



Fer van de Laar
Managing Director



LNG Working Group

of the

World Ports Climate Initiative



World Ports Climate Initiative



IAPH • PORT ENVIRONMENT COMMITTEE

WPCI



**World
Ports
Climate
Initiative**

Some Facts

- **Houston May 2007**
IAPH Resolution: Clean Air Program
- **Dunkirk April 2008**
IAPH Resolution: Support for Climate Challenges
- **Rotterdam July 2008**
World Port Climate Conference: World Ports Climate Declaration
- **Los Angeles November 2008**
**IAPH Port Environment Committee Symposium:
World Port Climate Initiative (WPCI)**



IAPH • PORT ENVIRONMENT COMMITTEE

WPCI



**World
Ports
Climate
Initiative**

WPCI Mission Statement

The mission of the World Ports Climate Initiative is to

- **raise awareness in the port community of need for action**
- **initiate studies, strategies and actions to reduce GHG emissions and improve air quality**
- **provide a platform for the maritime port sector for the exchange of information thereon**
- **make available information on the effects of climate change on the maritime port environment and measures for its mitigation**

IAPH • PORT ENVIRONMENT COMMITTEE

WPCI



**World
Ports
Climate
Initiative**

Current Projects

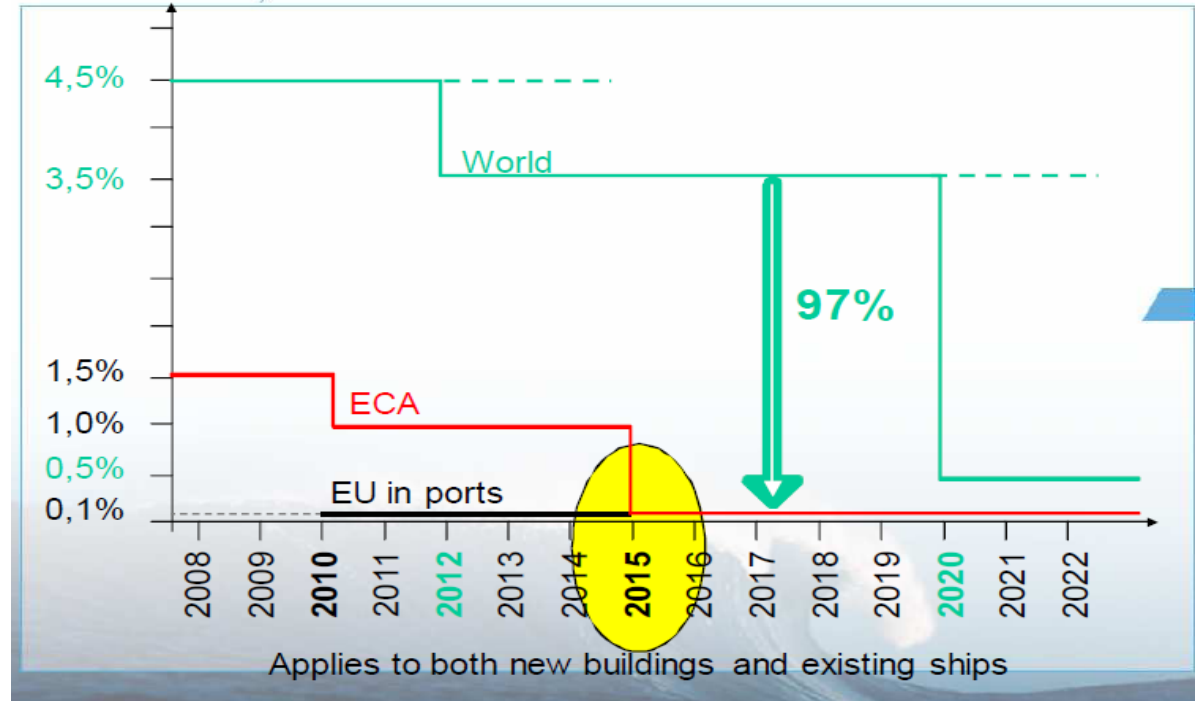
- | | | |
|-----------------------------------|------------|--------------------|
| • Carbon Foot Print | CFP | Los Angeles |
| • On-shore Power Supply | OPS | Göteborg |
| • Environmental Ship Index | ESI | Rotterdam |
| • LNG as a fuel | LNG | Antwerp |

Rules

**Cleaner fuel driven by worldwide future regulations of IMO
Annex VI for SO_x, NO_x, CO₂ and PM**

**Regional requirements
and rule proposals and
guidelines**

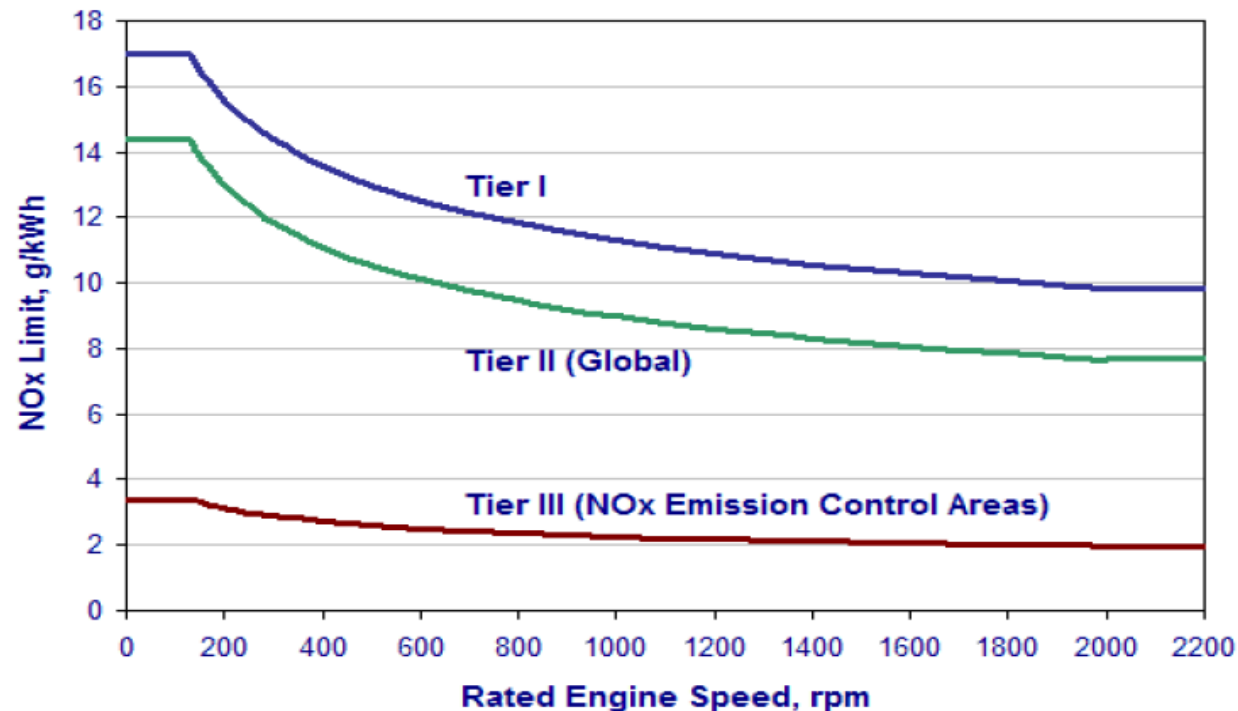
**Sulphur limits in fuel:
2015 = important year**



Rules

**Cleaner fuel driven by worldwide future regulations of IMO
Annex VI for SO_x, NO_x, CO₂ and PM**

**NO_x limits of engines;
2016 = important year**





(S)ECA's

- **Baltic Sea (SOx only)**
- **North Sea (SOx only)**
- **North American area (SOx, NOx and PM)**
- **United States Caribbean Sea (SOx, NOx and PM)**



Future (S)ECA's

- **Mediterranean**
- **Mexico**
- **Norway (NW rest)**
- **Japan ??**

IAPH • PORT ENVIRONMENT COMMITTEE

WPCI



**World
Ports
Climate
Initiative**

??????





?!? LNG ?!?





LNG what is it ?

LNG

- **Liquefied Natural Gas: carriage & handling temp - 161 °C**
- **Main component: methane**
- **Safety aspects: (very) hazardous, when not handled in accordance with safety procedures (SIGTTO)**
- **Experiences with LNG carriers (boil off) and only on small scale as fuel for for other types of vessels**
- **Storage space compared to fuel: 3 times as much**

Not CNG

Compressed Natural Gas

Not LPG

Liquefied Petroleum Gas



LNG why ?

- **Reduction in emissions (compared to Heavy Fuel Oil)**
 - Sulphur emission is eliminated
 - Particulate Matter (PM) is close to zero
 - CO₂ is reduced by 26% (source dependent); due to unburned methane the net reduction of greenhouse gases is somewhat lower (appr. 20%)
 - NO_x is reduced by 80-90% (Otto engines)
- Expected to be cost effective (LNG markets depend on largely unknown variables)
- Scores in incentive programs such as ESI, are high.

LNG Prices

PRICES

Area	US\$/MMBtu
US	3.2
Mexico	18.4
S-America	15.5
Europe	10.5
India	13.8
China	16.3
Japan	16.8



LNG why not ?

- **Safety aspects: very hazardous, when not handled in accordance with safety procedures**
- **Storage space requirements compared to HFO: 3 times as much**
- **Not expected to be cost effective (LNG markets depend on largely unknown variables)**
- **Public perception (NIMBY Syndrome)**



Fuel perspective

SHIPS VISITING ECA's

95 % HighSeas/ECA

5 % ECA Only

HFO + MDO 0.1 %

MDO 0.1 %

LNG

**Alternatives
(Scrubbers)**



LNG now

- In NW Europe, 50 + sea going vessels already fuelled by LNG (ferries / ro-ro / tugs / PSV's) starting some 10 years ago
- Newbuildings with LNG fuelled propulsion are increasingly ordered (short sea / coastal /ferries 50 + vessels)
- Growing interest by shipping sector, not only short sea but also container vessels, inland shipping & fishery

LNG now

48 LNG fuelled ships in operation worldwide

Ships in operation

Year	Type of vessel	Owner	Class	Year	Type of vessel	Owner	Class
2000	Car/passenger ferry	Fjord1	DNV	2012*	Car/passenger ferry	Fjord1	DNV
2003	PSV	Simon Møkster	DNV	2012	PSV	Eidesvik	DNV
2003	PSV	Eidesvik	DNV	2012	PSV	Olympic Shipping	DNV
2006	Car/passenger ferry	Fjord1	DNV	2012	PSV	Island Offshore	DNV
2007	Car/passenger ferry	Fjord1	DNV	2012	General Cargo	Nordnorsk Shipping	DNV
2007	Car/passenger ferry	Fjord1	DNV	2012	PSV	Eidesvik Shipping	DNV
2007	Car/passenger ferry	Fjord1	DNV	2012	PSV	Island Offshore	DNV
2007	Car/passenger ferry	Fjord1	DNV	2012	Car/passenger ferry	Torghatten Nord	DNV
2008	PSV	Eidesvik Shipping	DNV	2012	Car/passenger ferry	Torghatten Nord	DNV
2009	PSV	Eidesvik Shipping	DNV	2012	Car/passenger ferry	Torghatten Nord	DNV
2009	Car/passenger ferry	Tide Sjø	DNV	2013	PSV	REM	DNV
2009	Car/passenger ferry	Tide Sjø	DNV	2013	RoPax	Viking Line	LR
2009	Car/passenger ferry	Tide Sjø	DNV	2013	Car/passenger ferry	Torghatten Nord	DNV
2009	Patrol vessel	Remøy Management	DNV	2013	Harbor vessel	Incheon Port Authority	KR
2009	Car/passenger ferry	Fjord1	DNV	2013	General Cargo	Eidsvaag	DNV
2010	Patrol vessel	Remøy Management	DNV	2013	RoPax	Fjordline	DNV
2010	Car/passenger ferry	Fjord1	DNV	2013	High speed RoPax	Buquebus	DNV
2010	Patrol vessel	Remøy Management	DNV	2013	Tug	CNOOC	CCS
2010	Car/passenger ferry	Fjord1	DNV	2013	Tug	CNOOC	CCS
2010	Car/passenger ferry	Fjord1	DNV	2013	Car/passenger ferry	Norled	DNV
2010	Car/passenger ferry	Fosen Namsos Sjø	DNV	2014	Car/passenger ferry	Norled	DNV
2011	PSV	DOF	DNV	2014	Tug	Buksér & Berging	DNV
2011*	Chemical tanker	Tarbit Shipping	GL	2014	RoPax	Fjordline	DNV
2011	Car/passenger ferry	Fjord1	DNV				
2011	PSV	Solstad Rederi	DNV				

* Conversion project

Updated 07.03.2014
Excluding LNG carriers and inland waterway vessels

LNG newbuilds

53 confirmed LNG fuelled newbuilds

Confirmed orderbook

Year	Type of vessel	Owner	Class	Year	Type of vessel	Owner	Class
2014	Ro-Ro	Norlines	DNV	2015	LEG carrier	Evergas	BV
2014	Ro-Ro	Norlines	DNV	2015	LEG carrier	Evergas	BV
2014	Patrol vessel	Finish Border Guard	GL	2015	LEG carrier	Evergas	BV
2014	Car/passenger ferry	Society of Quebec	LR	2015	Bulk ship	Erik Thun	LR
2014	Car/passenger ferry	Society of Quebec	LR	2015	Container Ship	Brodosplit	DNV GL
2014	Car/passenger ferry	Society of Quebec	LR	2015	Container Ship	Brodosplit	DNV GL
2014	Tug	Buksér & Berging	DNV	2015	PSV	Siem Offshore	
2014	PSV	Harvey Gulf Int.	ABS	2015	PSV	Siem Offshore	
2014	PSV	Harvey Gulf Int.	ABS	2015	Container Ship	TOTE Shipholdings	ABS
2014	PSV	Harvey Gulf Int.	ABS	2016	Container Ship	TOTE Shipholdings	ABS
2014	PSV	Harvey Gulf Int.	ABS	2016	Icebreaker	Finnish Transport A.	LR
2014	Gas carrier	SABIC	BV	2016	PSV	Siem Offshore	
2014	Gas carrier	SABIC	BV	2016	PSV	Siem Offshore	
2014*	Product tanker	Bergen Tankers	LR	2016	Chemical tanker	Terntank	
2014	General Cargo	Egil Ulvan Rederi	DNV	2016	Chemical tanker	Terntank	
2014	General Cargo	Egil Ulvan Rederi	DNV	2016*	Ro-Ro	TOTE Shipholdings	ABS
2014	PSV	Remøy Shipping	DNV	2016*	Ro-Ro	TOTE Shipholdings	ABS
2014	Car/passenger ferry	AG Ems	GL	2016	Car carrier	UECC	LR
2014*	Car/passenger ferry	AG Ems	GL	2016	Car carrier	UECC	LR
2014	Car/passenger ferry	Samsoe Municipality	DNV	2016	Car/passenger ferry	Boreal Transport	
2014	Ro-Ro	Sea-Cargo	DNV	2016	Car/passenger ferry	Boreal Transport	
2014	Ro-Ro	Sea-Cargo	DNV	2017	RoPax	Brittany Ferries	BV
2015	PSV	Siem Offshore	DNV	2017	Container Ship	Crowley Maritime	DNV GL
2015	PSV	Siem Offshore	DNV	2017	Container Ship	Crowley Maritime	DNV GL
2015	PSV	Simon Møkster	DNV	2018	Container Ship	Matson Navigation	DNV GL
2015	PSV	Harvey Gulf Int.	ABS	2018	Container Ship	Matson Navigation	DNV GL
2015	PSV	Harvey Gulf Int.	ABS				

Updated 07.03.2014

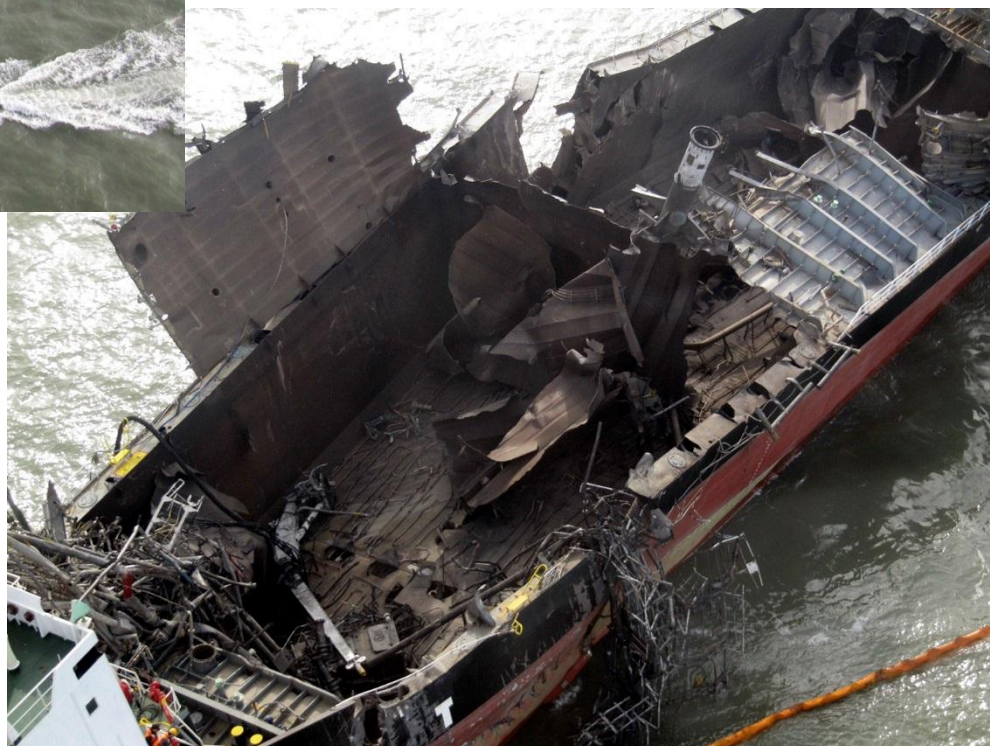
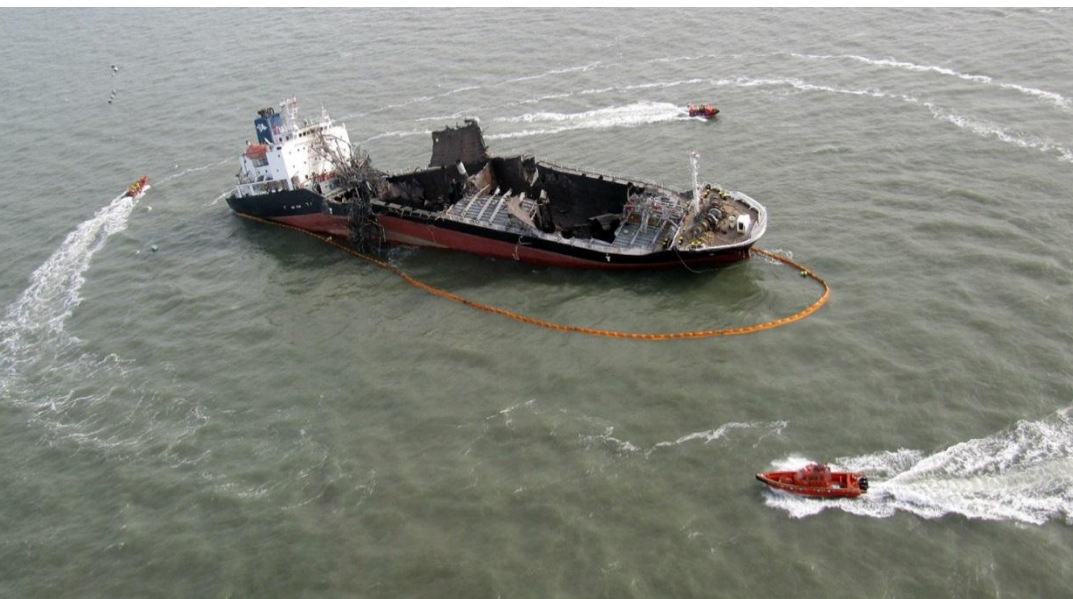
* Conversion project

Excluding LNG carriers and inland waterway vessels



LNG now

- **Technology: leading engine manufacturers Rolls Royce / Wärtsilä / MAN**
- **IMO: Interim guidelines covering gas fuelled ships; draft International Code of Safety for Ships Using Gases or Other Low Flashpoint Fuels (IGF Code) under development**



Ships Retrofit



Ships Retrofit



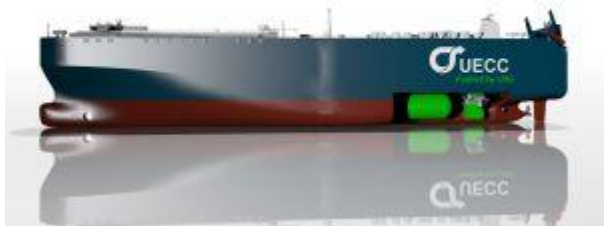
Bit Viking



Viking Grace



Ships New



Ships



Bergensfjord

Chinese shipowner **Zhejiang Huaxiang Shipping Co** has ordered a 14,000-m³ dual-fuel LNG carrier. When delivered in August 2015, the new vessel will operate along the Chinese coast to serve the domestic LNG transport market.



Stavangerfjord



LNG and ports

- **Reaction to the developments in maritime sector.**
- **A (possible) increasing but limited demand from the shipping industry (economic reason for our ports: needs of our clients).**
- **Sustainable port development; cleaner local air quality means a licence to grow.**
- **Scope: LNG as fuel, not as cargo.**

Be prepared for the future !



LNG in ports

- **Infrastructure of bunker facilities in your port; fixed, floating or by truck or barge ? Depending of the local /regional situation.**
- **Some questions which may arise:**
 - **Inland shipping / barges in your port fuelled with LNG?**
 - **Sea going vessels fuelled at LNG in your port; bunkering of LNG needed ?**
 - **Are LNG trucks available/ allowed in your port ?**
 - **Do you have a LNG terminal in your port which can also serve as a LNG bunkering station?**



LNG

Safety aspects (1)

- External safety & security aspects
- Which safety distances should be used?
- At which berths is bunkering of LNG permitted and how?
- At which waterways is bunkering possible by LNG barges ?
- At which berths are LNG fuelled vessels permitted ?
- Does it influence the ISPS plans?
- Bunker safety procedures (legal framework, e.g.port bye laws)



LNG

Safety aspects (2)

- **Supervision**
 - Education and training; safety philosophy
 - Awareness (e.g. crews of LNG bunker vessels)
- **Incidents**
 - Preparation in case of accidents (training, procedures, facilities and equipment)



LNG as a fuel

- **International developments in the shipping sector are showing that LNG fuelled vessels will be sailing at a larger scale in the near future;**
- **Ports should be prepared; however at this moment guidelines for ports are only being developed at local level;**
- **Ports: no standards/guidelines are available for**
 - **Infrastructural requirements in ports (fixed, floating, barge, truck)**
 - **Uniform safety procedures**
 - **A legal framework**



LNG as a fuel

For LNG to be successful as a fuel

- **Harmonize the approach of ports to rules and regulations regarding LNG as fuel and**
- **Create LNG awareness.**



LNG as a fuel ?

Corporate social responsibility

- **Commitment to sustainability**
- **Customer demand**
- **Green image**



LNG

WPCI

LNG Working Group



LNG Working Group

Sub Working Group (SWG) 1: Bunker checklists and accreditation

- **Common bunker checklists listing the extra requirements of ports with regard to LNG bunkering operations in a port environment**
 - **Truck-to-ship, ship-to-ship and shore-to-ship bunker checklists**
- **Develop guidelines for the accreditation of bunkering companies**



LNG Working Group

LNG Bunker Checklist – Truck to Ship

[Based on all comments and additions by Industry Reference Group]

I. PART A: Pre Operations Checklist

(This part should be completed before actual bunker operations start)

I. PART B: Pre Transfer Checklist

(This part should be completed before actual transfer operations start)

I. PART C: LNG Transfer Data

Record of repetitive checks

II. After LNG Transfer Checklist

(This part should be completed after transfer operations have been completed)

Appendix I - GUIDELINES FOR COMPLETING CHECKLIST

Appendix II - LIST OF DEFINITIONS

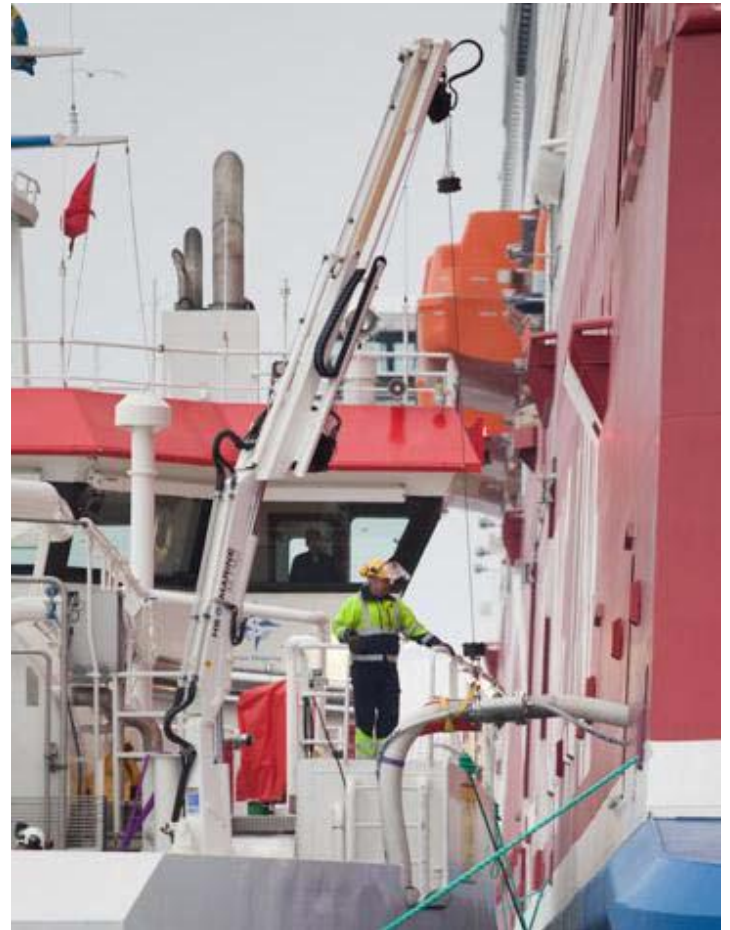


LNG Bunkering





LNG Bunkering



LNG Bunkering



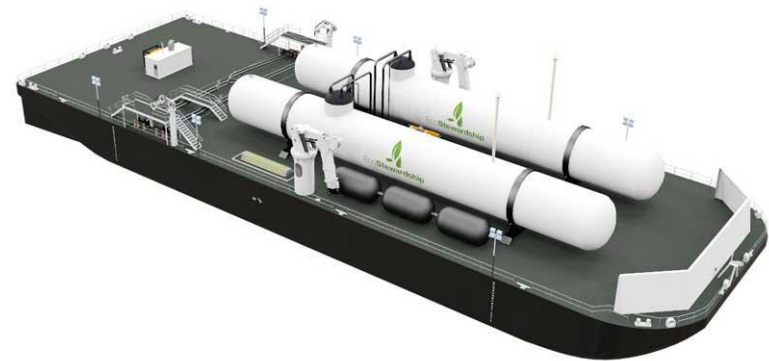
Truck



HARVEY Gulf Facility Port Fourchon, LA



Seagas



CROWLEY LNG Supply / Bunker Barges Louisiana



LNG Bunkering



Encourage

*(financial incentives
offered)*

Possible

*(infrastructure
available)*

Permit

(procedures in place)



Alternatives

METHANOL





LNG Working Group

Sub Working Group 2: Risk Perimeters

- **Create guidance towards a harmonized approach of risk perimeters of the different possible LNG bunkering scenarios within a port environment.**
- **National differences of failure frequencies will determine the outcome.**
 - **A guideline towards a harmonized approach**
 - **Recommendations to enable a harmonized approach**

LNG Risk perimeters

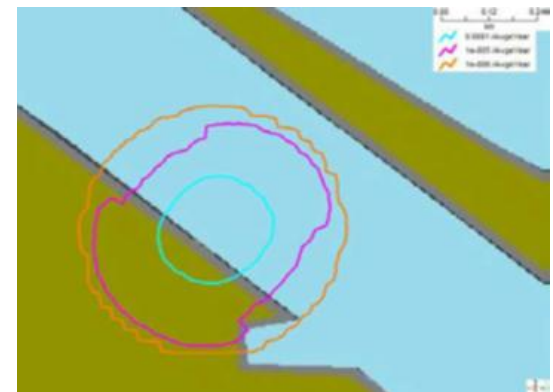
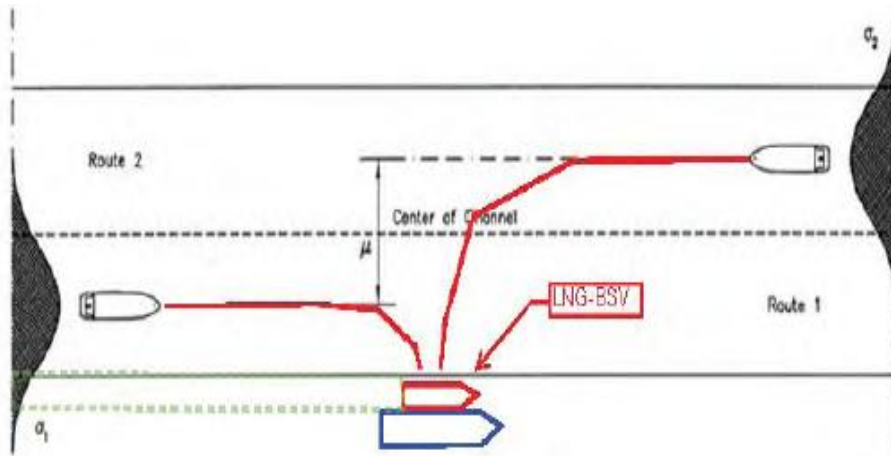


Figure 27: Striking of LNG-BSV (LNG-Tanker similar)



LNG Working Group

Sub Working Group SWG 3: LNG Awareness

- **Get ports moving towards an LNG fuelled future through clear and unbiased information**
- **Provide guidance for ports who could face issues with public awareness concerning LNG**
- **Share knowledge between ports will help to ensure that all ports start from a common understanding, which is the earliest possible onset towards harmonization between ports**



LNG Working Group

Sub Working Group SWG 3: LNG Awareness

- **Produce a world class web site on LNG as a fuel**
- **Web site now in its test phase**
- **Ready in summer 2014**



Website LNG as a fuel



LNG fueled vessels

[Home](#) | [Environment](#) | [Regulations](#) | [Bunkering](#) | [Vessels](#) | [Technical solutions](#) | [Business case](#)

Advantages of LNG

LNG is one of the clean and cost competitive fuels meeting the upcoming 2015 IMO environmental regulations. LNG is obviously the ship's fuel of the future and ports are preparing to offer safe storage and bunkering of LNG for shipping lines in or near their port areas.

LNG Working Group Ports

Active **ANTWERP** Consulting

Project port

Amsterdam
Antwerp
Bremen
Brunsbüttel
Fujairah
Gijón
Gothenburg
Hamburg
Le Havre
Long Beach
Los Angeles
Rotterdam
Stockholm
Wilhelmshaven
Zeebrugge

Flindersports
NY & NJ
Singapore
Taranaki



LNG Working Group Ports Interested

Australia	Jeddah
Barcelona	Johor
Broome	Longview
Busan	Marseille
Cork	Mauritius
Denmark	Nagoya
Dover	Nelson
Dublin	Oakland
Everglades	Oslo
Finland	Peel Ports Liverpool
Frederikstadt	Peel Ports Medway
Gent	San Francisco
Gibraltar	Tacoma
Indonesia	Tanzania
Jacksonville	Valencia



LNG Working Group Participation

All ports are welcome to join

Industry partners will also be invited to join



**World
Ports
Climate
Initiative**

THANKS !

ESI SCORES

