

# SHIPPING VISIONS ON THE HORIZON

Radical Emissions Reductions Conference  
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# Outline

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- Policy backdrop
- Radical ship
- Radical shipping
- Radical system



# Policy backdrop

# Policy context

3% global CO<sub>2</sub> & most efficient mode of transport

'International' emissions not covered by Kyoto

International Maritime Organisation (IMO) responsible for mitigation

First mitigation policy put in place 2013

Growth expected/assumed indefinitely



# Mitigation debate paralysed by...

Absence of overarching global cross-sector carbon cap

Policies that share out emissions to nations/organisations problematic

‘Common but differentiated responsibility’ vs ‘no more favourable treatment’

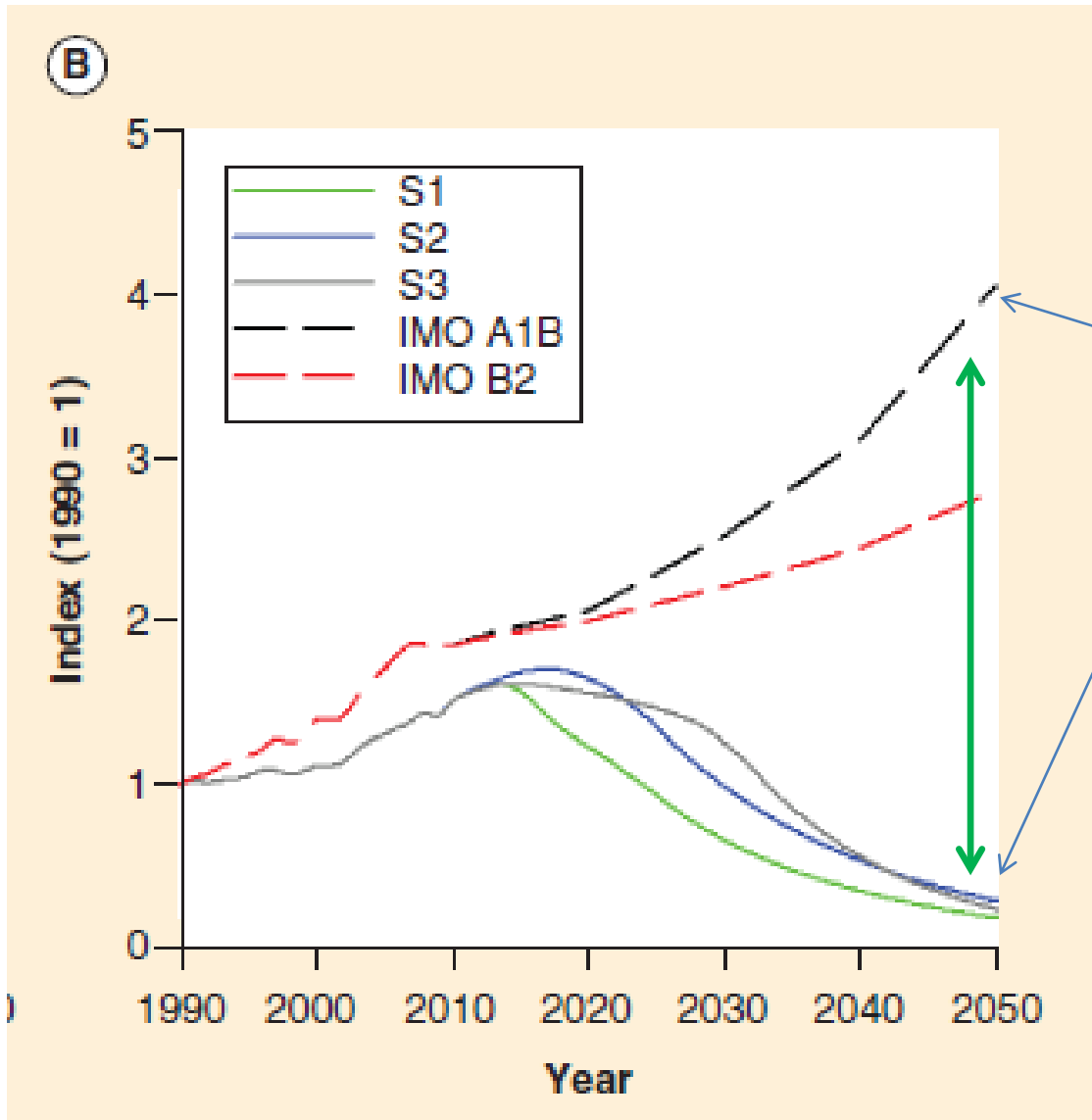
Sector is “more important” and “more efficient” than others





# Scale of the 2°C challenge for shipping

# Comparison with industry's own projections



IMO up to 300% growth

Fair(?) cut 80% by 2050

Huge Gap

# Is closing the gap too challenging?

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Not necessarily...

- Mitigation technologies are plentiful - ship
- Operational efficiency savings available - shipping
- Decarbonisation agenda is shifting trade - system





# Radical ship

# Radical ship

- **Kites:** attached to the bow; operated a high altitude
- **Flettner rotors:** first in 1926; up to 1MW
- **Sails:** fixed or rigid; solar lined; composite materials
- **Battery with electric drive:** suitable for short-sea
- **Fuels:** biofuels; fuel cells



Artist's view of the "E-Ship 1".



- Many opportunities for **retrofitting** – not just new ships



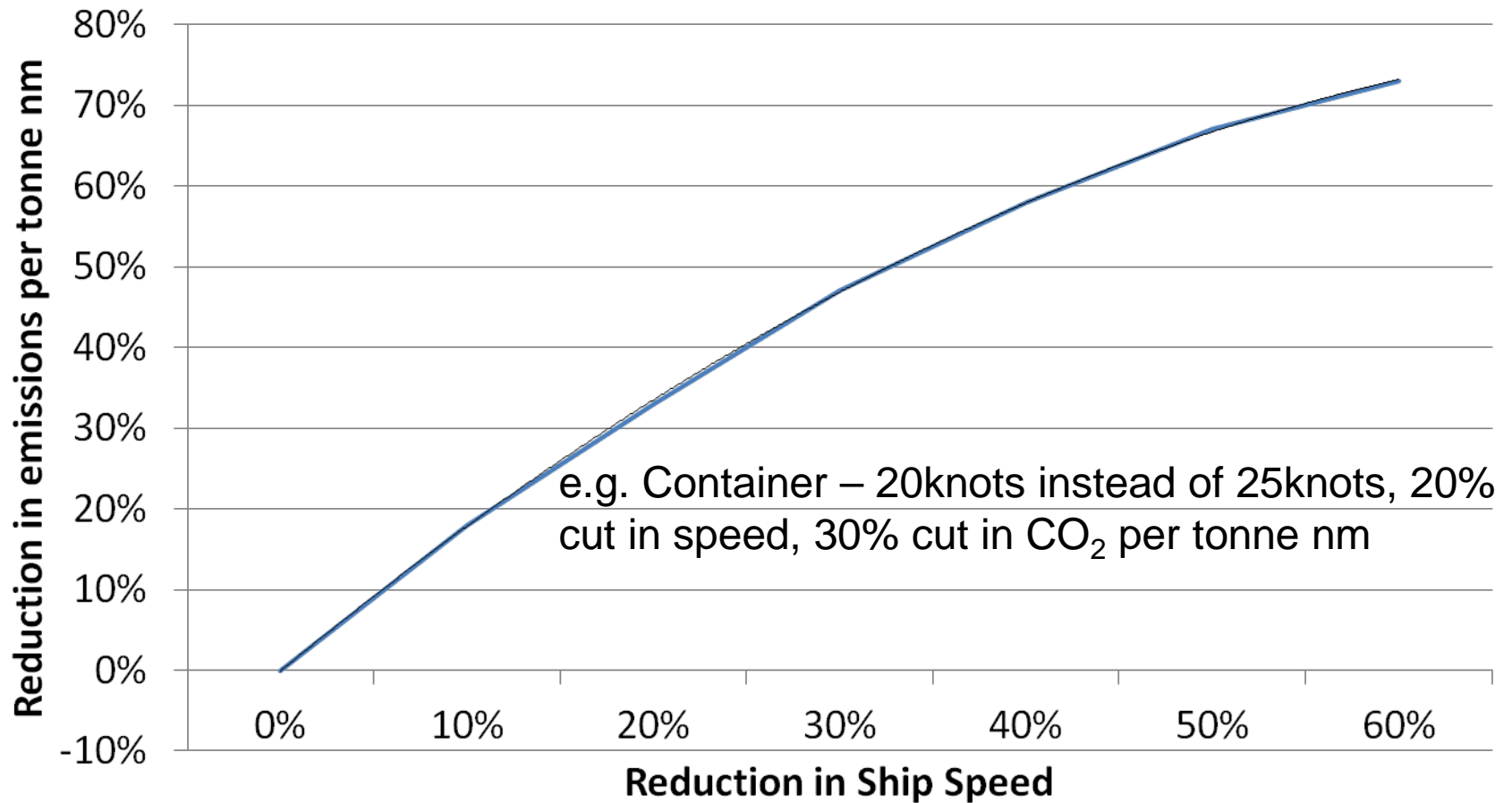
# Radical shipping

# Radical shipping

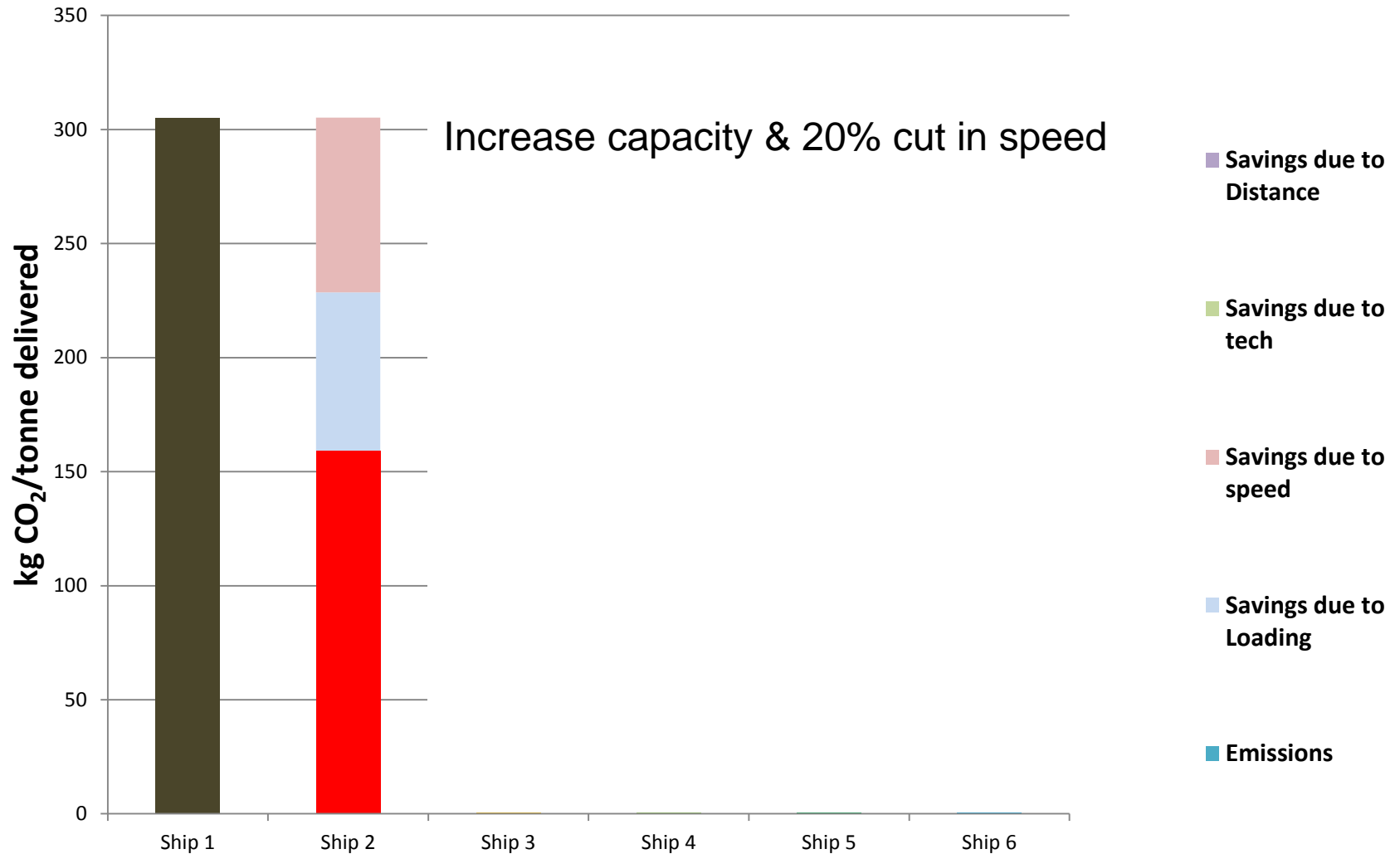
- **Raise capacity:** 70% utilisation is typical
- **Cut speed:** cubed relationship with fuel for power
  - » **Slower ships:** slower transit times – ships at sea for longer (aux engine)

	SIZE (dwt)	TYPICAL SERVICE SPEED (knots)
Oil tanker	100,000	15
Product tanker	8,000	14
Dry bulk carrier	60,000	14
Large container vessel	50,000	25
Small container vessel	10,000	19
Ro-ro	10,000	19
General cargo	3,000	12

# Theoretical impact of speed reduction



# Radical ship system

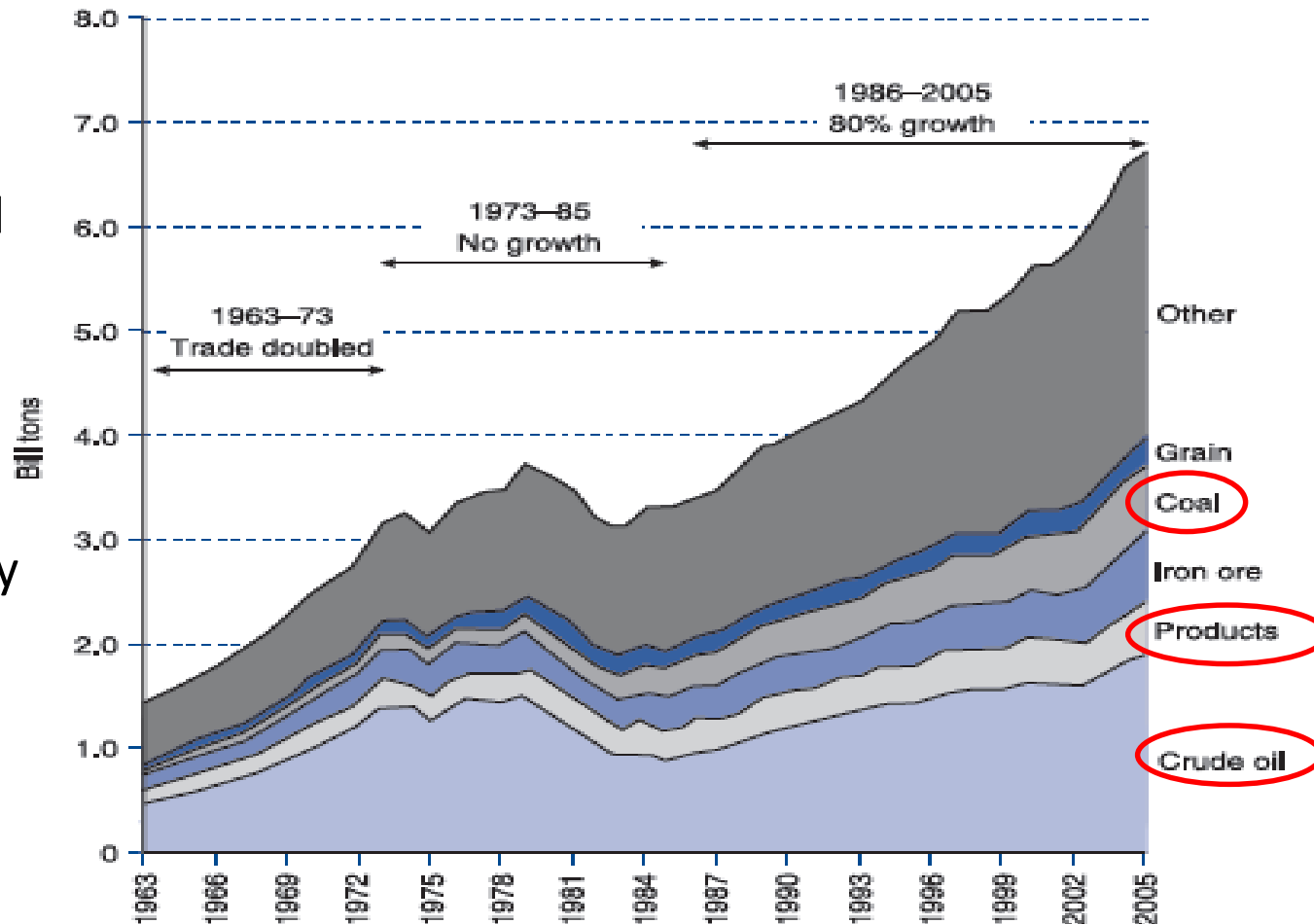




# Radical system

# Global trade in fossil fuels

- Approx ~40% of total tonnes of cargo moved is fossil fuel
- Crude is the largest individual commodity traded by sea



**Figure 4.4**  
Major seaborne trades by commodity

Source: *Fearnleys Review* Taken from Stopford, Maritime Economics.

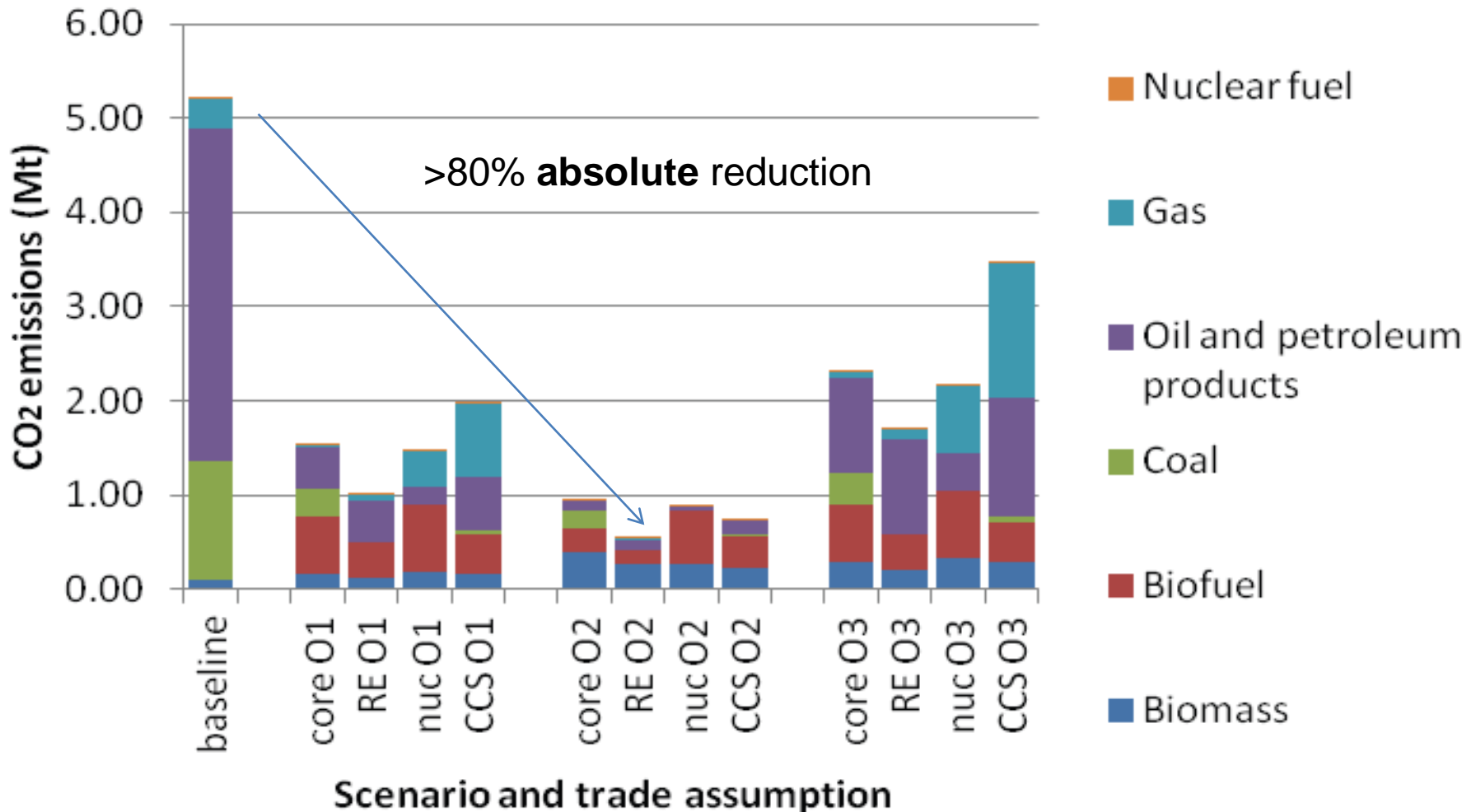


# UK example: using DECC energy scenarios

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- Success of CCS dictates future use of coal (and gas)
- Transport decarbonisation determines impacts on oil
- New biomass and biofuel markets

# Implications of DECC scenarios for CO2



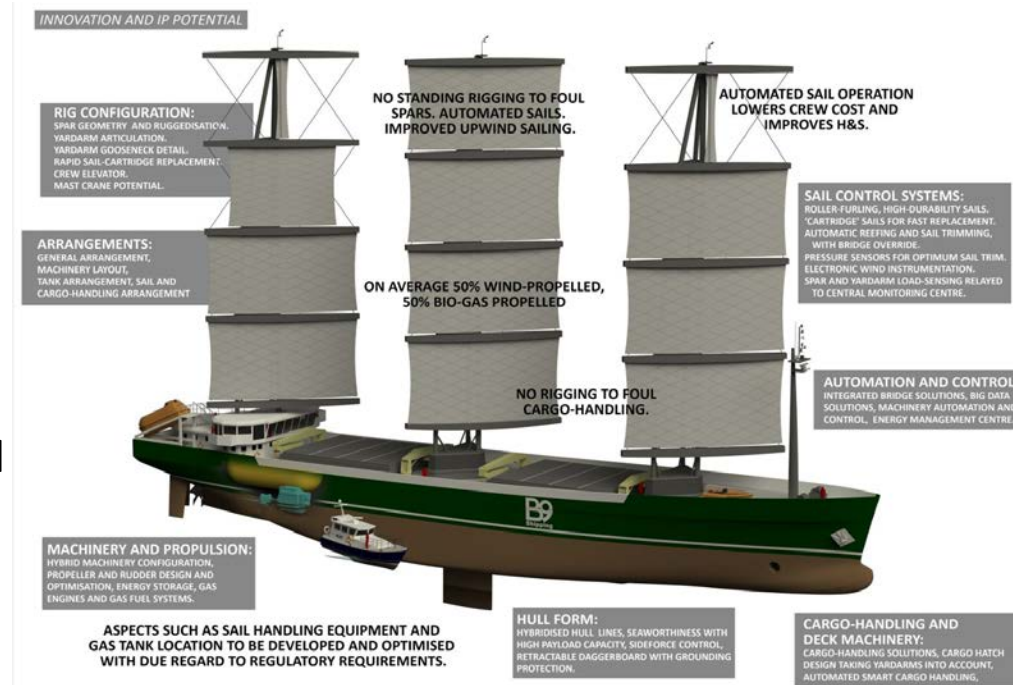
# Opportunities & Obstacles for Shipping

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- Unbounded by weight constraints
- Less constrained by expectations (than other transport)
- Multiple mitigation opportunities from all intervention points
  
- Cutting speed needs more or bigger ships to maintain rates
- New build will take too long – need retrofit
- Conservative industry needs to see full scale demonstration

# Pie in the sky? Example from B9 shipping

- » 65% of ships <10,000dwt
- » ~25% global shipping
- » Stop moving “renewables” in fossil-fuel powered ship...
- » **New ship for transporting biomass**
- » **50% wind propulsion; 50% bio-methane – forest to furnace**
- » **Ideal for liner transport where wind regime can be well understood**
- » Transfer tech/skills from high tech yachting secto; authomotive
- » Attractive as shields investors from fuel price changes



# 6 key elements for radical shift

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- Quantitatively show its feasible/possible
- Slow steam to immediately cut energy demand
- Slow steam to get benefit from retrofit renewables
- Improve loading
- Retrofit technology where possible
- Levels of consumption & distance transported

# Conclusions

- Gap between 2°C challenge and IMO projections enormous
  - But – substantial mitigation within shipping is feasible
  - Slow steaming key to short-term reductions
  - Wind power has a role in the future not just the past
  - 80% cut in CO<sub>2</sub> intensity feasible
  - Further impacts from a decarbonising energy system
- From *High Seas project* to Shipping in Changing Climates – watch this space...

# THANK YOU



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