



PureteQ

THE SCRUBBER MAKER

PureteQ designs, delivers and commissions state of art, reliable and patented Exhaust Gas Cleaning Systems to the shipping industry across the globe. This includes superior quality and extensive safety measures, which go on and beyond normal industry standards. Our Water Treatment System is easy to install and operate, and the open tower in-line scrubber system has no moving parts nor any obstructions such as a packaging layer. The simple construction requires less maintenance and it is very simple to operate for the crew. It features the lowest OPEX in the business.

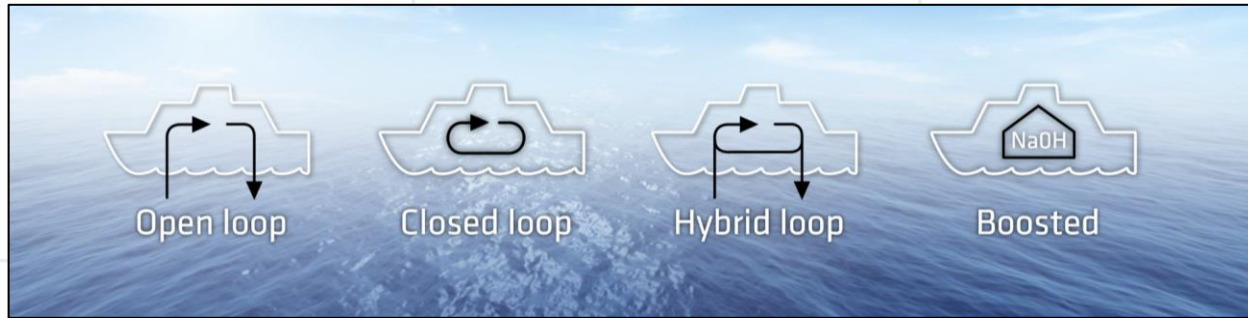
The simple solution to a global challenge

- Compact & Energy efficient design
- Specialized supplier of scrubbers
- Global service offering
- 24/7 trouble shooting service
- Online fleet performance tools

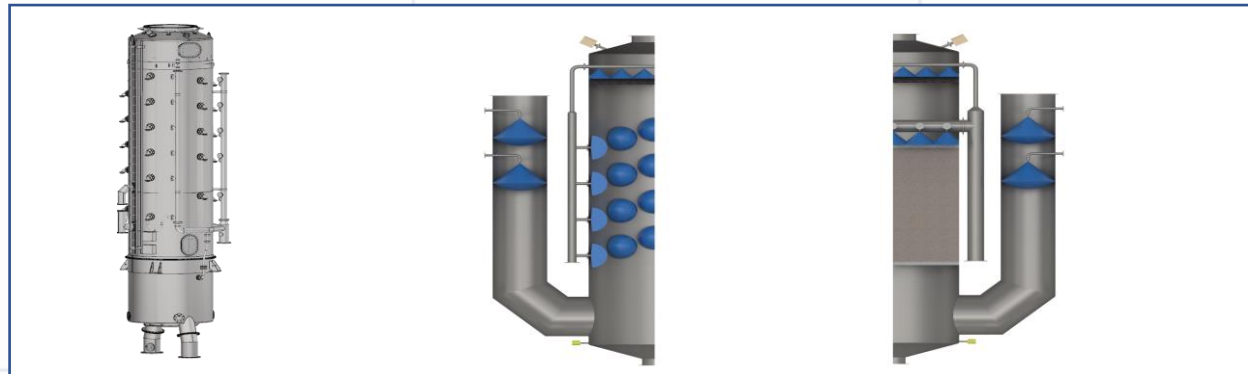


- PureteQ was established in 2010 to invent and transform environmental issues into sustainable solutions.
- Private Limited Company.
- HQ situated in Svendborg, Denmark
 - PureteQ Japan KK, Tokyo
 - PureteQ GmbH, Hamburg
 - PureteQ Service, Romania
 - PureteQ Service, China
 - PureteQ Service, Singapore
 - PureteQ Service, Australia
- 1st Hybrid Scrubber System installed and commissioned in spring 2015
- Global Service Offering for PureteQ scrubbers and any other brand scrubber system, with in-house specialists and workshops

PureteQ – a full house scrubber system specialist and products

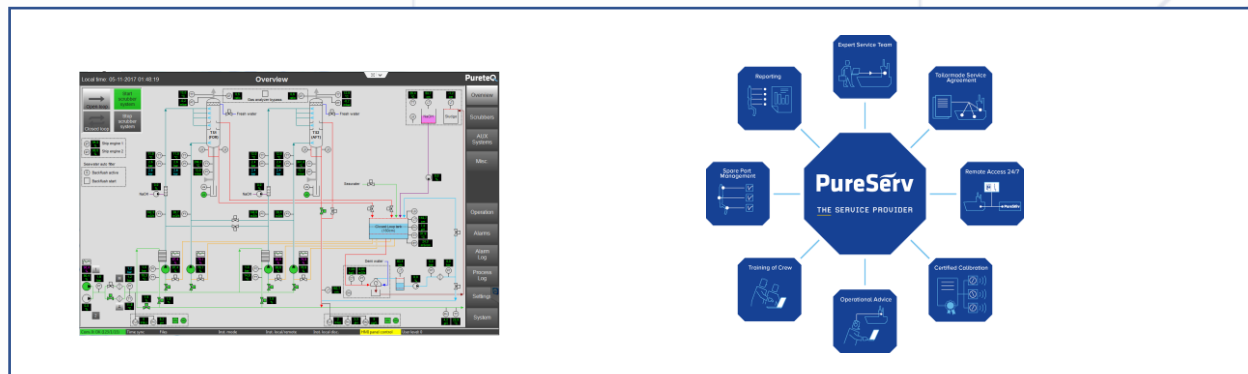


- All scrubber system variations



- 3 scrubber design types

- Inline spray tower Very compact, up to 20 MW
 - By-pass spray tower Up to 20 MW
 - By-pass packed bed tower Up to 40 MW
- ➔ Pre installed with wiring, sensors and pipes for quick and low cost yard installation

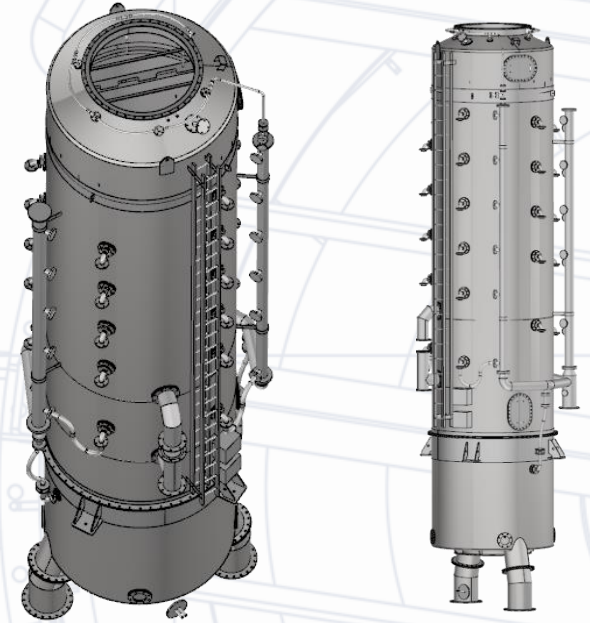


- Inhouse control system / software design
- Full remote access and trouble-shooting
- PureServ = Global specialist service solutions

Pre-installed towers with wiring, sensors and piping

PureteQ towers are supplied as pre-installed of:

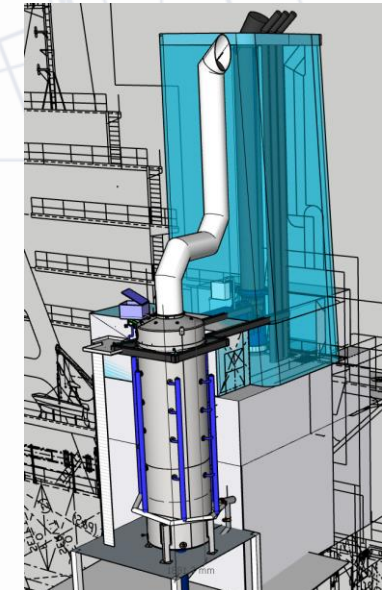
- Wiring and data boxes
- Sensors
- Piping
- Single connection for main water supply and drainage



Towers can be installed inside a casing, or as free-standing structure

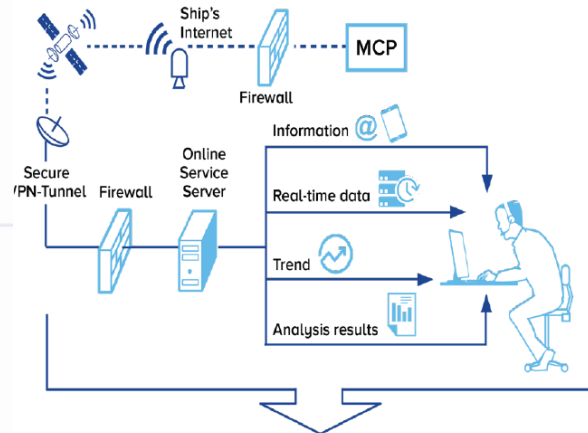
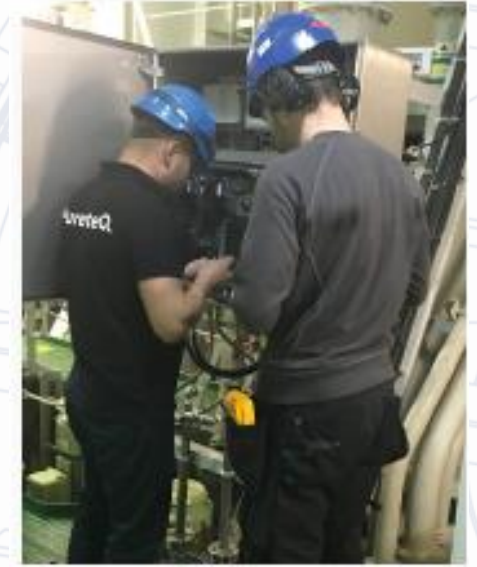
For certain installations, a by-pass scrubber may be installed as a free standing structure, to minimize structural work.

This includes special precautions for weather protection.

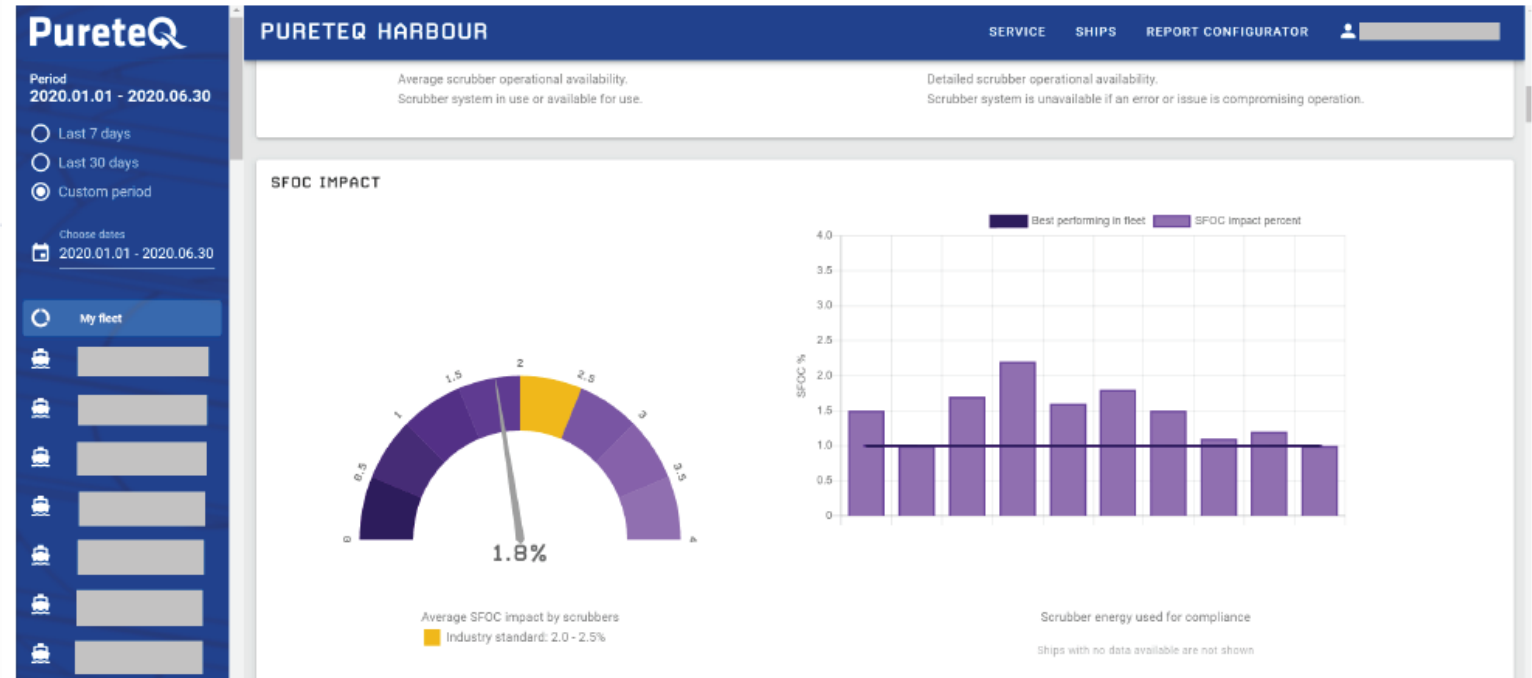


The PureteQ service system for EGCS includes:

- crew training: On ship, and as online training
- crew certification: PureteQ cerfication of crew EGCS training and skills level
- 365/24/7 service support Technical specialist trouble-shooting and assistance
- Calibration service Handling and management of critical sensor calibrations
- PureSpot Fleet optimization software with online monitoring of EGCS performance data
- Spare management: Global warehousing and delivery. Always stocking of critcal spares for continued scrubber operation, especially for gas analyzers and water monitoring equipment
- Service agreement Taylor made agreements per ship – you only pay for what you get



- On-line Monitoring
- System optimization
- Reporting
- Operational advice
- Sparepart management
- Software updates



PureteQ PureteQ tower production – integrated design and production

- 4 factories for scrubber tower production
- Extensive quality testing and documentation
- PureteQ supervision of production
- High alloy stainless steels specialists
- QS9000 based quality system
- Customers are always welcome to visit 😊



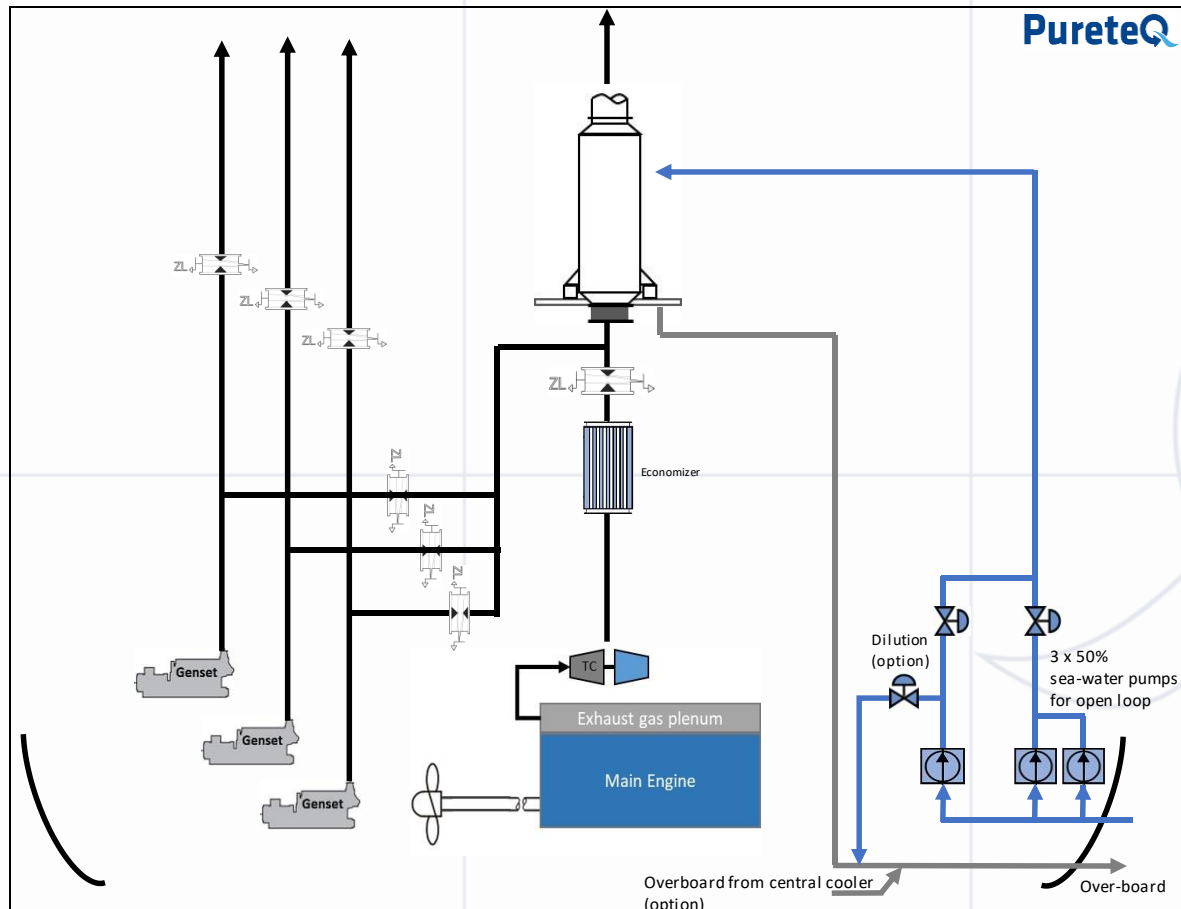
Options all types: Different pump setup's, NaOH boosting modules, inclusion of oil fired boilers, dilution of overboard water

Inline concept:

Scrubber(s) replacing silencers

Compact installation and few components

Well suited for ships with space limitations or stability issues

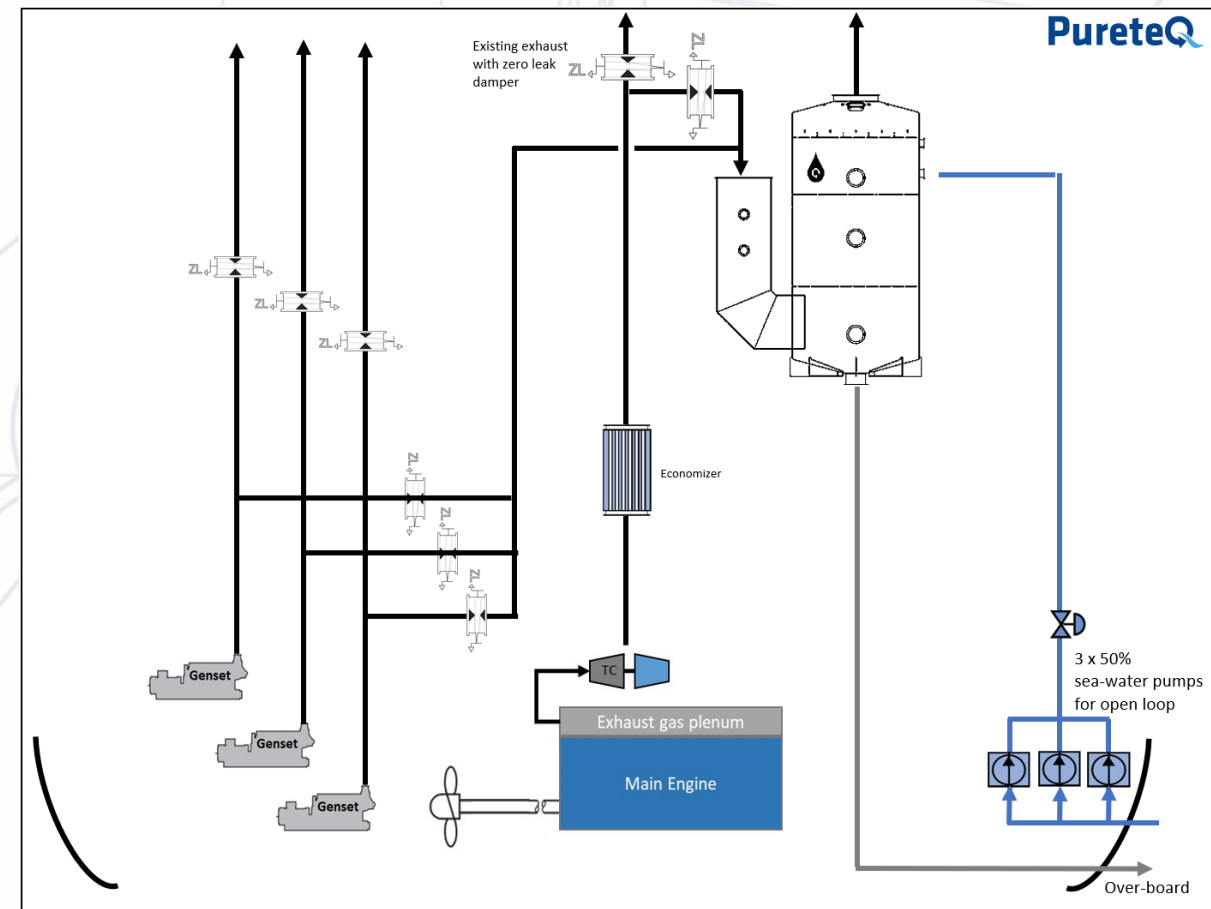


By-pass type concept:

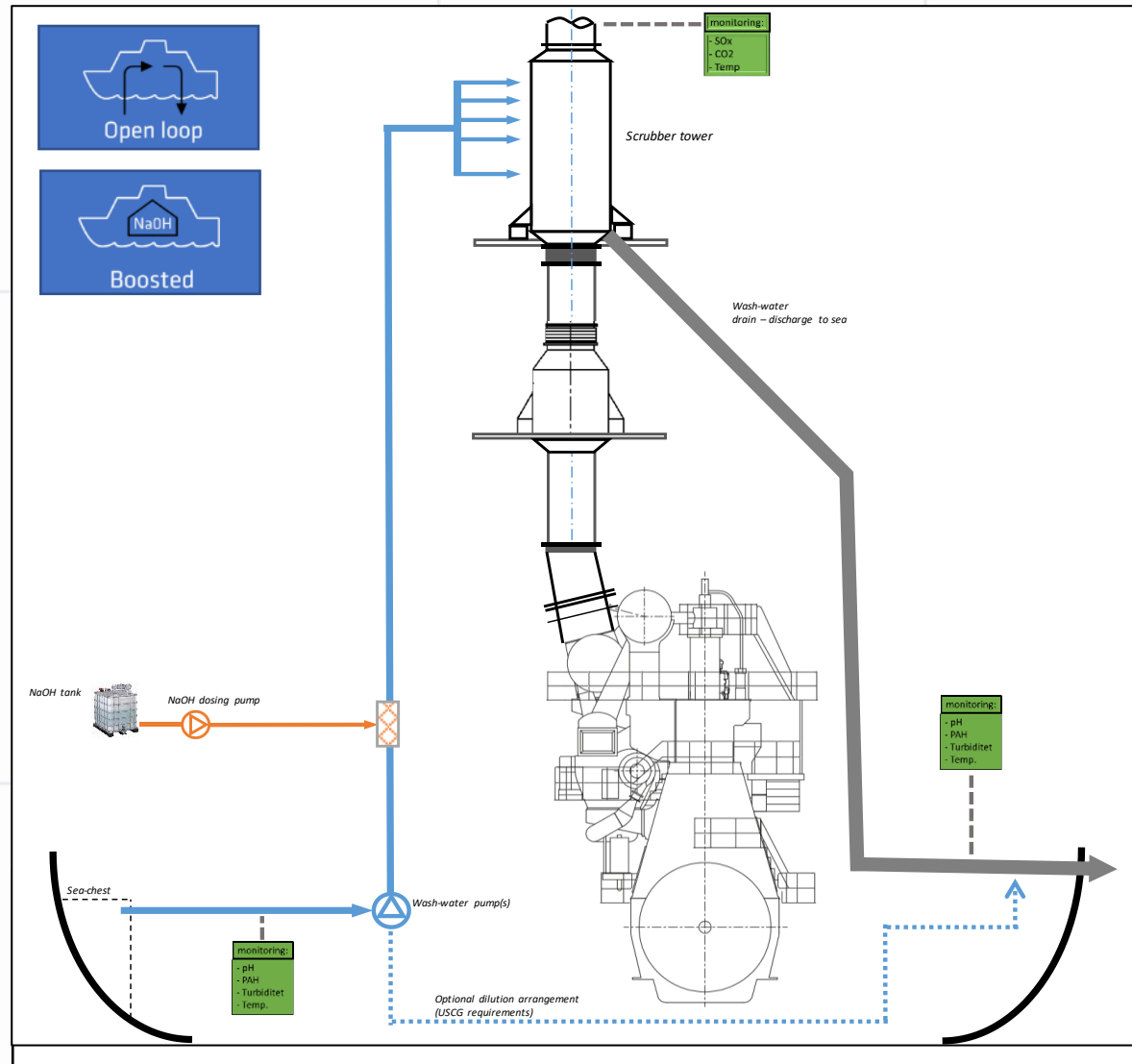
Scrubber in addition to silencers and exhaust piping

Larger installation and additional space requirement

Well suited for big single engines and large vessels such as container vessels and VLCC's

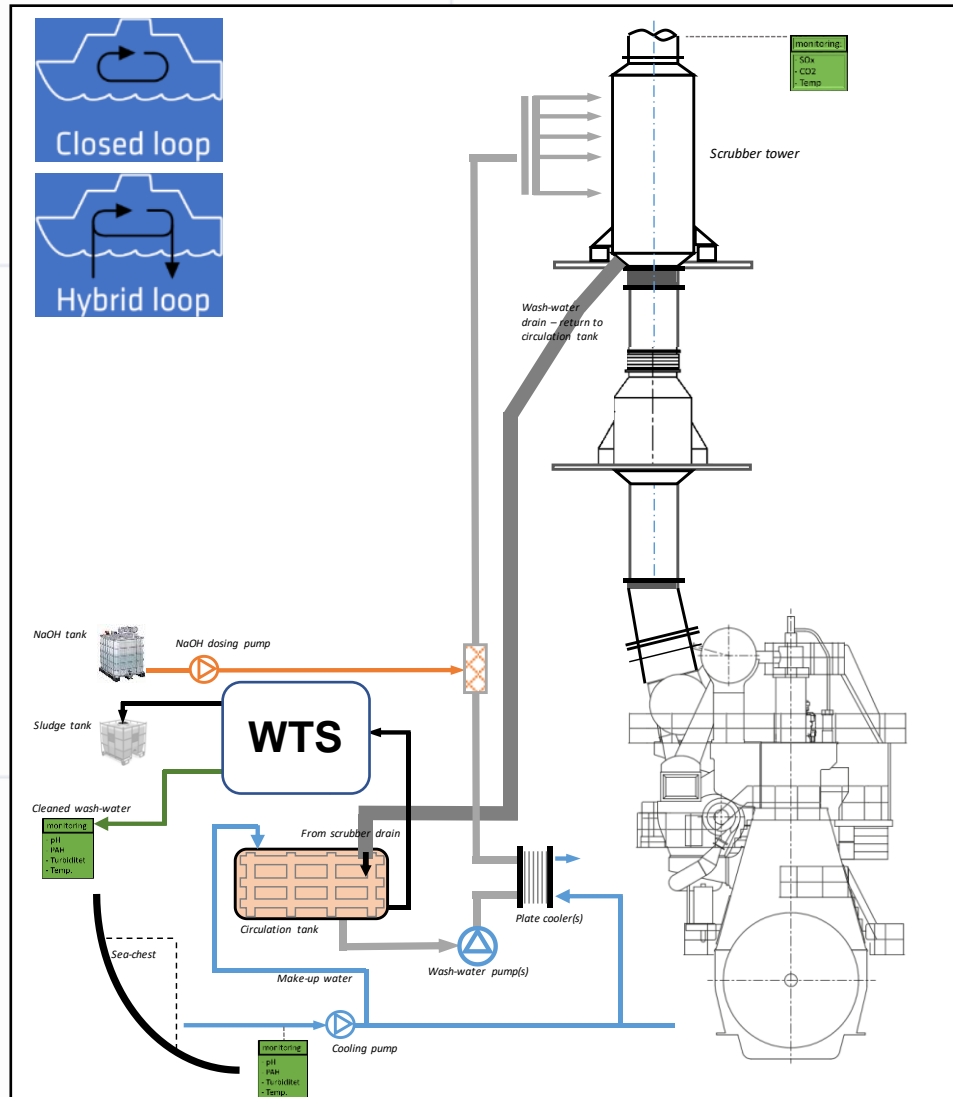


PuretecQ Open Loop – Hybrid Ready version, for later upgrade to closed loop



Open Loop – Hybrid Ready Scope of supply:

- Scrubber towers are designed for operation in both open and closed loop
- Water monitoring unit has reserve slot for input of monitoring data from a closed loop water treatment system
- NaOH dosing system is based on requirements of the closed loop operation (capacity of the dosing pumps)
- NaOH mixing pipes installed
- Control panel and system has reserved space for physical installation of various sensors etc. for a closed loop operation, as well as the software being prepared for a closed loop operation



Hybrid version:

- Combined Open Loop and Closed Loop system
- Largest complexity of installation

Pure Closed Loop with Water Treatment System:

- Small tank sizing
- Low wash-water flow
- Low total power consumption
- No need for hull penetrations of discharge pipes

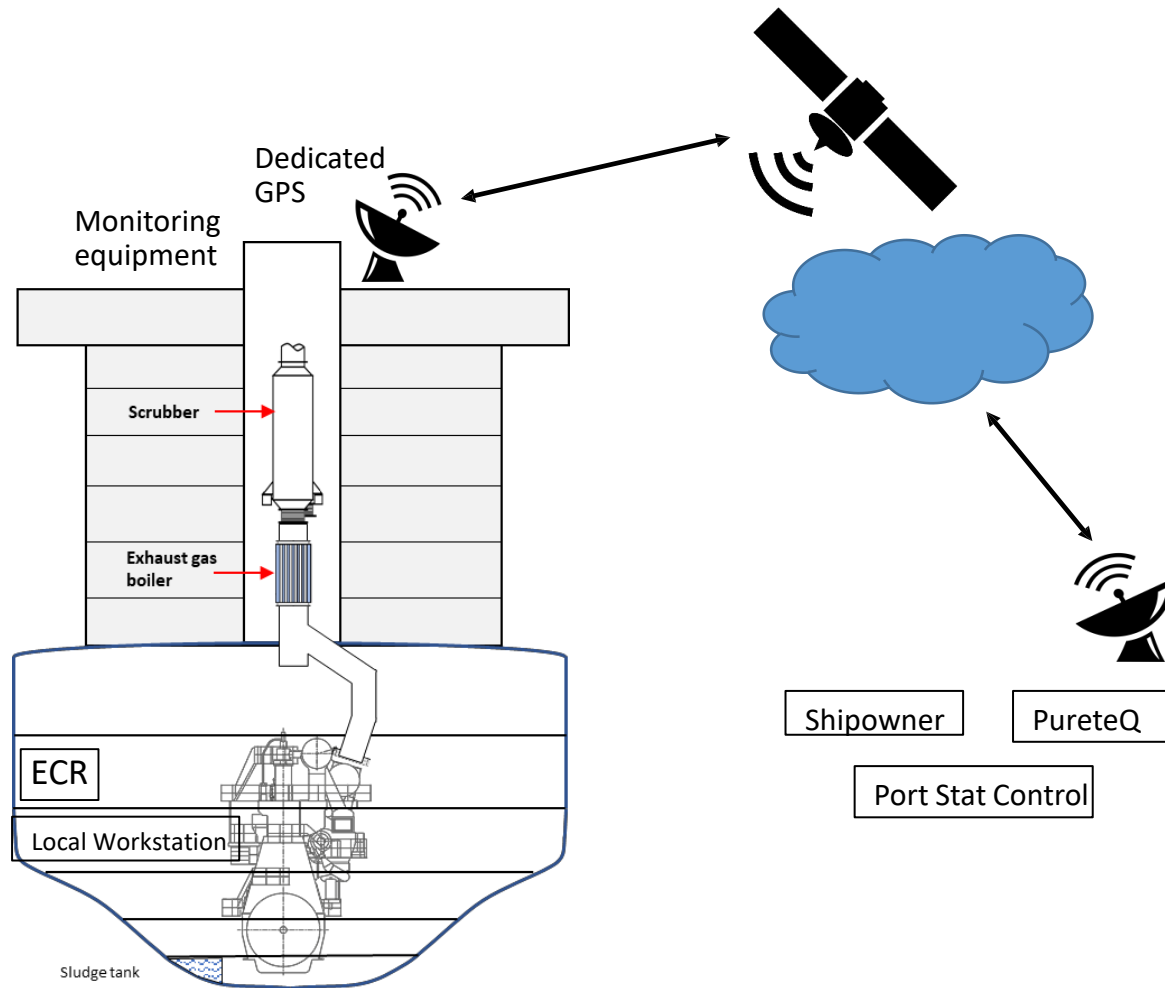
Water Treatment System, WTS

Options includes:

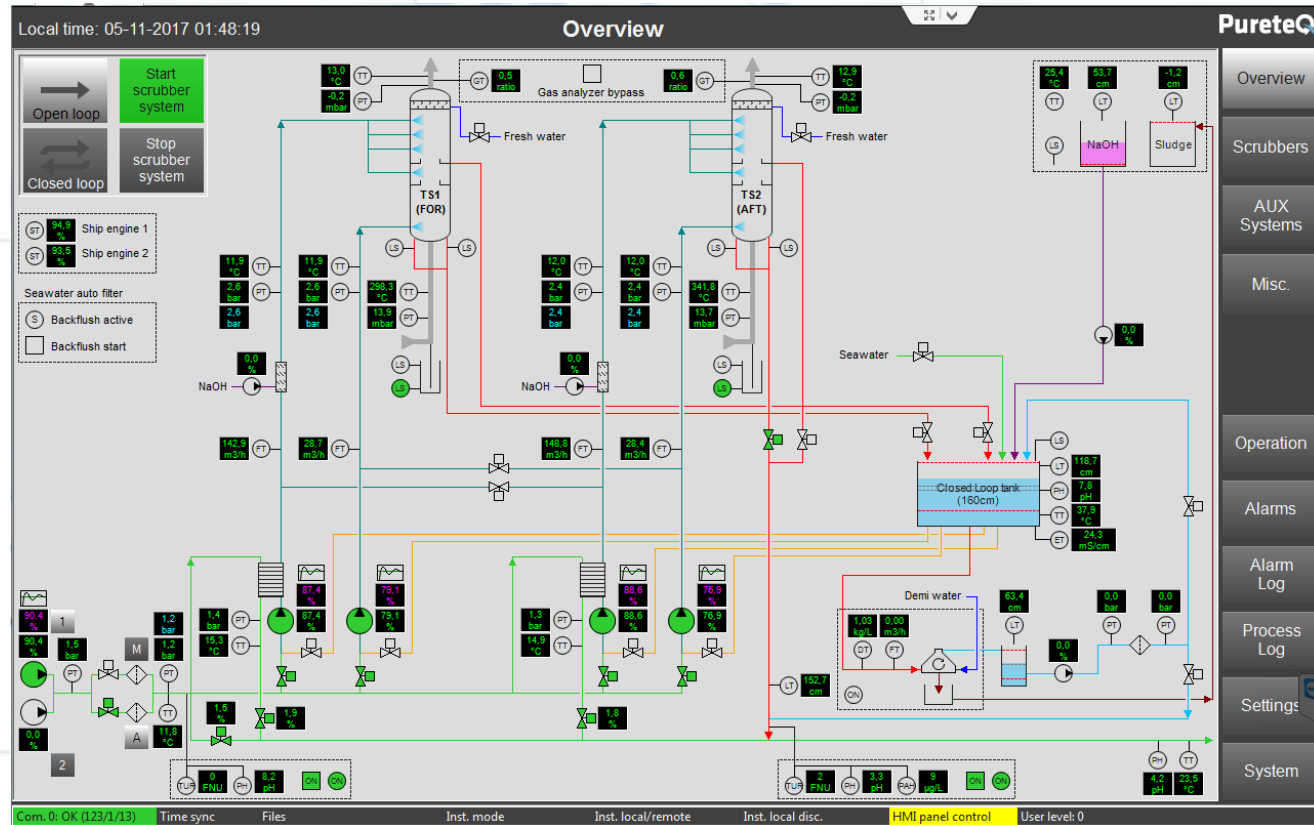
- Centrifuge, mechanical cleaning
- Membrane filters
- Additional options for reductions of sludge (cost saving).



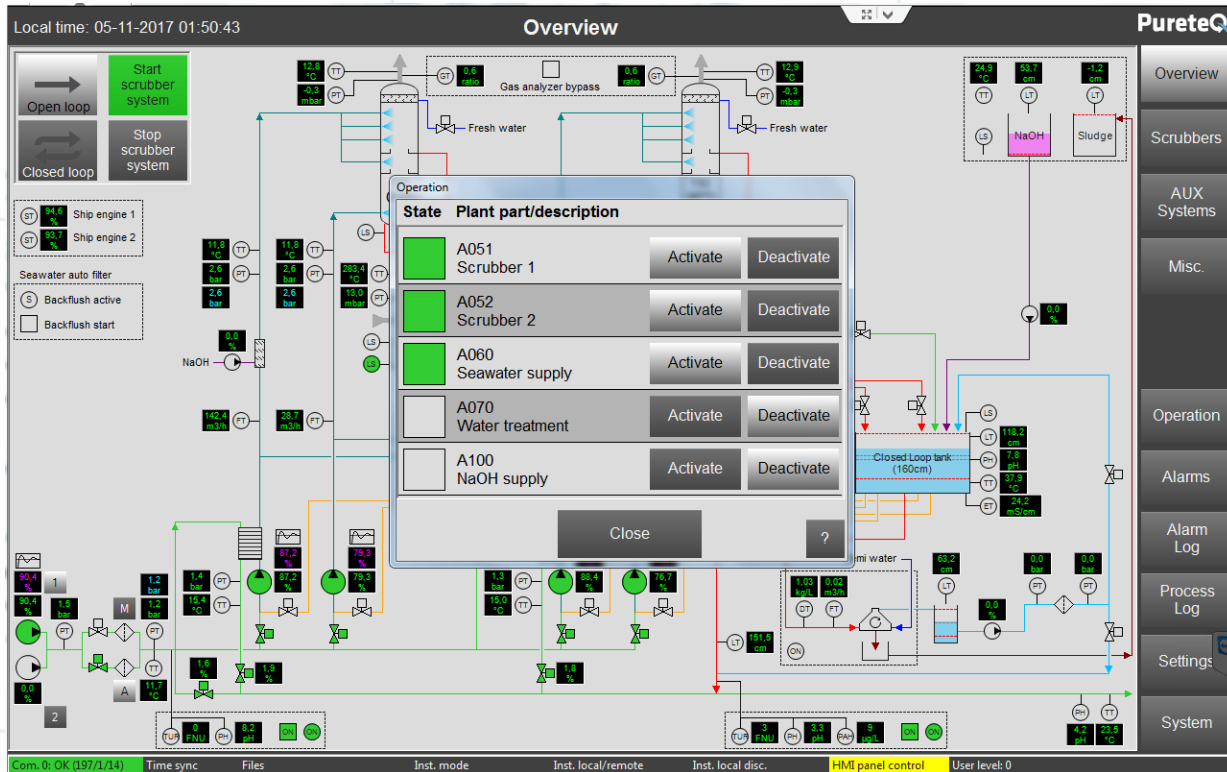
- As an option on Open Loop systems, and always on closed loop systems, a PureteQ system includes a chemical dosing system, which can compensate for eventual low alkalinity of the seawater, or be used to boost the overboard pH level at i.e. US-regulated waters
- The chemical system is based on NaOH but can handle MgO as well.
- The chemical dosing system is installed in a fully enclosed cabinet for maximum user safety.



- The PureteQ EGC control system / HMI is fully developed by PureteQ.
- Based on many years of experience from complex exhaust gas- and water treatment plants as well as energy systems.
- Extremely reliable
- Fully automated system with dedicated GPS and internet connections.
- Easy and fast integration with ships SRO systems.
- Cheap maintenance as it is stand alone and only exchange of critical signals with Ships SRO systems.
- Standard 4 security levels ranging from full control mode to start and stop mode (AMS is read only- tamper proof)
- Remote control is possible – ship owner decide who is to see data and when.
- Data belong to shipowner
- PureteQ may assist in surveillance of performance and optimization thereof if ship owner request



- **User friendly design:**
 - Basic simple overview of compliance
 - Simple detailed overview
- **HMI/control system has a context manual – each function has its own help file.**
- **Easy down load of data in raw format for integration in ships management system**
- **Automatic back-up procedures**
- **Modbus for fast and reliable communication between HMI and PLC and AMS**
- **Remote access and support possible**



- **PureteQ Interactive touch screen:**
 - switch between the complete overview and the more detailed instrument information
 - Statistics available
 - Reports available
- **Built-in optimization of OPEX**
 - Linear function, load condition
 - Linear function, S-content
 - PI Regulator on SO_x/CO_2
- **System operation shown as:**
 - On/Off
 - Valves and Pumps indicates status
 - Individual detailed information possible (fully automated switching or manual)