Heavy Duty Vehicles - Marine

#ETI10

Welcome and Introduction

Stuart Bradley
Strategy Manager

Agenda

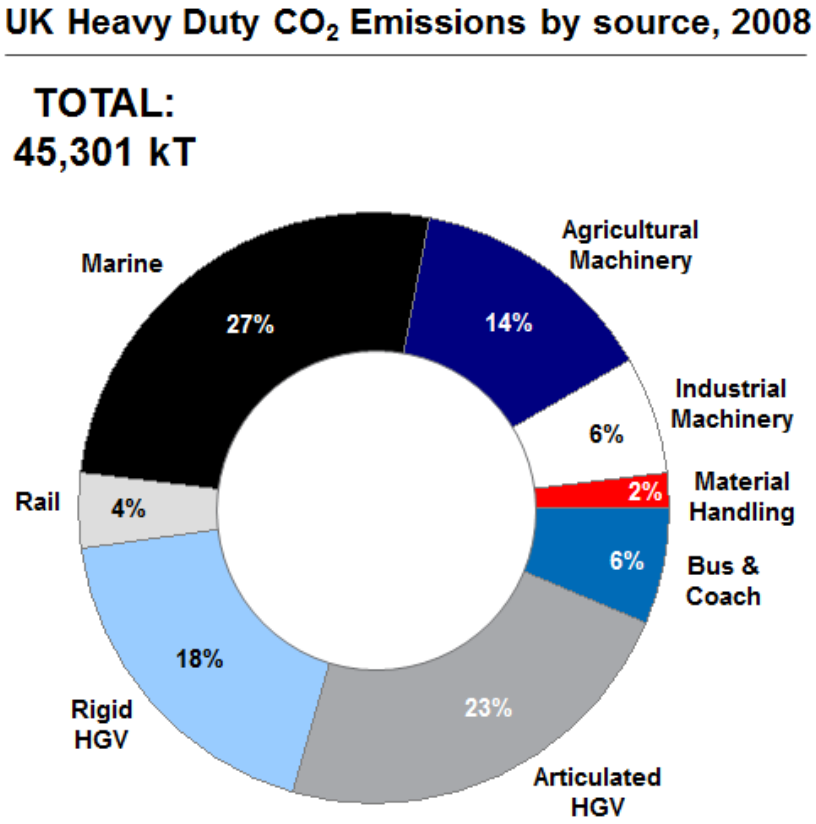
Introduction and welcome	Stuart Bradley (ETI)
Programme overview	Stuart Bradley (ETI)
High Efficiency Propulsion System	Ian Godfrey (Teignbridge Propellers)
Rotor Sail Solution	Tuomas Riski (Norsepower) Steen Jacobsen (Maersk Tankers)
Waste Heat Recovery	Ryan Maughan (Avid Technology)
Insights and forward look	Chris Thorne (ETI)
Close	

HDV Programme Overview

Strategy Manager
Stuart Bradley

Heavy Duty Vehicles Emissions

- UK Shipping
  - 11 million tonnes of CO_2 p.a.
  - Over 120,000 port calls p.a.
  - Over 90% of port calls are from Atlantic coast of Europe
- International Shipping
  - 796 million tonnes of CO_2 in 2012 (Source – IMO)

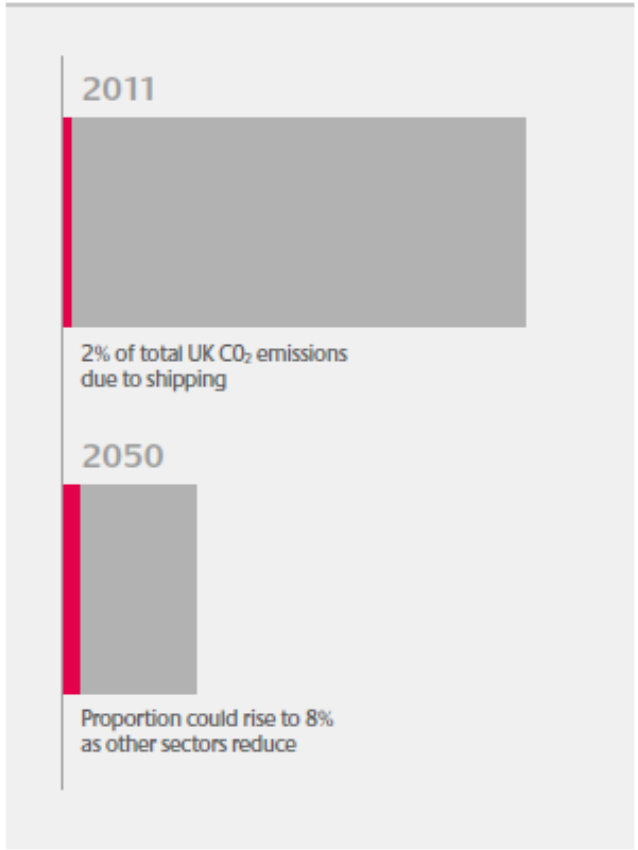


THE AIM OF THE HDV MARINE PROGRAMME

To bring about a meaningful change to the fuel efficiency and Green House Gas intensity of the UK HDV marine fleet

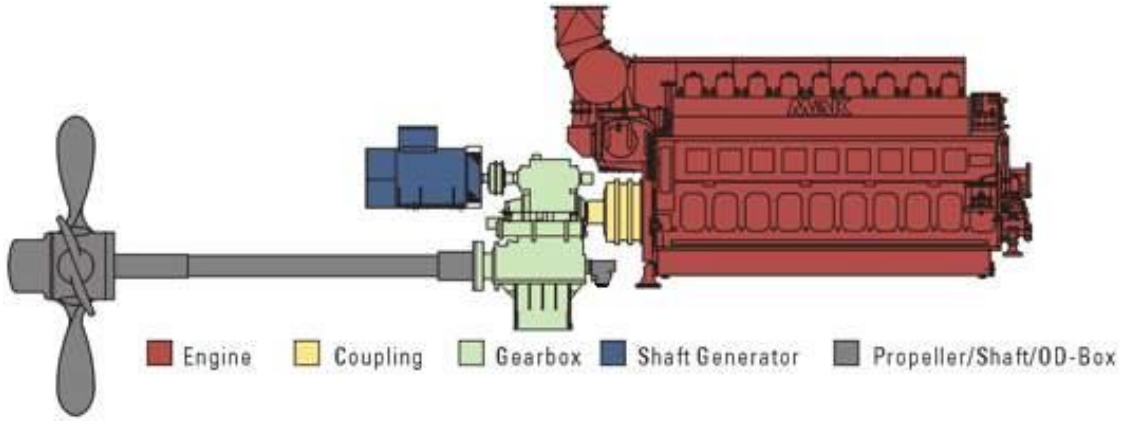
What is the UK Fleet?

Emissions and Ships



Ship Type		Global fleet annual CO_2 in Mtonnes	No of ships in the UK fleet	UK fleet annual CO_2 in Mtonnes	gCO_2 per tonne km	Average journey, km	Mission profile
	Tanker	170	530	3.03	8–90	2800	
	Dry Bulk	180	400	1.11	5–65	3000	
	Container feeder	260	780	5.98	15–82	2600	
	RoPax	105	550	1.53	20–150	200	
	OSV	95	390	0.36	–	–	

What do Ships use Today?



Propulsion Driveline

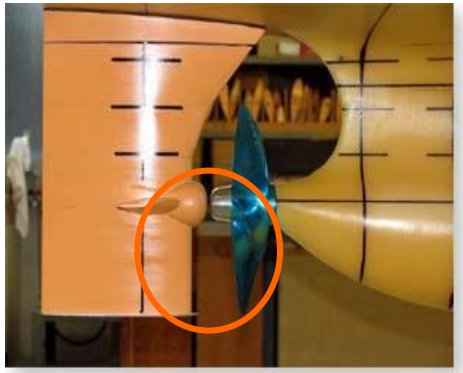
Electrical Power

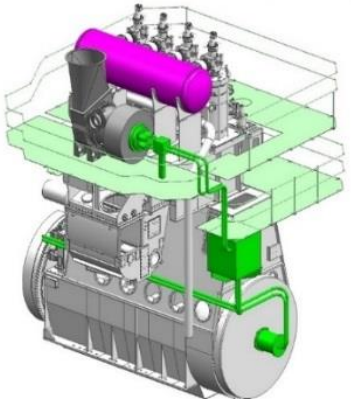
Courtesy: MaK Caterpillar

Marine Programme Phase 1

- Investigation
  - Which ships, routes and markets currently account for our CO_2 emissions and in the future?
  - What technologies can make a significant difference?
  - What vessel concepts and sub-systems will deliver our aspirations?
  - What are the market and technology barriers?
- Preparation for Phase 2 - demonstration

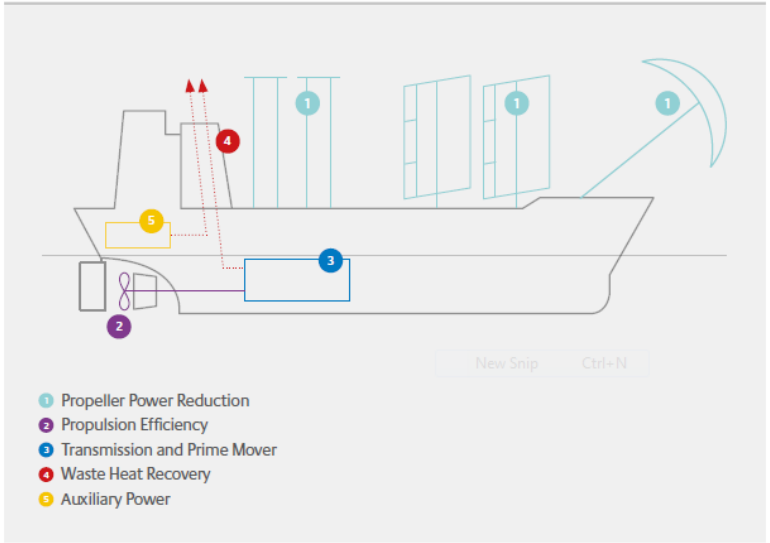
Innovations for Ship Fuel Economy





Phase 2 Projects

- Targeting a 30% reduction in Fuel Consumption
- Waste Heat Recovery
  - Organic Rankine Cycle
- Wind Assisted Propulsion
  - Flettner Rotor
- High Efficiency Propulsion System
  - Improved Propeller-based system
- Independent Results Validation



	Optimum Technologies Applied	Fuel Consumption Improvement, %[18]
Tanker	DFHP Gas Engine, MBDR, ORC and TG, HEPS, FR	40
Dry Bulk	MBDR, ORC and TG, HEPS, FR	32
Container feeder	DFHP Gas Engine, MBDR, ORC and TG, HEPS, WS	30
RoPax	DFHP Gas Engine, ORC and TG Set, MBDR, WS	16
OSV	ORC, TG Set, MBDR, WS	13