

# Emission measurements on Stena Britannica

Scrubbers – Closing the loop

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## Scrubbers - Closing the loop

### Activity 3. Integrated Life Cycle Balance

A study including

- ➔ Measurements of emissions to air on one of the main engines on Stena Britannica
- ➔ Sampling of process water and effluent water for chemical analysis and toxicity tests
- ➔ Sampling of rest product for chemical analysis
- ➔ Life Cycle Assessment (LCA)
- ➔ Cost Benefit Assessment (CBA)
  
- ➔ IVL, Lloyd's Register and Wärtsilä

**N.B. All results on the following slides are preliminary**

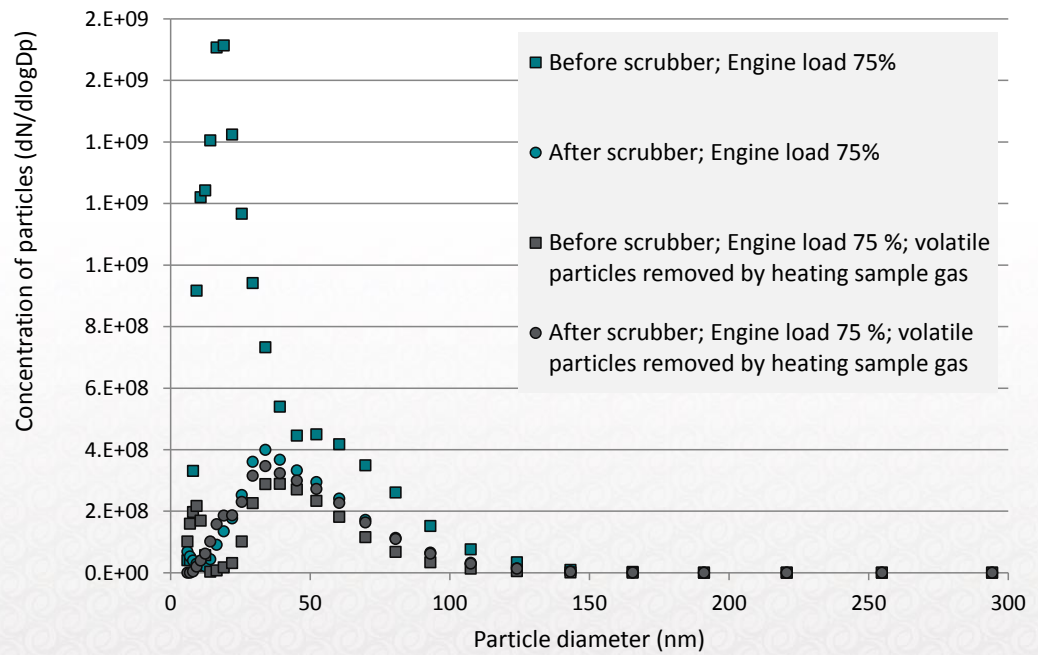


## Emission tests

- Tests on steady state engine loads; 85%, 75%, 50%, and 35%
- Tests on LSFO in Feb
- Tests on HSFO, and HSFO + scrubber in Sep
- LSFO results show typical emission factors from a four stroke marine engine
- Scrubber wash out 99% of all sulphur dioxide
- Comparable to reductions from 2.55% S in fuel to 0.0255% S in fuel
- Some NO<sub>x</sub> removal at 75 % engine load

## Particle emissions

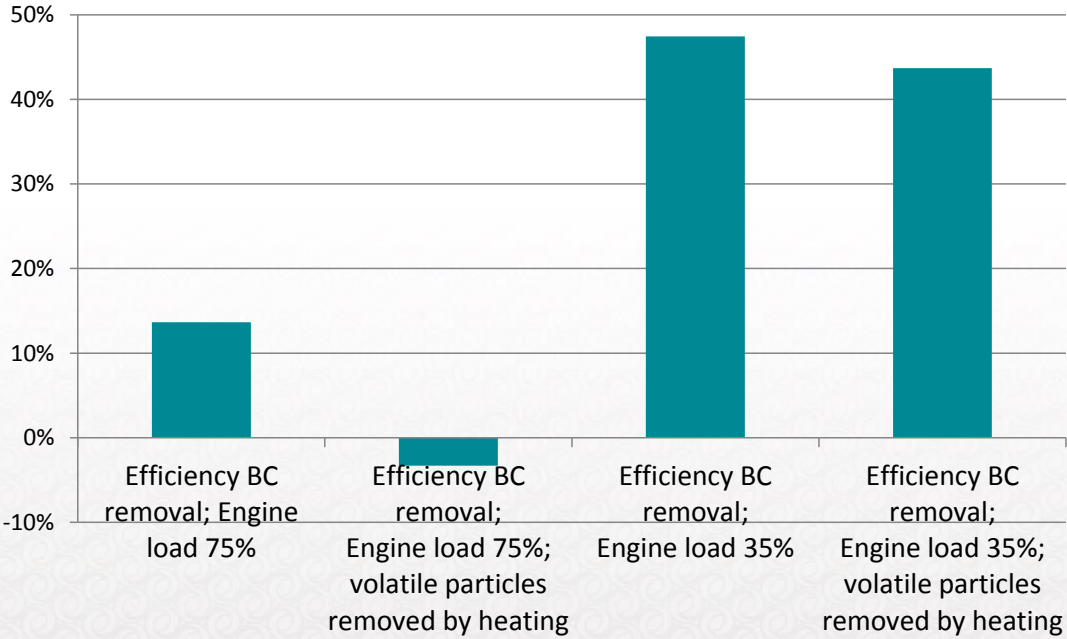
– volatile particles are removed efficiently



## Black carbon emission

- ➔ Preliminary results indicate:
  - Scrubber reduces BC emissions but to a less extent than volatile particles
  - Emissions are higher at low engine loads but the difference in concentration after the scrubber are smaller compared to before the scrubber
  - BC emissions from previous measurements on LSFO in Feb gave lower levels than measurements after the scrubber

# Scrubber BC removal

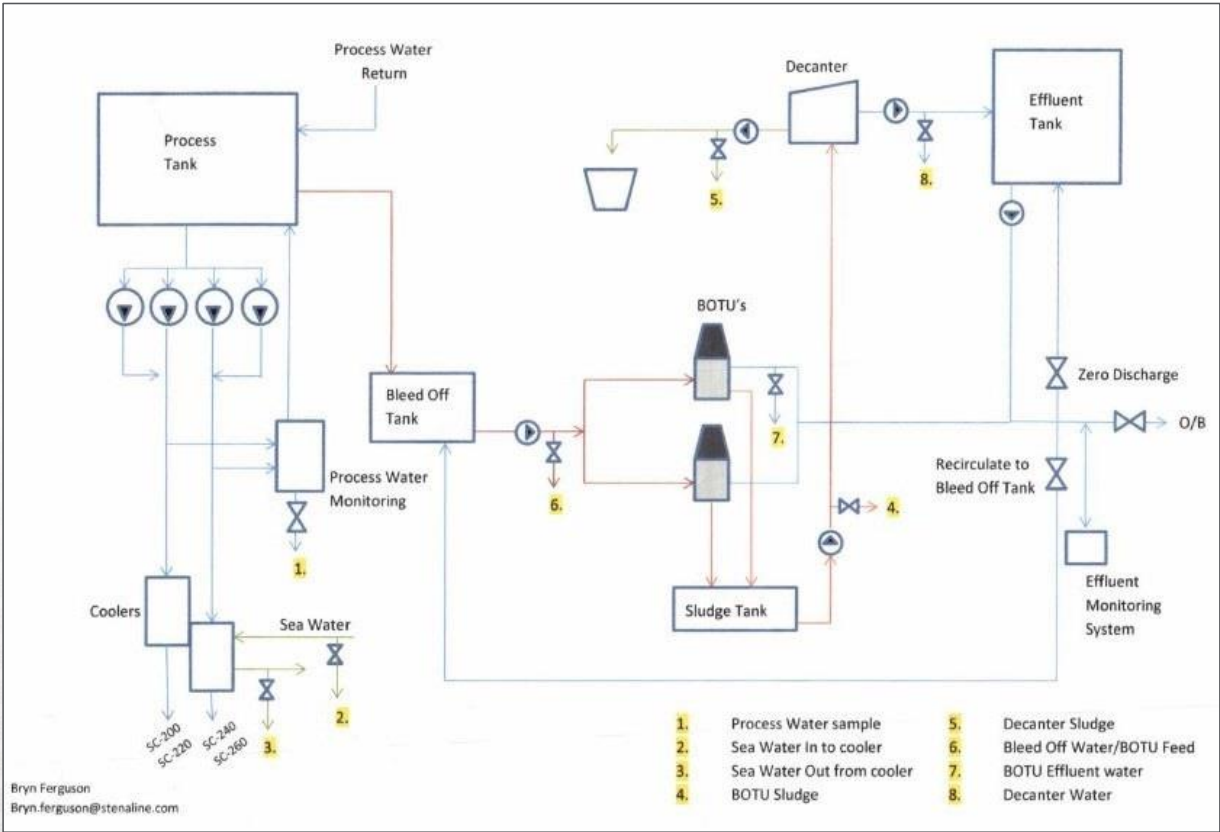


## Water emissions and sludge





# Sampling scheme for scrubber water



Thank you!

