

INVESTOR-GRADE CASE STUDY

REFERENCE SCENARIO | ECONOMICS AND RETROFIT PATHWAY COMPARISON

Container Feeder Retrofit Economics

Comparing NOx compliance pathways: LNG conversion, SCR, and EGR

This reference scenario helps shipowners compare retrofit routes on the factors that most affect investment decisions: capital cost, off-hire time, integration complexity, operating impact, and readiness for vessel-specific engineering review.


EUR 1.10M
LOWEST EGR OPTION
1 week
SHORTEST DOWNTIME
EUR 1.29M
EGR + FSO
1,000 TEU
REFERENCE VESSEL

Executive Summary

This case study gives feeder container operators a decision-oriented comparison of four NOx compliance pathways: LNG dual-fuel conversion, SCR installation, EGR with Fuel Saving Option, and EGR without Fuel Saving Option. It compares each route by capital investment, estimated downtime, operational complexity, and fit with vessel-specific retrofit planning.

STUDY IN SHORT

Using a standard 1,000 TEU feeder container vessel with an approximately 9 MW main engine as the reference case, CET Marine compares four retrofit pathways: LNG conversion, SCR, EGR with FSO, and EGR-only. The comparison focuses on indicative investment level, installation downtime, operational implications, and suitability for vessel-specific assessment.

Reference vessel

METRIC	RESULT
Vessel type	Feeder Container Vessel
Capacity	1,000 TEU
Main engine output	Approx. 9 MW
Objective	IMO Tier III Compliance

The decision problem

For many vessel owners, the compliance requirement is clear. The harder decision is selecting the pathway that delivers the right balance of capital cost, off-hire time, onboard integration complexity, operational impact, and long-term flexibility.

Compliance options compared

SOLUTION	INVESTMENT	DOWNTIME	BEST-FIT USE CASE
LNG dual-fuel conversion	EUR 10.2M	8 weeks	Comprehensive conversion where LNG infrastructure and long installation window are acceptable.
SCR installation	EUR 1.75M	4 weeks	Established Tier III route where space, urea handling, and maintenance model are acceptable.
EGR + FSO	EUR 1.29M	2 weeks	Balanced pathway combining NOx reduction with fuel-saving potential.
EGR	EUR 1.10M	1 week	Streamlined compliance route prioritizing lower investment and rapid implementation.

All figures should be treated as indicative reference values. Final investment level, installation duration, performance outcome, and compliance pathway must be confirmed through vessel-specific engineering, class and flag review, shipyard planning, and commercial assessment.

Option profiles

LNG DUAL-FUEL CONVERSION

LNG dual-fuel conversion is the most comprehensive pathway in this comparison. It can support significant emissions reduction and future fuel flexibility, but it also requires the highest capital investment, LNG storage and fuel-system integration, and the longest installation window.

SCR INSTALLATION

SCR installation is a proven Tier III compliance pathway with broad engine compatibility. Its main trade-offs are urea consumption, additional maintenance requirements, and the need for sufficient onboard space for catalyst, dosing, and supporting systems.

EGR WITH FUEL SAVING OPTION

EGR with Fuel Saving Option combines NO_x reduction with combustion-efficiency optimization. In the reference scenario, it offers a lower compliance cost than LNG conversion and SCR, shorter downtime than both alternatives, and additional fuel-saving potential that can improve lifecycle economics.

EGR WITHOUT FUEL SAVING OPTION

EGR without Fuel Saving Option is the streamlined pathway for operators prioritizing fast compliance and minimum capital expenditure. In the reference scenario, it has the lowest installation cost and the shortest downtime among the options compared.

Fuel Saving Option (FSO)

- Approx. 11% fuel reduction.
- Approx. 11% CO2 reduction.
- Approx. 11% particulate matter reduction.
- Lower lifecycle operating costs.

Why shipowners choose EGR

- Shipowners choose EGR when they need a practical balance of Tier III compliance capability, lower capital investment, shorter off-hire time, and simpler onboard operation.
- Lower project cost than higher-investment alternatives in the reference scenario.
- Shorter off-hire period and simplified implementation.
- No urea handling for the EGR pathway.

REQUEST A VESSEL-SPECIFIC ASSESSMENT

Request a vessel-specific assessment to confirm the right retrofit pathway for the vessel. The review should cover vessel design, engine type, operating profile, class and flag requirements, shipyard location, installation scope, expected downtime, and project-specific economics.

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