 2020

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## Abstract

This paper presents the results of research conducted in collaboration with 97 ESPO EcoPorts members that completed the Self-Diagnosis Method (SDM), most of them members of the EU TEN-T network. SDM is a concise checklist against which ports can self-assess their environmental management performance, and it is also a precursor to the International Quality Standard of Environmental Management System, EcoPorts PERS (<http://www.ecoport.com>) – the only standard dedicated to the port sector. Participating ports can compare their results with the benchmark performance of the EU port sector as a whole. The system is anonymous. SDM is managed by the European Sea Ports Organisation (ESPO).

A set of 60 environmental management performance indicators were selected from those present in the SDM (around 300). These key environmental indicators were categorized as follows: i) Environmental Management - summarized in an Environmental Management Index; ii) Environmental Monitoring; iii) Top 10 Environmental Priorities, and iv) Services to Shipping offered by the port authority in order to facilitate greener shipping. Responses were analyzed and the results are discussed in this paper. 2020 results were compared with data from previous years, allowing the analysis of trends over time. Despite Covid-19, results over the years show trends of continuous improvement in port environmental management performance in terms of the provisions necessary to deliver compliance and sustainability of port operations.

**Keywords:** Environmental management of Ports, Environmental indicators, Benchmark performance.

## 1. Introduction

Ports are important infrastructures for economic growth and development. They have strategic importance for a nation, acting as gateways to trade. They also constitute a key node in the global supply chain (Wright, 2013). However, at the same time, they are very complex systems, since each port is unique in terms of activities, geography or applicable laws (Puig et al, 2015).

Due to the range and nature of the activities, products and services carried out in the port area, multiple

environmental aspects may be generated contributing to the port environmental footprint such as: air pollution, noise pollution, CO<sub>2</sub> emissions, and congestion (Chiu et al., 2014, Ng and Song, 2010).

Many ports are in environmentally sensitive areas protected by EU law. A majority of ports are in or close to urban areas. Most ports handle large volumes of hydrocarbons which contribute to carbon emissions and air quality problems.

Ports have tended to be proactive in finding, facilitating and implementing solutions to such problems. In order to reduce these negative impacts, greening and sustainability issues have become even more important in the port industry in recent years (Mumim et al, 2020). This paper presents the main outcomes of the 2020 Environmental Report of the European Sea Ports Organization (ESPO, 2020). This is the fifth Annual ESPO environmental report. However, this initiative is not new, in fact this is the tenth time that an environmental survey has been conducted by ESPO in the last 25 years (e.g., ESPO 2005, ESPO, 2009, ESPO, 2012a, Puig et al, 2017, ESPO, 2018, ESPO 2019).

## Methodology

### 2.1. Data Source

All the data presented in this paper comes from the Self Diagnosis Method (SDM) questionnaire. This is a checklist against which port managers can self-assess the environmental performance of their ports in relation to the performance of both the sector and international standards (Darbra et al. 2004). This tool was developed within the ECOPORTS project (2002-2005) and it has been used since then not only in Europe through ESPO ([www.espo.be](http://www.espo.be)) but also around the world through EcoSLC Foundation ([www.ecoslc.eu](http://www.ecoslc.eu)).

### 2.2. Characteristics of the sample

The total number of ports that participated in this study were 97 from 18 different countries, all of them being ESPO members. These include the European Union countries plus United Kingdom and Norway. UK and

Spain were the countries with the most participant ports, around 15% each, followed by France and Germany each with 10% of ports.

Concerning the tonnage of the sample, most of the ports are small (<5 million tons, 39%) and the geographical distribution is quite diverse (i.e. embayment, estuary, engineered coastline and river). Most of them are part of the TEN-T Network (84%).

The data extraction was done on the 1<sup>st</sup> of September 2020 from the ECOPORTS database. Information on each question on SDM was obtained with the average answer of participant ports.

## 2. Results

Information on more than 60 different indicators was presented in the 2020 ESPO environmental report. In this paper, those deemed to be the most significant for purposes of EMS analysis are summarized according to their designated categories. Concerning the status and trends on Environmental Management Indicators, Table 1 shows the main results since 2013. The most common indicator used in the ports under study is the existence of an Environmental Policy (96%), followed by the existence of an inventory of Significant Environmental Aspects. These two elements are essential to implement any environmental management system. The Inventory of Relevant Legislation has also a high percentage (>90%).

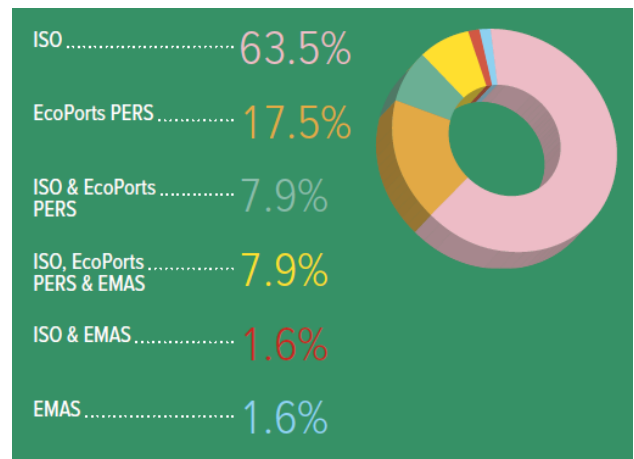
**Table 1.** Percentage of positives responses to the environmental management indicators. Source: ESPO, 2020

Indicators	2013 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)	% CHANGE 13-20
A Existence of a certified Environmental Management System (EMS) – ISO, EMAS or PERS	54	70	70	73	71	65	+11
B Existence of an Environmental Policy	90	92	97	96	95	96	+6
C Environmental Policy makes reference to ESPO's guideline documents	38	34	35	36	38	43	+5
D Existence of an inventory of relevant environmental legislation	90	90	93	97	96	91	+1
E Existence of an inventory of Significant Environmental Aspects (SEA)	84	89	93	93	89	92	+8
F Definition of objectives and targets for environmental improvement	84	89	93	93	90	88	+4
G Existence of an environmental training program for port employees	66	55	68	58	53	55	-11
H Existence of an environmental monitoring program	79	82	89	89	82	81	+2
I Environmental responsibilities of key personnel are documented	71	85	86	86	85	85	+14
J Publication of a publicly available environmental report	62	66	68	68	65	69	+7

On the basis of the ten indicators present in Table 1, an Environmental Management Index can be obtained. This is calculated on the basis of a specific weighting applied to the significance of these key environmental management component. This is Index value =  $A*1.5 +$

$B*1.25 + C*0.75 + D*1 + E*1 + F*1 + G*0.75 + H*1 + I*1 + J*0.75$ . This indicator goes from 1 to 10, being in 2013 equal to 7.23 and in 2020 equal to 7.8. However, it must be said that in 2017 and 2018 the index was over 8. The reduction of the index can be explained due to the reduction in the number of ports with certified Environmental Management System (EMS) and the decrease in the number of ports with an inventory of relevant legislation. These two issues can be directly related with Covid-19 effects since environmental issues may have been subordinated to other priorities.

Figure 1 shows the percentage of ports that are certified with an internationally recognized EMS (ISO 14001, EMAS or PERS). Out of the 65% of ports with a certified EMS, more than half of these have opted for ISO 14001 (63.5%) followed by the EcoPorts' PERS (17.5%), making ISO and PERS the most popular standards in the sector. Additionally, some ports are certified with more than one standard such as ports with ISO and EcoPorts' PERS (7.9%) or with the three certificates (7.9%).



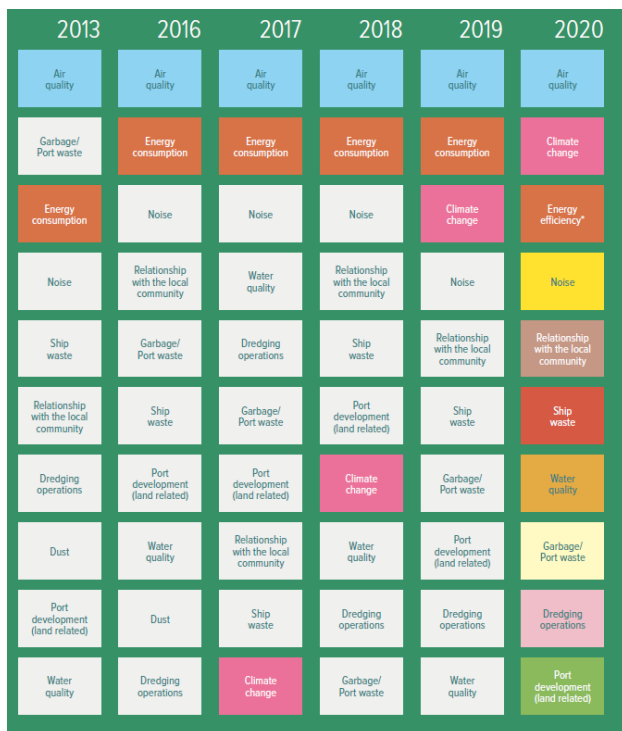
**Figure 1.** Breakdown of the EMS certificates. Source: ESPO, 2020

The second category of indicators are related with the Environmental Monitoring efforts of European ports. As it can be seen in Table 2, waste is the environmental issue that is being more monitored by ports (79%), followed by Energy efficiency (75%) and Water consumption (69%).

**Table 2.** Percentage of positive responses to environmental indicators. Source: ESPO, 2020.

Indicators	2013 (%)	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)	% CHANGE 2013–2020
Garbage/Port waste	67	79	88	84	79	79	+12
Energy efficiency	65	73	80	80	76	75	+10
Water consumption	58	62	71	72	68	69	+11
Water quality	56	70	75	76	71	67	+11
Air quality	52	65	69	67	62	67	+15
Sediment quality	56	63	65	58	54	59	+3
Noise	52	57	64	68	57	54	+2
Carbon footprint	48	47	49	47	49	52	+4
Marine ecosystems	35	36	44	40	40	46	+11
Terrestrial habitats	38	30	37	38	37	41	+3
Soil quality	42	44	48	38	32	41	-1

Figure 2 illustrates that in terms of the priorities of ports, air quality continues as the top environmental priority, followed by climate change, which has risen – in only three years – from being the tenth priority in 2017 to become the second priority for ports in 2020. Energy efficiency is the third priority of ports. It is significant the fact that the Top 10 priorities have been the same over the last four years (2017-2020). However, their relative positions have changed over the years. Noise and relationship with the local community are very important issues as well, especially for urban ports

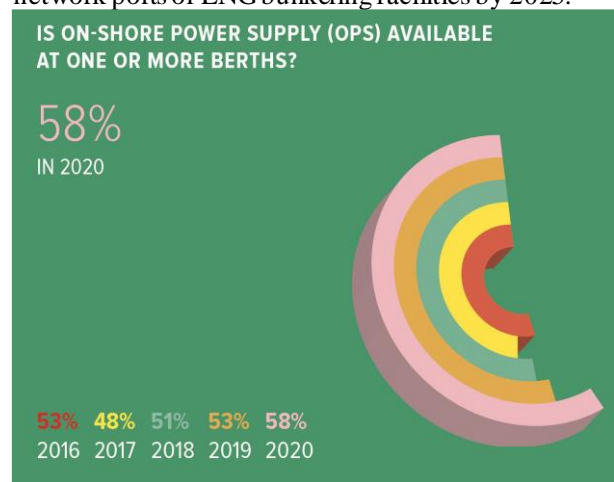


**Figure 2.** Top 10 environmental priorities of the port sector over the years

The last category of indicators analyzed in this paper are green services to shipping. These are: provision of on shore power supply (OPS), liquefied natural gas (LNG) bunkering and application of environmental differentiated fees.

As it can be seen in Figure 3, more than half of the respondent ports are offering on shore power supply (OPS). This includes low and high voltage. This percentage has been increasing over the years and 40% of ports are planning to offer OPS in the next two years. However, it is important to note that most ports only provide low voltage OPS (e.g. tugs and/or other port authority vessels). For high voltage (commercial seagoing vessels), the percentage is 46%.

With reference to the availability of LNG in ports, one third of them is offering it and the most common way is by truck. In addition, one fifth of the participant ports are planning to install LNG bunkering in the future. This is a positive sign for the implementation of the Alternative Fuels Infrastructure Directive (European Commission, 2014) with regard to the provision by TEN-T core network ports of LNG bunkering facilities by 2025.



**Figure 3.** Percentage of ports offering OPS. Source: ESPO, 2020

In parallel, an increasing number of ports (57%) provide differentiated dues for ships that go beyond regulatory standards (Table 3). More than half of the ports that provide green discounts aim to encourage the reduction of air emissions and to encourage better waste management. Environmental certification of ships is rewarded by around half of ports providing such incentive schemes. Another 40% encourage the reduction of GHG emissions.

**Table 3.** Differentiate dues for “Greener vessels”

Indicator	2019 (%)	2020 (%)
Does the port offer differentiated dues for “Greener” vessels?	56	57
Air emissions (NO <sub>x</sub> , SO <sub>x</sub> , PM) reduction*	50	55
Waste management/segregation*	45	53
Environmental certification*	42	49
GHG emissions reduction*	34	40
Noise reduction*	15	13
Does the port plan to introduce environmentally differentiated port dues during the next 2 years?	28	30

\*The percentage of the different initiatives are calculated on the basis of the 55 ports offering differentiated dues for “Greener Vessels”, not out of the total of participating ports.

### 3. Conclusions

Based on the responses to the SDM, it can be concluded that there exists a general trend of European ports being pro-active in terms of environmental management. Despite Covid-19 pandemic, ports are showing improvement in most of the selected indicators. Only few of them such as the number of certified EMS and the inventory of environmental legislation show a slight decrease in 2020. This could be attributed to the particular circumstances brought by the Covid-19 pandemic, or the larger sample used for 2020. The variation in the indicators will be carefully observed to see if they are temporary or part of new trends.

With reference to monitoring of environmental issues, Port waste and Energy efficiency have remained in the top priority positions since 2013. Most of the environmental monitoring programs have increased their percentage of positive responses.

Climate change continues to rise in importance and is now the second top priority issue for European Ports. Air quality has been in the first position since 2013 followed in most of the years by Energy efficiency. These three issues are directly related, showing that participant ports are aware of the importance of Climate Change for their infrastructures.

Finally, an increasing importance of green services has been identified. There has been a rise in all the services offered to greening shipping: OPS, LNG bunkering and environmental differentiated port fees. Initiatives such as the ESPO Green Guide have been an important part of this increase. The current 2012 version of the Guide (ESPO, 2012b) is being updated, and a new version will be presented by the summer of 2021.

The environmental management performance of practically one hundred port authorities has provided an insight into the status and progress of environmental management across the European port sector. The responses to the 2020 EcoPorts SDM confirm that EU ports are demonstrating continuous improvement in several Key components of their Environmental Management Programs.

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