CIMAC Circle at SMM September 2016.

“IMO Tier III strategies under the light of changes in the oil market”

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Existing and Future ECA Areas (DNV)
High BN oil + ACOM

Low BN oil
0.5% Sulphur Limit in International Waters
2020 or 2025?

Tell us your gut feeling!

“When will a max. 0.5% sulphur content in fuel be applied in international waters?”

Place your pin

2020

2025
NO\textsubscript{x} Reduction Technologies

Available Methods

<table>
<thead>
<tr>
<th>After Treatment</th>
<th>SCR, HP or LP</th>
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</table>

Primary method

<table>
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<tr>
<th>EGR, HP or LP</th>
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<tbody>
<tr>
<td>Emulsion fuel</td>
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<tr>
<td>Water injection</td>
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<tr>
<td>Engine tuning</td>
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</table>

Possible NO\textsubscript{x} Reduction

0% 50% 100%

SCR: Selective Catalytic Reduction System; Combination of Methods also being pursued

EGR: Exhaust Gas Recirculation System

Tier III
Tier III questions

- How long time in NECA?
- Which Tier III technology?
- Which fuels?
- Logistical issues with bunkering and tank emptying of tanks?
- SOx compliance strategy
- Space requirements in engine room?
MDT Tier III Technologies

EGR = Exhaust Gas Recirculation

SCR = Selective Catalytic Reduction
EGR and SCR
Fully documented and specified
ERCS for EGR and SCR

Emission Reduction Control System (ERCS)

- Control of all valves
- Measurement of $O_2$ in scavenging air
- Control of $NO_X$ reduction through control of recirculation rate (EGR blower rpm), determining scavenging air $O_2$
- "Near limit" control of EGR to avoid smoke

- Control of all valves
- Measurement of $NO_X$ in exhaust gas
- Control of $NO_X$ reduction through control of $NH_3$ dosing (urea dosing signal)
- Limiters for high and low $NH_3$ in order to avoid $NH_3$ slip and ABS formation
- Too low reactor inlet T=> by-pass SCR
Selection of Tier III Technology

Deciding factors:

- Yard preferences
- First cost (CAPEX)
- Space requirements
- Installation flexibility
- Owner preferences
- Operation cost (OPEX)
- Operation simplicity
- Reliability
- Maintenance cost
- Waste disposal cost

EGR On-Engine
SCR HP or LP
Tier III Solutions Layout

Flexibility in fuel and use

- Prepared for future retrofit
- EGR design
- LS fuel design
- HFO design
- EGR/SCR use in Tier II
- EGR without WTS

First costs
Interested in more information?

MDT 2-stroke ”Emission Project Guide”
Find it at www.mandieselturbo.com under:
  ”Marine Engines and Systems” /
  ”Two Stroke” /
  ”Project Guides” /
  ”Other Guides” /
  ”Emission Project Guide”

NOTE: this also includes info on:
  • SOx scrubbers
  • Combined EGR + SOx scrubber
  • SFOC penalties
  • All consumptions
  • Installation issues
  • Compliance
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