

INVESTOR-GRADE CASE STUDY

REFERENCE APPLICATION | PASSENGER VESSEL EMISSIONS UPGRADE

Cruise Vessel Retrofit

How CET Marine helped achieve IMO Tier III compliance without replacing existing engines



**CET
MARINE**
Clean Emissions Technology

CRUISE VESSEL RETROFIT

Achieving IMO Tier III Compliance Without Engine Replacement

CET Marine EGR technology enables cruise operators to meet the world's most stringent NO_x emission standards with confidence.





80%
NO_x Reduction



IMO
Tier II
→
Tier III



4 x
Wärtsilä
12V32E



Continuous
Emissions
Monitoring

COMPLIANCE PATHWAY



TIER II
Current Status

IMO NO_x Tier II Compliance



**CET MARINE
EGR RETROFIT**

Proven Technology
Minimal Downtime



TIER III
Compliance Achieved

IMO NO_x Tier III Compliance



AVOID COSTLY ENGINE REPLACEMENT

Achieve IMO Tier III compliance with a proven, cost-effective EGR solution.

KEY BENEFITS



No Urea
Required



No Ammonia
Handling



No Measurable
Fuel Penalty



No Measurable
Backpressure
Increase

COMPLIANCE VERIFICATION



**TECHNICAL FILE
UPDATED**

All retrofit documentation
prepared and approved



**EIAPP
DOCUMENTATION
ISSUED**

Engine International Air
Pollution Prevention
Certificate



**CEMS
INCLUDED**

Continuous Emissions
Monitoring System
installed and verified



**TIER III
COMPLIANCE
ACHIEVED**

Meets IMO Tier III
NO_x requirements



PROVEN TECHNOLOGY. GLOBAL EXPERIENCE. MEASURABLE RESULTS.
Trusted by leading cruise operators worldwide.



50+
VESSELS
RETROFITTED



15+
YEARS
EXPERIENCE



**GLOBAL
SUPPORT**
Local partners
worldwide

Approx. 80% NOX REDUCTION	Tier II -> Tier III COMPLIANCE	4 x Wartsila 12V32E ENGINES	CEMS included MONITORING
---	---	---	--

Executive summary

This case study outlines how a cruise vessel operator achieved IMO Tier III compliance and reduced NOx emissions by retrofitting existing main engines instead of replacing them.

CASE IN SHORT

The vessel was upgraded with CET Marine EGR technology across four Wartsila 12V32E main engines. The retrofit delivered IMO Tier III NOx compliance while preserving operational flexibility and avoiding the cost, complexity, and downtime of full engine replacement.

Key outcomes

METRIC	RESULT
Engines retrofitted	4 x Wartsila 12V32E
Engine output	Approx. 7 MW per engine
Compliance upgrade	IMO Tier II -> IMO Tier III
NOx reduction	Approx. 80%
Urea requirement	None
Continuous monitoring	Included

Project challenge

The operator needed a practical emissions upgrade that would:

- Meet stricter environmental requirements without extended vessel downtime.
- Avoid the cost and complexity of replacing existing main engines.
- Limit disruption to onboard systems, crew routines, and daily operations.
- Reduce dependence on chemicals, consumables, and additional handling procedures.

The solution

CET Marine installed EGR technology on four Wartsila main engines as part of a vessel-wide emissions upgrade. The system recirculates a controlled share of exhaust gas back into the combustion process, reducing NOx formation while maintaining engine performance and reliability.

Continuous Emissions Monitoring (CEMS) was also included, giving the operator a clear basis for ongoing verification, operational transparency, and compliance documentation.

Compliance pathway

1	2	3	4	5
EGR retrofit	CEMS integration	Technical File update	EIAPP documentation	Tier III outcome

Compliance verification

The retrofit was supported by the following verification and documentation steps:

- Updating the Technical File documentation.
- Preparing EIAPP certification documentation.
- Verifying the IMO Tier III compliance outcome.
- Enabling continuous emissions monitoring through CEMS.

Results and impact

Result summary

METRIC	RESULT
Environmental performance	Approx. 80% NOx reduction, supporting the transition from IMO Tier II to IMO Tier III and strengthening the vessel's environmental profile.
Operational performance	No urea or ammonia handling required, no measurable increase in engine backpressure or fuel consumption, and limited disruption to existing vessel systems.
Business impact	A practical retrofit pathway for fleet modernization, supporting long-term compliance planning without full engine replacement.

Why this matters

This project shows how existing vessels can meet modern emissions requirements through targeted retrofit solutions rather than full engine replacement. For operators planning long-term compliance and fleet modernization, CET Marine EGR provides a practical, lower-disruption pathway with clear environmental and operational value.

REQUEST A FLEET COMPLIANCE REVIEW

For comparable passenger or cruise vessels, the next step is a vessel-specific compliance review covering engine configuration, operating profile, class documentation, monitoring requirements, installation scope, and projected business case.

Qualification: Performance, compliance outcome, installation scope, downtime, and economics are project-specific and depend on vessel design, engine configuration, operating profile, class/flag requirements, shipyard location, and final engineering review.