SESSION FOUR

PORT – CITY INTERFACE
PANEL DISCUSSION

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BIOGRAPHY

Ms Eeva Hietanen, M.A.

-ESPO, Passenger Committee chair
-AIVP, member of Board of Directors
-head of Communications and Cruise development in Port of Helsinki
-secretary – treasurer of Cruise Europe 2003 -2008
-chair and one of the founders of Cruise Finland
-chair of Helsinki Cruise port team since 2002
-project manager for the City of Helsinki, the 450th anniversary celebration of Helsinki 1997-2000
-Master of Arts at University of Helsinki, Finland

Avoiding congestion in the Cruise Port

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Venice Port Authority

Marta Citron
Head of the Environmental Department and Alverta Parlin
Venice Port Authority

BIOGRAPHIES

Alberta Parolin has a first degree in Architecture at the Venice IUAV University and a Quality of Design PhD in Architecture and Urbanism at the Venice IUAV University. She has been working in Venice Port Authority since 2009. Currently she is an official in the Urban Planning Area, where she oversees aspects related to the accessibility of the port and planning of port activities.

Marta Citron has a first degree in Environmental Sciences at the Venice Ca' Foscari University. She has been working in Venice Port Authority since 2004. She has been Chief of Environmental Dept. since 2012, with project management focus on environmental aspects related to Port activities, for example: cleaning of contaminated sites, dredging, waste management and atmospheric impacts of shipping.

ABSTRACT

Cruise sector in the last years is increasing its market. Port authorities have to deal with cruise traf-fic and impacts, according to general aim of IMO: highest practicable standards concerning mari-time safety adoption, prevention and control of environmental effects.
The major environmental consequences investigated by IMO include air and water pollution, while other key aspects, like risk and its perception, have to be taken into account. Many times risk perception is not based on objective parameters, but it is linked to subjective eval-uations of possible damage. It is the disproportion between the dimensions of the cruise ships and the Venetian historical and architectural context that makes many Venetians feel like inhabitants of Lilliput faced with Gulliver- sized ships full of passengersm. The research deals with the Venice Lagoon case study where Interministerial Decree forbids ships with a gross tonnage more than 40.000 tons entering the Marittima Cruise terminal passing through San Marco Basin and the Giudecca Channel, asking to Maritime Authority to identify a dif-ferent path to reach Marittima terminal. VPA, following these national directives, is collaborating with competent authorities to evaluate the best solution between different paths reaching the Marittima Station.Both environmental and economic aspects have been evaluated by Port Authority, with a special focus of risk analysis: in this research IMO/Safedoor methodology has been used, with the intro-duction of specific criteria linked to the Venetian port case to find out the best solution.

1.VENICE PORT CHARACTERS

The Port of Venice, located in the northern part of the Adriatic sea, in Italy, is one of the key com-ponents of the freight logistic chain in the Veneto Region and in the North-East Italian economic area.
The Port of Venice's location, at the top end of the Adriatic sea, as well as at the intersection of the main European transport corridors and of the Motorways of the Seas (MoS), gives the right posi-tion to act as the European gateway for trade flows to and from Asia.
For this, priority objectives are the development of port infrastructures, including the implementa-tion of maritime access, the expansion of port areas and the improvement of hinterland connec-tions as key elements for the integration of the port into the regional logistics chain.

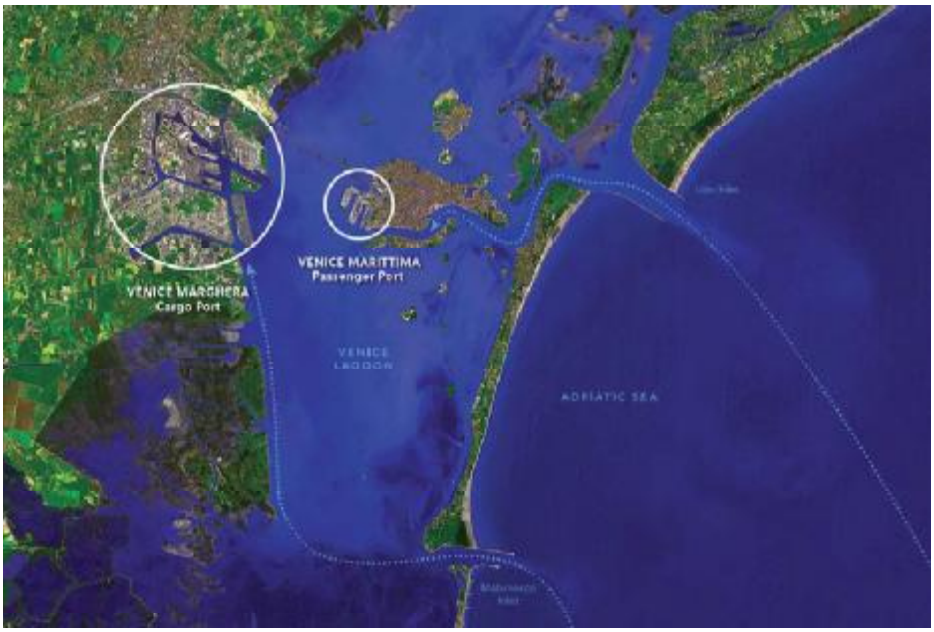


Figure 1: Port of Venice: commercial terminals area (Porto Marghera) and cruise/ferry terminals area (Marittima).

As shown in the above figure, the Port is divided in two different operative areas, the commercial terminals area which is located in Porto Marghera zone (the area underlined with a circle on the left), in the hinterland, and the cruise terminals area (Marittima), located in the historical center (underlined with a smaller circle on the right).

Some general data about Venice Port:

- Surface: 2.045 hectares
- Channels: 16 km2
- 30 km wharves
- 163 operational berthing
- 38’ depth
- 24 cargo terminals
- 70 km internal road
- 205 km of railways network

In particular, Venice Passenger terminal facilities surface is more than 260.000 square meters; there are more than 3.000 linear meters of piers and 9,90 - 10,50 meters depth.

2.ENVIRONMENTAL ASPECTS – VENICE GREEN PORT

In order to be successful, the Port of Venice aims to be a sustainable infrastructure, by promoting the imperative of environment protection.
To achieve these goals, Venice Port Authority (herewith VPA) is carrying out activities under the so called "Green Port" initiative (foreseen both by the planning document "Three Annual Operative Plan – P.O.T." 2008-2011 and by the P.O.T. 2013-2015).
The green port is not simply a slogan or a wish. On the contrary, it summarizes a concept that revolutionizes the way the port is traditionally conceived and translates into a range of concrete actions. These actions have been strenuously encouraged by the VPA, that has carefully set up its environmental policy and defined procedures, programs and aims to be achieved, also according to UNI EN ISO 14001:2004, an environmental management standard that specifies a set of ecolog-ical management requirements for green management systems, with the purpose to help organization to protect the environment, to prevent pollution, and to improve the environmental performance.

Since 2007 VPA has adopted a proactive strategy to improve air quality that involves both compliance with existing regulations and undertaking voluntary endorsements to reduce air emissions.
In April 2007 the local Harbor Office and VPA, together with Cruise companies and the Municipali-ty, signed the first **"Venice Blue Flag"**, a voluntary agreement **on using fuel with lower level of sulphur** and engine rules during mooring in Venice Port.
This agreement brought forward by more than three years the objective of improving the quality of fuel set by the national regulations.
The shipping companies that endorsed the first Venice Blue Flag in 2007 committed themselves to using for the 2007 cruise season fuel oil with a sulfur content lower than 2,5% by weight, with an occasional margin of 0.5% to be reported on the Harbor Office each time.
This should be seen in relation to the international standards set by the MARPOL convention of the IMO, which provides in Annex VI for a maximum level of sulfur in fuels of 4.5% by weight, reduced to 1.5% for the ships passing through special emission control areas.
This voluntary agreement has been renewed in following years, continuing with the voluntary use of cleaner fuels and bringing the maximum content of sulfur for the seasons 2008-2009 to 2.0% in navigation and 1.5% at berth. The introduction since 2007 of this increasingly restrictive limit on the sulphur content of the fuels used by ships, has meant that there has been a reduction in the emission of sulphur with respect to 2007.

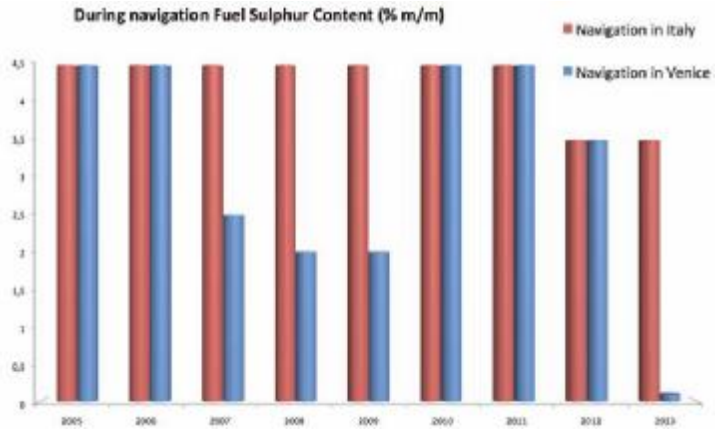


Figure 2: investing in sustainability Venice blue flag Agreement
Sulfur content in fuel used during navigation in Venice

According to Venice Blue Flag rules, VPA teamed up together with National Research Council (CNR) to understand the effects of ship emissions. Over the years studies showed a 32% reduction in the emissions of SO2 from 2007 to 2009 following the implementation of the agreement.
In 2013 a new voluntary agreement (Venice Blue Flag 2) was subscribed to have the engines of cruise shift to 0,1 % S fuel as they approach the Lido Inlet.

3.MEASUREMENTS OF SAFEGUARD

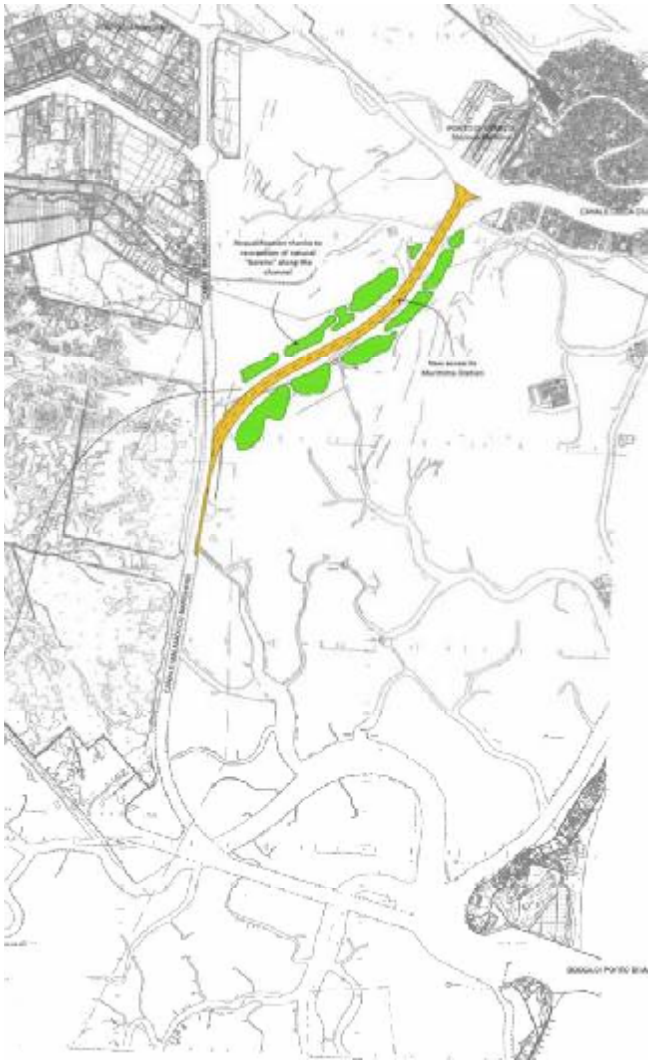
3.1.Interministerial Decree

A Decree issued by the Italian Ministries of Transport and the Environment on 2nd March 2012 banned ships displacing more than 40,000 tons from the San Marco Channel and the Giudecca Channel; this ban has to be applied when alternative routes to those forbidden are practicable.

The law was enacted nationwide following the crash of the Costa Concordia cruise ship in early 2012. The new provisions would tighten daily limits on cruise liners, with no more than five ships over 40,000 tonnes allowed passage, obliging many ships to find alternative pathway to moor in Marittima Station.

Environmental Minister and Infrastructure Minister asked to Harbour Master to identify a different path to reach passenger terminal. VPA, following these national directives, is collaborating with competent authorities to find out the best solution and presented a project, regarding the excavation of the Contorta Sant'Angelo channel.

On 5th December 2013 Venice Harbor Master with Decree 153/2013 established that the most favorite waterway to reach Marittima Cruise station is Contorta-S. Angelo channel.
The excavation project consists in the adjustment of channel section and in the environmental requalification of the central Venice Lagoon thanks to re-creation of natural "barene" (salt marshes) along the channel. This will contribute to restore the central part of the Venice Lagoon, deeply suffering from sediments loss.



3.2. Safety aspects

Waiting for the solution required by Interministerial Decree, in order to guarantee Venice historical center safeguard, many measurements have been implemented through the last years. Harbor Master Decrees 23/2012 and 105/2013 foresee:

1. Tug service through S. Marco channel for every ship bigger than 4.000 GT;
2. Double towing rope service from San Marco channel to Marittima station for ships bigger than 40.000 GT;
3. Two pilots on board from Lido inlet for passenger ships bigger than 40.000 GT;
4. The minimum distance between ships entering from Lido inlet must be 0,7 nautical miles. For cruises bigger than 40.000 GT, the minimum distance is established in 2 nautical miles.
5. The minimum distance between ships entering from Malamocco Marghera inlet must be 0,7 nautical miles. For cruises bigger than 40.000 GT, the minimum distance is established in 1 nautical miles.
6. Obligation of towing rope before leaving moorings from Marittima Station;
7. Ships entering from Lido and Malamocco-Marghera inlet must navigate with a maximum speed of 6 nodes. Minimum speed along port channels for ships convoys must be 3 nodes.

Every adopted measure have been taken in account in the risk analysis following described.

4.RISK ANALYSIS

4.1.Safedoor Methodology

The general aim of the International Maritime Organization (IMO) is the adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation, prevention and control of environmental effects due to maritime traffic. Ship movements nearby inhabitant center have to be preserved from marine casualties and accident involving ships, such as collision in the inner route or loose of load, engine failure, oil spill off etc. (the 2009/18/EC Directive estab-lishes principles for investigating accidents).
Even if the major environmental consequences investigated by IMO include air pollution, water pol-lution and the ship waste reception and handling planning, the International Maritime Organization has also published a specific study to evaluate accident probability of cruise ships (Formal Safety Assessment FSA – Cruise ships MSC 85/INF.2 e MSC 85/17/1). This study has been used to de-velop the present research.
The methodology is based on the statistic evaluation of all accidents. In order to determine the ac-cident frequencies, fault trees are used. A fault tree provides a structured system to model the final (top event) accident frequency from a set of initiating faults. However, in cruise FSA study, the fault trees models have not been used to determine the accident frequencies. Instead, the accident fre-quencies have been determined by use of historical accident data.
The fundamental way to calculate accident frequencies is to divide the number of accidents rec-orded in a given period by the corresponding exposure for that period.

$$\text{Incidents per ship year} = \frac{\text{Number of ship years accumulated during x years}}{\text{Accidents reported during a period of x years}}$$

Lloyds Register Fairplay (LRFP) accident database has been used as source for cruise accidents reported, while Lloyd's World Fleet Statistics (LWFS) has been used to derive the exposure of the cruise fleet. It should be noted that the number of accidents presented in this chapter does not in-clude minor incidents, as previously discussed, as these are under-reported in the database.
The methodology is based on statistic evaluation of every accident occurred on world fleet, be-tween 1994 and 2004. The figure n.4 resumes statistical data about annual accidents frequencies for ships with specific parameters described below.

Table 6-3 LRFP Cruise ship annual accidents frequencies 1990-2004			
Year	Ships > 20,000 GRT		
	Accidents	Ship years	Frequency [accidents / ship year]
1990	2	77	2.6E-02
1991	2	77	2.6E-02
1992	2	77	2.6E-02
1993	1	77	1.3E-02
1994	2	89	2.2E-02
1995	4	98	4.1E-02
1996	3	107	2.8E-02
1997	4	109	3.7E-02
1998	4	118	3.4E-02
1999	9	123	7.3E-02
2000	9	139	6.5E-02
2001	8	151	5.3E-02
2002	6	162	3.7E-02
2003	12	166	7.2E-02
2004	9	172	5.2E-02
Total:	77	1742	4.4E-02

Ship parameters	Value
Size	110,000 GRT
Speed	22 knots
Passengers	2,800
Crew	1,200
Passengers + Crew	4,000
Length	290 m
Draft	8.5 m
Breadth	36 m

Figure 4: Cruise ship annual accidents frequencies with references ship parameters (Source: FORMAL SAFETY AS-SESSMENT FSA – Cruise ships Details of the Formal Safety Assessment MSC 85/INF.2 21 July 2008)

Applying tree events IMO methodology to Venice case study, accidents frequency, divided by type are listed in the following table:

ACCIDENT TYPE	Accident frequency in Venice – values calculated considering calls in Venice port in 2009 (85 vessels)
COLLISION	2,2E-04
CONTACT	3,5E-05
GROUNDING	4,8E-04
FIRE	4,3E-04
OTHER	3,1E-04

Some accidents - e.g. iceberg collision, offshore infrastructure collisions - have been excluded by tree events considering both the nature and the infrastructures in Venice port. It means that in Venice Port accident frequency is lower than the frequency calculated on world fleet.

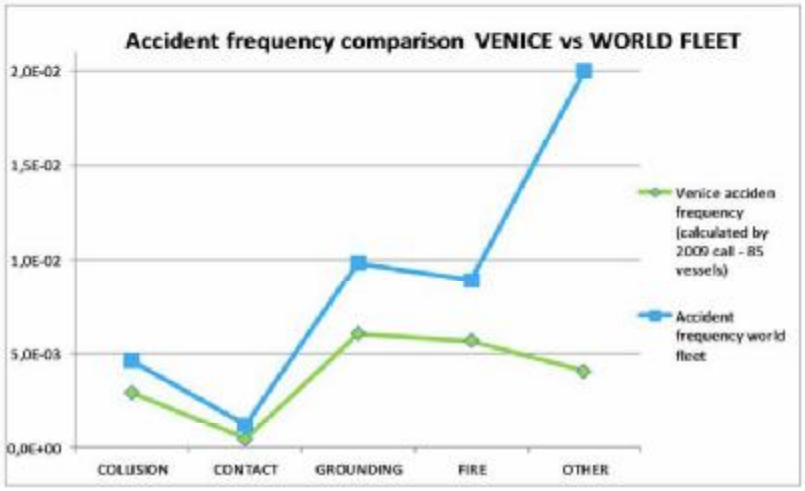


Figure 5: Comparison between Venice accident frequency and world fleet

This study has been realized using the same input of the IMO FSA – cruise ships: in particular cruise speed data, 22 knots, is much higher than the real cruise speed through Lido and Giudecca channel in Venice (6 knots according to the Harbor Master Local Decree).

4.2. SAFEDOOR METHODOLOGY AND REDUCTION FACTORS INTRODUCED TO EVALUATE ALTERNATIVE PATHS.

In order to evaluate the best solution to reach Marittima station, according to Interministerial Decree directive, five different paths have been analyzed:

1. "Zero" option (Lido inlet – San Marco Basin) - 9 km long;
2. Retrogiudecca (lido inlet and Retrogiudecca path)- 9 km long;
3. Contorta (Malamocco inlet and Contorta path) – 16,4 km long;
4. Bacino 1 (Malamocco inlet, Malamocco –Marghera channel and Vittorio Emanuele path) – 22,1 km long;
5. Bacino 3 (Malamocco inlet, Malamocco –Marghera channel, Tresse Channel and Vittorio Emanuele path) – 21,1 km long.

Figure 6: The evaluated alternative paths to reach Marittima

It is important to underline that IMO methodology doesn't consider either peculiarities of ports and environmental condition, neither distances covered within port channels.

For this reason, to reach a comparative evaluation of the accident frequency in different paths, the research applied some adjustment factors (listed in the following table). Two tugs reduction factor has been fixed to path number 1 (zero option) due to safety aspects previously described in 3.2 paragraph; path length proportion factor has been used to compare the different solution to option number 3; cruise speed reduction factor has been considered for each path compared to IMO input data; another adjustment factor is defined by number of shipping hauls along different paths.

	Path				
Adjustment factors	1 – "zero" option	2 - Retrogiudecca	3 - Contorta	4 – Bac1-VE	5 Bac3-VE
Tugs	0,8	1	1	1	1
Path length	0,55	0,55	1	1,35	1,29
Cruise speed	0,5	0,5	0,8	0,8	0,8
Number of shipping hauls	5	4	3	4	3
Shipping hauls	1,7	1,3	1,0	1,3	1,0

5.RESULTS

Results are reported in the following table:

1 – ZERO OPTION	Accident frequency
COLLISION	8,2E-05
CONTACT	1,3E-05
GROUNDING	1,7E-04
FIRE	1,6E-04
OTHER	1,1E-04
Total	**5,4E-04**
2- RETROGIUDECCA	Accident frequency
COLLISION	8,2E-05
CONTACT	1,3E-05
GROUNDING	1,7E-04
FIRE	1,6E-04
OTHER	1,1E-04
Total	**5,4E-04**
3 - CONTORTA	Accident frequency
COLLISION	1,8E-04
CONTACT	2,8E-05
GROUNDING	3,7E-04
FIRE	3,5E-04
OTHER	2,5E-04
Total	**1,2E-03**
4 - BACINO 1 VE	Accident frequency
COLLISION	2,4E-04
CONTACT	3,8E-05
GROUNDING	5,0E-04
FIRE	4,7E-04
OTHER	3,4E-04
Total	**1,6E-03**
5 - BACINO 3 VE	Accident frequency
COLLISION	3,1E-04
CONTACT	4,8E-05
GROUNDING	6,4E-04
FIRE	6,0E-04
OTHER	4,3E-04
Total	**2,0E-03**

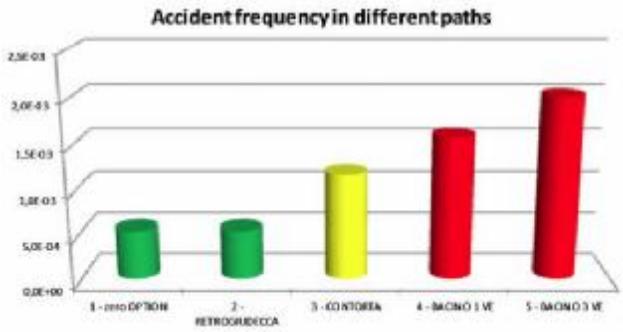


Figure 7: Accident frequency in different paths

Considering calculated frequency values, accident recurrence interval for each alternative are the following:

1) Zero option - 1851 years;
2) Retrogiudecca channel - 1851 years;
3) Contorta channel - 833 years;
4) Bacino 1 – 625 years;
5) Bacino 3 - 500 years.

From the risk point of view, the best solutions to reach Marittima Station are the “zero” option as well as Retrogiudecca channel path. This is due to the high level of safety measurement already applied in the first case, and to the channel infrastructure configuration (and the consequent low number of shipping hauls) for the Retrogiudecca option.
The alternative choice evaluation must consider both risk analysis results and economic, environ-mental and social aspects, so Harbour Master in its assessment should contemplate also the risk perception and not only the calculated accident frequency.
In the Venice case, due to its environmental contest and historical heritage, people and residents risk perception becomes an overriding aspect: from this point of view a valid alternative could be the Contorta channel which permits ships reaching the Marittima Station, cruising far from Venice historical center (avoiding “Lilliput syndrome”), with a lower accident frequency compared to alter-native 4 and 5.

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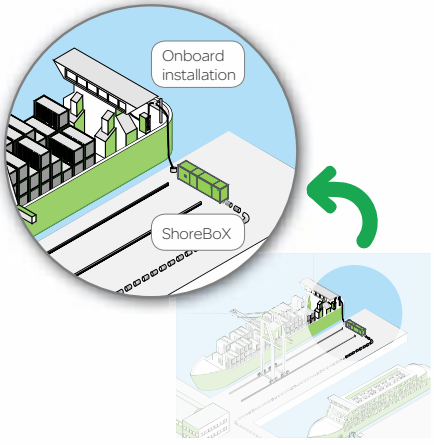

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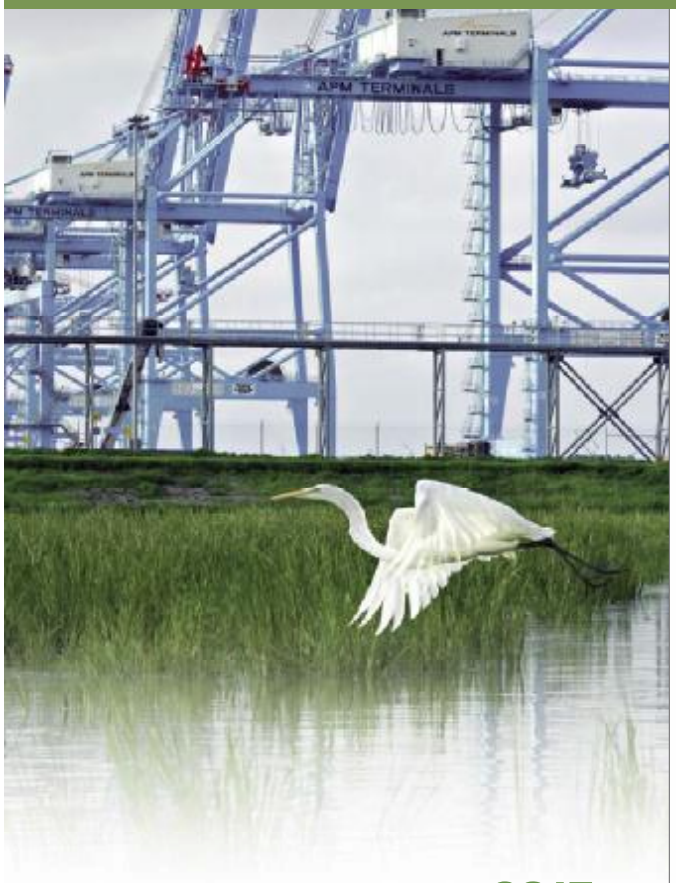

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