



GROWING MARINE ENVIRONMENTAL MARKETS

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SO_x

Acid rains

ECA 0.1% (2015)
EU 0.5% (2020)
Global 0.5%
(2020 or 2025)

NO_x

Acid rains
Ozone depletion

Tier II (2011)
Tier III in ECA
(2016?)

PM

Impact on
air quality

Along with SO_x
reduction

GHG

Global warming

Under evaluation
by IMO

BALLAST WATER

Damage to local
ecosystems

IMO Global
ballast convention
USCG Regulation

Global



- Not yet ratified
- Proposal to delay enforcement

37	30.38%
30	35%
Countries	World GT

All ships > 400 GT trading internationally

US (Local)

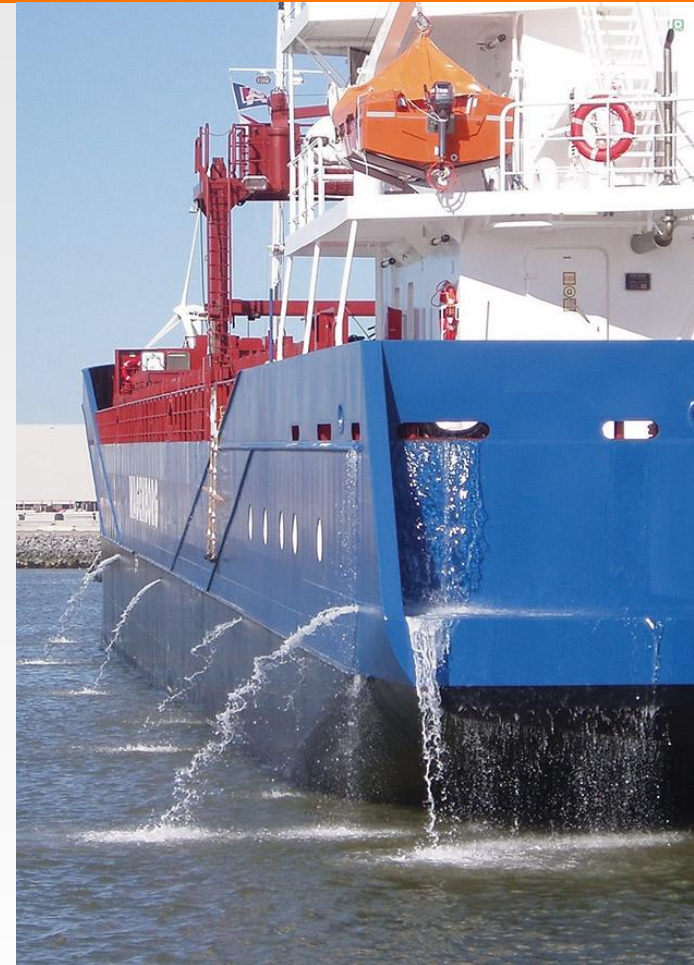


2013 VGP in place

in force from Dec 2013

All ships > 300 GT operating in US waters

- Overall market potential:
 - Over 40,000 existing ships
 - Newbuilds sailing between different ecosystems
- Retrofit market
 - Circa 12,000 ships sailing to US over next years
 - Rescheduling of IMO regulations **could delay peak demand by 2-3 years**
 - Ship owners prioritizing their **green credentials** will continue **ordering ahead of deadlines**
- Contract value per vessel:
 - Small UV system: equipment value ca. **100-400 k€**
 - Large EC system: equipment value ca. **400-1,000 k€**
 - Retrofitting costs of similar magnitude



AQUARIUS® UV

IMO Type
Approval
2012

AMS status
2013

Testing & US
Type
Approval
2015 (target)

2012

2013

2014

2015

AQUARIUS® EC

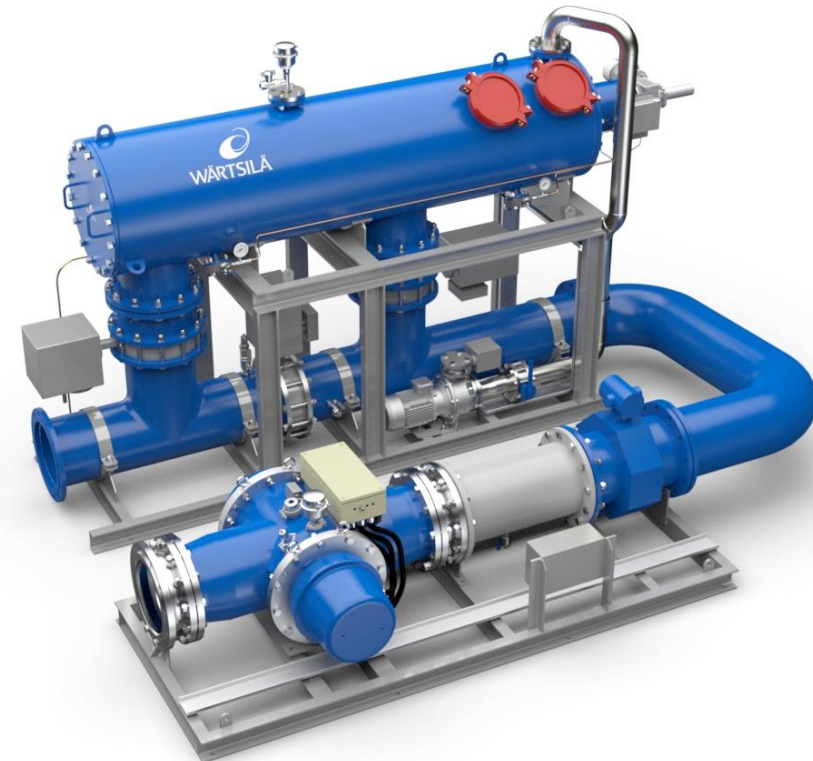
- IMO Final Approval May 2013
- IMO Type Approval 2013 (target)

Undertake testing for US Type Approval

US Type Approval early 2015 (target)

Wärtsilä aims at being a frontrunner in the US through early certification

- Only player offering a **technology choice**
- **Partnership** program with customers:
 - Selection of technology based on customer needs
 - Retrofit services (engineering, installation, turnkey)
 - Global lifecycle support
- **AQUARIUS READY** is an intermediate step to prepare the ship for later installation of the system



- Unique selling points attracting customers
- Robust design and thorough validation process
- Delays in IMO implementation may push small suppliers out of market
- US Type Approval could be an additional hurdle for small players
- Roll-out of industrialization plans
 - Ramp-up of production in the Delivery Centre Suzhou
 - Strategic partnerships for key components to secure cost efficient ramp-up
 - Phased ramp-up of project management and engineering resources for retrofits



**Relevant vessels operating in Emission Control Areas:
Baltic Sea, North Sea and North America**

**Around
16,000
ships**

**Market potential depending on fuel price difference
Relevant commercial vessels with <5 years pay-back time**

**Between
1,500-2,000
ships**

- No relevant changes to legislations in 2013
- Updated calculation of market potential for current Emissions Control Areas based on historical ship movements data
- IMO global sulphur cap to be introduced in 2020 or 2025 will affect around 40,000 vessels
- 0.5% cap in European waters from 2020, irrespective of IMO fuel review

Contract value:

- Equipment varying between ca. **1,500 k€** and **5,000 k€** per ship
- As a rule of thumb, equipment and installation each represent 40% of the total price for a turnkey retrofit



Wärtsilä Open Loop Scrubber

- Tens of thousands of running hours

Wärtsilä Closed Loop Scrubber

- Thousands of running hours
- System onboard Containerships 7 successfully completed tests and achieved approvals by Class and Flag State in October 2013

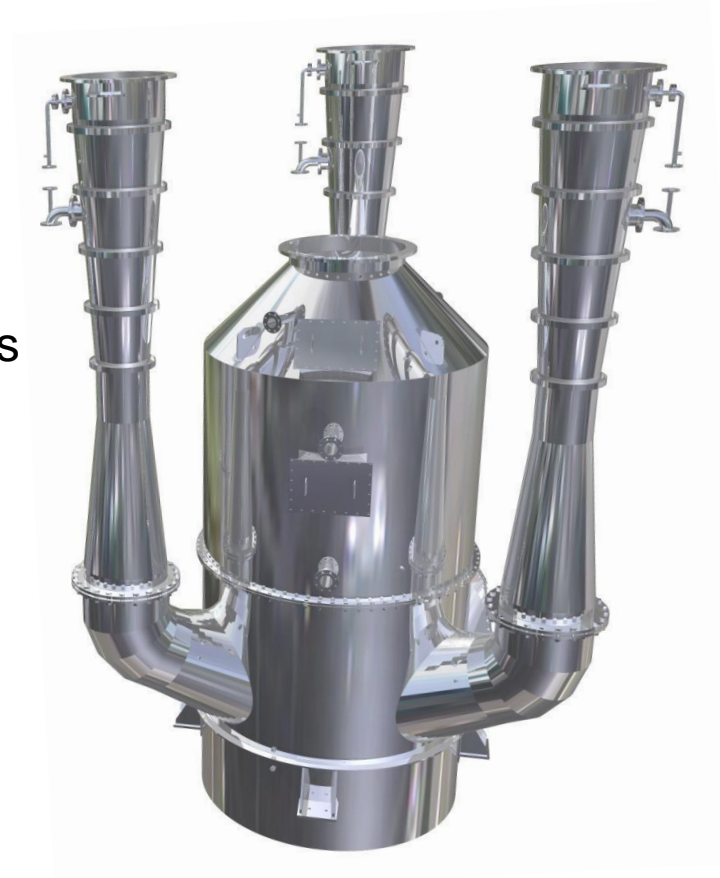
Wärtsilä Hybrid Scrubber

- First system in operation since summer 2013
- Several other systems to be delivered in coming months

Key development activities

- Space efficient system for retrofit applications

Total number of references (deliveries and orders, as of October 2013)
38 ships and 83 systems



Dedicated organization for retrofit projects taking care of customers' needs

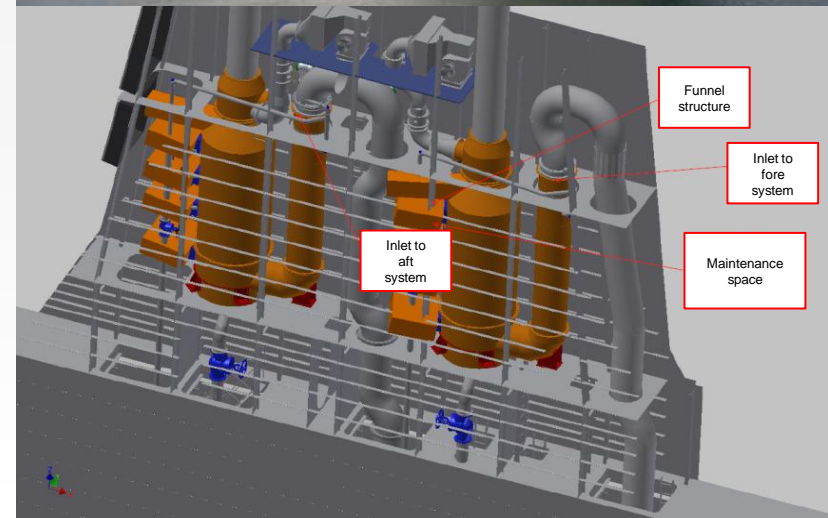
- Engineering
- Planning and project management
- Installation plan approvals by Class or Flag
- Prefabrication and onboard preparations to shorten docking time and costs
- Installation and construction works
- Site management



Retrofit contract

TT-Line Green Ship MS “ROBIN HOOD”

- Modern RoPax Ferry (passenger and freight) operating between Travemünde, Germany and Trelleborg, Sweden
- Order in October 2013 → delivery in Q3 2014
- **Turnkey** contract including:
 - 4 x hybrid scrubbers
 - Complete retrofit design (basic and detail)
 - Plan approval coordination with Class and Flag
 - Pre-fabrication
 - Installation



Wärtsilä Moss, Norway

- Products: scrubbers and auxiliaries
- Medium scale production

North and East Europe





- Products: scrubbers and auxiliaries
- External fabricators
- Large scale production

Wärtsilä Suzhou, China

- Products: scrubbers and auxiliaries
- Large scale production

 Existing site

 Ongoing expansion

	Available technology	Analysis
	<ul style="list-style-type: none"> • Open loop • Closed loop • Hybrid 	<ul style="list-style-type: none"> • Market leader: references, technology choice, brand, market reach • Retrofit capabilities
	<ul style="list-style-type: none"> • Hybrid 	<ul style="list-style-type: none"> • Main competitor • Brand • Global player • References
	<ul style="list-style-type: none"> • Open loop • Hybrid? 	<ul style="list-style-type: none"> • Good position in cruise market • Smaller company
	<ul style="list-style-type: none"> • Open loop • Closed loop 	<ul style="list-style-type: none"> • Low price strategy • Turnkey provider?

- Other players: Belco DuPont, Couple Systems, AEC Systems, Saacke
- Small newcomers entering the market

- Full range of wet scrubbing technologies
- Several references across all main ship types
- Running hours onboard and at laboratory in Moss
- Unique retrofit capabilities
- Market reach and capability of rapidly ramping up deliveries





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