



LOGISTICS & MARITIME FORUM

The sustainable, connected and resilient road to 2030

16-17 October 2019, La Spezia Expo

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Agenda

- **PORTFORWARD: MAIN GOALS AND FEATURES**
- **PROJECT STRUCTURE AND PROGRESS**
 - ✓ **PORTFORWARD USE CASES**
- **PORT – CITY RELATIONSHIP**
 - ✓ **USE CASE PROJECT: VIGO CONTAINER TERMINAL**
ENVIRONMENTAL IMPACT



PORTFORWARD: MAIN GOALS AND FEATURES

“PortForward: Towards a green and sustainable ecosystem for the EU Port of the Future” is developing a platform for small and medium sized ports to support operations management. The expected outcome will lead to a smarter, greener and more sustainable port ecosystem.

Internet of Things

Big Data

RFID



Interoperability

Integration

Scalability

● SMART ● INTERCONNECTED ● GREEN



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PORTFORWARD: MAIN GOALS AND FEATURES

Therefore, within "Port of the Future" measure, "Portforward" is supporting port communities by implementing:

- **Smart Port Solutions**

Employing ICT solutions to improve information flows between ports and port communities.

- **Green Port Solutions**

Adopting green technologies to reduce the environmental impacts of port operations and save resources.

- **Interconnected Port Solutions**

Combining different modes of transport and integrating different technologies to better monitor and control flows.



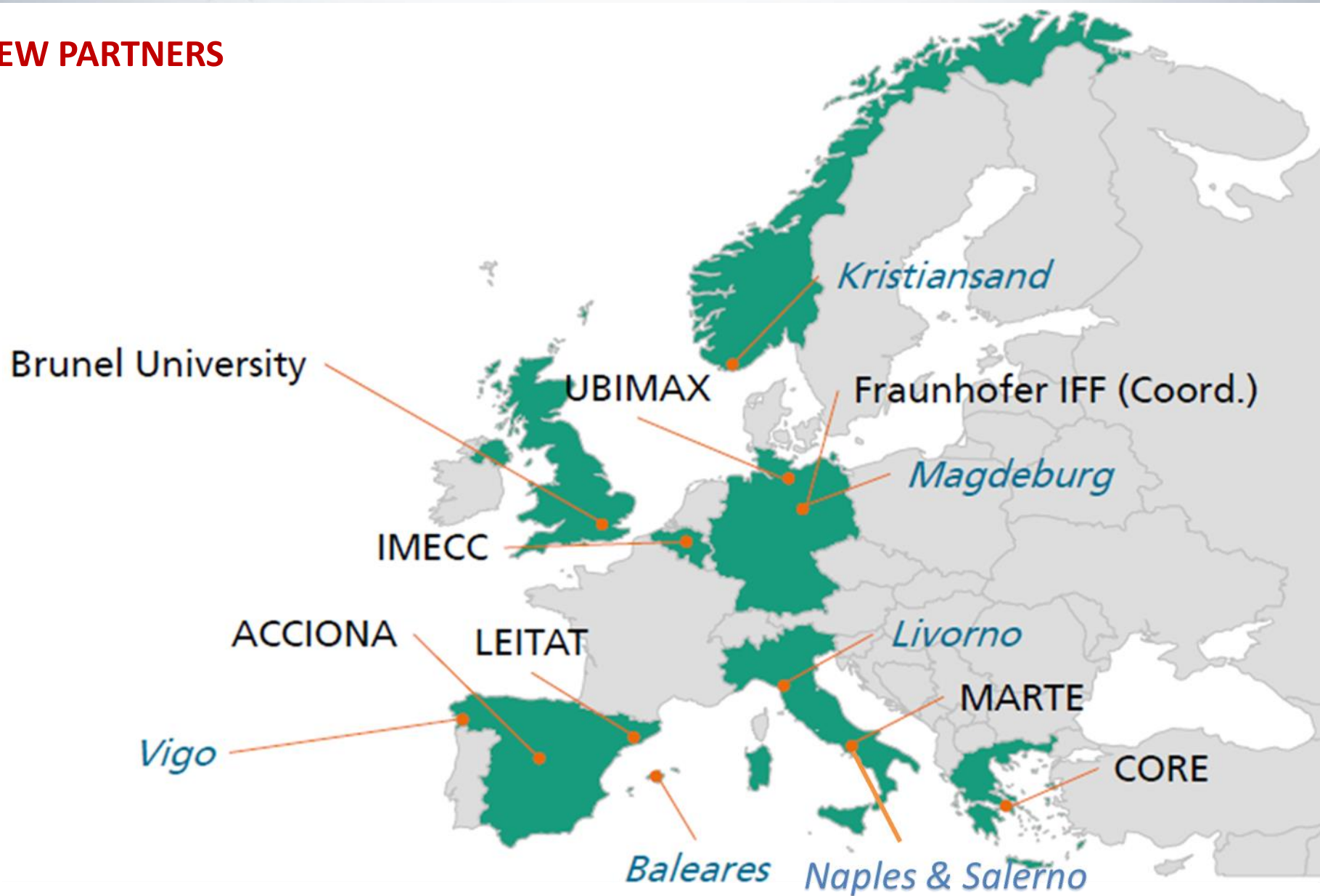


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OVERVIEW PARTNERS





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STRUCTURE AND PROGRESS (1/3)

Project management meetings:

- Magdeburg (kick-off in July 10-12, 2018)
- Madrid (February 12-14, 2019)
- Kristiansand (September 3-5, 2019)



Kick off port visits:

- Baleares (October 4-5, 2018)
- Naples and Salerno (October 29-30, 2018)
- Livorno (October 10-11, 2018)
- Vigo (September 25-26, 2018)
- Magdeburg (July 10-11, 2018)



Institutional website of the project:
www.portforward-project.eu



STRUCTURE AND PROGRESS (2/3)



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STRUCTURE AND PROGRESS (3/3)

| | Jul - Dec 2018 | Jen - Jun 2019 | Jul - Dec 2019 | Jen - Jun 2020 | Jul - Dec 2020 | Jen - Jun 2021 | Jul - Dec 2021 |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| | 1 2 3 4 5 6 7 8 9 10 11 12 | 1 2 3 4 5 6 7 8 9 10 11 12 | 1 2 3 4 5 6 7 8 9 10 11 12 | 1 2 3 4 5 6 7 8 9 10 11 12 | 1 2 3 4 5 6 7 8 9 10 11 12 | 1 2 3 4 5 6 7 8 9 10 11 12 | 1 2 3 4 5 6 7 8 9 10 11 12 |
| WP6 - The PortForward Dashboard & technical validation | | | | | | | |
| T6.1 Development of port digital twin and virtualization of infrastructure and processes (Virtual Port Tool) [M4 – M30] [IFF, UBIMAX, MARTE, MAGDEBURG] | | | | | | | |
| T6.2 The PortForward Decision Support System (DSS) [M4 – M36] [IFF, LEITAT, PDB, APS MTS, MARTE, MAGDEBURG] | | | | | | | |
| T6.3 Integration of tools and services [M13 – M36] [IMEC, IFF, ACCIONA, BRUNEL, UBIMAX, PDB, MARTE] | | | | | | | |
| T6.4 The PortForward Dashboard [M13 – M36] [ACCIONA, MARTE, IFF, BRUNEL, LEITAT, UBI-MAXPDB, APS MTS, MAGDEBURG] | | | | | | | |
| T6.5 Technical validation [M25 – M40] [ACCIONA, IFF, IMEC, MARTE, Vigo, PDB] | | | | | | | |
| WP7 - Use cases & impact assessment (TRL 6) | | | | | | | |
| T7.1 Methodology and research framework [M4 – M24] [MARTE, KRISTIANSAND, Vigo, CORE, IFF, ACCIONA, IMEC, BRUNEL] | | | | | | | |
| T7.2 Implementation of use cases [M24 – M42] [MARTE, ALL PARTNERS] | | | | | | | |
| T7.3 Comparative analysis [M30 – M42] [MARTE, ALL PARTNERS] | | | | | | | |
| T7.4 Best practices and replication report [M36 – M42] [KRISTIANSAND, ALL PARTNERS] | | | | | | | |
| WP8 - Valorization and market assessment | | | | | | | |
| T8.1 Standardisation activities [M13– M42] [IFF, MARTE] | | | | | | | |
| T8.2 Advisory board [M1– M42] [MARTE, KRISTIANSAND, Vigo, PDB, APS MTS, MAGDEBURG, CORE, IFF] | | | | | | | |
| T8.3 Roadmapping for scale-up, uptake and market replication [M1– M42] [CORE, MARTE, IFF] | | | | | | | |
| T8.4 Market analysis and segmentation, business modelling [M1– M42] [MARTE, CORE, IFF] | | | | | | | |
| T8.5 Customer Adoption Plan [M1– M42] [MARTE, CORE] | | | | | | | |
| T8.6 Commercialisation planning [M5– M42] [CORE, IFF] | | | | | | | |
| T8.7 Reassessment of Business models [M5– M42] [CORE, MARTE, IFF] | | | | | | | |
| WP9 - Dissemination/Communication/Exploitation | | | | | | | |
| T9.1 Development of the Plan for the Exploitation and Dissemination of Results (PEDR) [M1-M42] [CORE, ALL PARTNERS] | | | | | | | |
| T9.2 Dissemination activities [M1-M42] [MARTE, ALL PARTNERS] | | | | | | | |
| T9.3 Exploitation activities [M1-M42] [CORE, ALL PARTNERS] | | | | | | | |
| T9.4 Innovation Management [M1-M42] [CORE, ALL PARTNERS] | | | | | | | |
| T9.5 Knowledge Management, Data Management Plan & IPR Protection [M1-M42] [CORE, ALL PARTNERS] | | | | | | | |
| T9.6 Future funding & investment plans [M18-M42] [CORE, ALL PARTNERS] | | | | | | | |
| WP10 - Project Management | | | | | | | |
| T10.1 Project Coordination [M1-M42] [IFF] | | | | | | | |
| T10.2 Technical Management [M1-M42] [IFF] | | | | | | | |






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PortForward is applying an holistic and modular approach for the development of a **port operations management platform**. It will create a solution based on **technological standards** for a wide range of management processes in the port system.

| The PortForward partnership | | | |
|--------------------------------------|--|--|---|
| PORTS OF NAPLES & SALERNO |  AUTORITÀ DI SISTEMA PORTUALE DEL MAR TIRRENO CENTRALE NAPOLI - SALERNO - CASTELLAMARE DI STABIA | MAR.TE. Sea-Land Logistics |  |
| MAGDEBURG PORT |  TRANSPORTWERK Magdeburger Hafen GmbH GREENPORT | FRAUNHOFER |  |
| PORTS OF BALEARES |  Ports de Balears Autoritat Portuària de Balears | ACCIONA |  |
| PORTS OF LIVORNO AND PIOMBINO |  Porti di Livorno, Piombino, Capraia Isola, Portoferraio, Rio Marina, Cavo | AUTORITA' DI SISTEMA PORTUALE DEL MAR TIRRENO SETTENTRIONALE |  Autorità di Sistema Portuale del Mar Tirreno Settentrionale |
| PORT OF VIGO (ex Port of Felixstowe) |  Port of Vigo Port Authority of Vigo | BRUNEL |  |



USE CASES (1/2)

| # | Project partners | Port | Use case | PF Tools |
|---|---|------------------|--|--|
| 1 | Acciona IMEC Leitat | Ports of Balears | Stevedoring, Ro-Ro terminal handling and logistic service optimization. | <ul style="list-style-type: none"> • IoT services • Tracking systems • Stowage management • PF Dashboard (Optional) • LPWAN communication |
| 2 | Acciona IMEC Leitat Fraunhofer | | Optimizing the centralized supervision and management of heterogeneous port systems. | <ul style="list-style-type: none"> • PF Dashboard • Potential use of IoT service for integrating existing IoT data sources |
| 3 | Leitat Acciona | | Prediction of movements among the city and the port to increase security and improve the flow of movements of people to touristic activities. | <ul style="list-style-type: none"> • Dashboard • Tracking devices & connectivity • IoT services |
| 4 | Brunel LEITAT IMEC | Port of Vigo | Green Scheduling and Sustainability of operations | <ul style="list-style-type: none"> • Green Scheduler • IoT Services • Dashboard • Air quality sensors • Digital twin |



USE CASES (2/2)

| # | Project partners | Port | Use case | PF Tools |
|---|------------------|-------------------------------|---|---|
| 5 | Ubimax | Ports of Livorno and Piombino | Pilot Assistance to ship maneuvering in port waters. | <ul style="list-style-type: none"> • Smart glasses (assisted augmented reality) • Ubimax frontline solutions |
| 6 | Ubimax | | Assistance to custom control and inspection within port boundaries | <ul style="list-style-type: none"> • Smart glasses (assisted reality) • Ubimax frontline solutions |
| 7 | MAR.TE. | Ports of Naples and Salerno | Monitoring of port performance in different port areas (Dashboard) | <ul style="list-style-type: none"> • Port Forward Dashboard |
| 8 | Fraunhofer | Port of Magdeburg | Dynamic storage monitoring | <ul style="list-style-type: none"> • Digital twin • Virtual port model • Decision support system • Mobile interfaces • Mobile scanners and tracking devices • Update of camera hardware may be required |
| 9 | Fraunhofer | | Inter-terminal tracking of external companies (mainly trucks) | <ul style="list-style-type: none"> • Asset Tracking • Digital twin • Virtual port model • Decision support system • IoT middleware • IoT infrastructure (trackers + gateways) |



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PORT-CITY RELATIONSHIP: THE TRADE-OFF

The success of ports and port-cities depend to a large extent on the influence of the place-based actors in creating the most competitive environment, maximizing both port and urban performances while smoothing the side counter effects.

Positive effects



Economic effects

- Fostering employment
- Business and occupation taxes

Social effects

- Establishment of highly qualified workers
- Promoting multicultural work teams

Negative effects



Social effects

- Port's perception as an enemy and threat
- Migration to cities with a better life quality

Environmental effects

- Sea, land and air deterioration
- Reduction of biodiversity



USE CASE PROJECT VIGO CONTAINER TERMINAL (1/4)

Case Study

- Port of Vigo

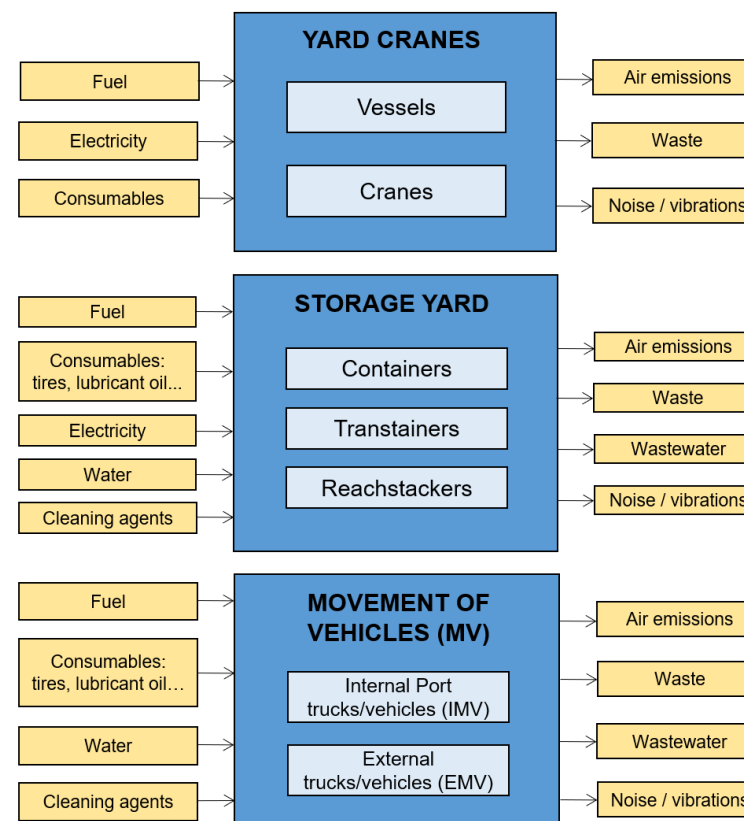
Goals – Baseline Scenario

- To evaluate the environmental impacts of Container Terminal operations and the main environmental impact contributors.
- To calculate the average fuel/energy consumption and the potential CO2 emissions generated by the different Container Terminal operation considered.
- To establish a set of environmental indicators.

Functional Unit

- 1 TEU handled in a Container Terminal

System Boundaries





USE CASE PROJECT VIGO CONTAINER TERMINAL (2/4)

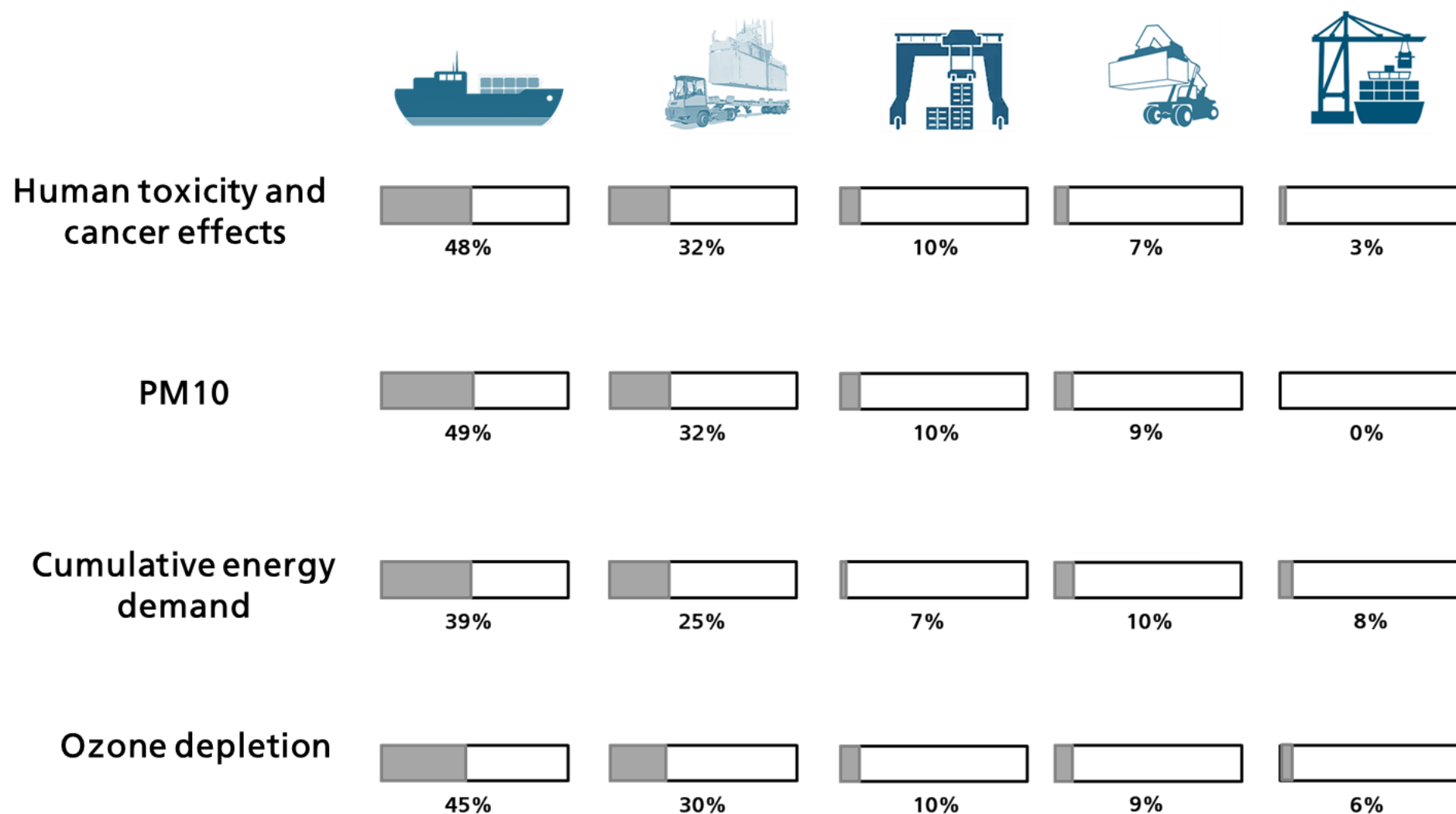
Berthing time of vessels berthed in the berthing line of the Container Terminal of Port of Vigo from October 2017 to October 2018.

| Gross tonnage (GT) | Total berth time (min) | Total quantity of diesel consumed (m ³) |
|--------------------|------------------------|---|
| < 4,000 | 2,702 | 7.506 |
| 5,000 – 10,000 | 163,529 | 454.247 |
| 10,000 – 20,000 | 117,039 | 325.108 |
| 20,000 – 30,000 | 81,126 | 225.35 |
| 30,000 – 42,000 | 42,273 | 117.425 |
| TOTAL | 406,669 | 1,129.636 |

Average berthing time: 33,1 hours



USE CASE PROJECT VIGO CONTAINER TERMINAL (3/4)





USE CASE PROJECT VIGO CONTAINER TERMINAL (4/4)

The environmental assessment carried out by Leitat about the Port of Vigo allows to evaluate the port operations-related **carbon foot print**.



Carbon foot print
45.549 hg CO2 eq. / TEU



21.308 kg CO2 eq.



47%



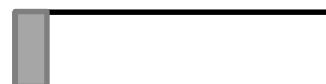
14.161 kg CO2 eq.



31%



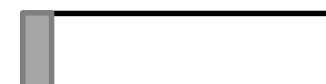
4.584 kg CO2 eq.



10%



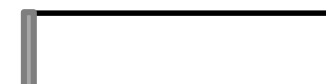
4.048 kg CO2 eq.



9%



1.448 kg CO2 eq.



3%



CONCLUSIONS

As matter not only freight-related port operations are responsible as for delivering pollutants.

Cruise traffic is responsible in turn, due to ships' long-time berthing. Ports that account for a notable number of cruise call should adopt **green solutions**.



| Nave | Molo | Arrivo | Ora a. | Partenza | Ora p. | Lungh. |
|--------------------|---------|------------|--------|------------|--------|--------|
| NORWEGIAN PEARL | 21-22 | 18/09/2019 | 07:30 | 18/09/2019 | 19:00 | 294 |
| SOVEREIGN | 5 | 18/09/2019 | 08:00 | 18/09/2019 | 19:00 | 268 |
| MARELLA EXPLORER 2 | 6-7 | 18/09/2019 | 05:00 | 18/09/2019 | 18:00 | 264 |
| CELEBRITY INFINITY | 9-10-11 | 18/09/2019 | 07:00 | 18/09/2019 | 20:00 | 294 |