

Supply, Demand & Pricing to 2030



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London

The supply demand balance and prices will be influenced

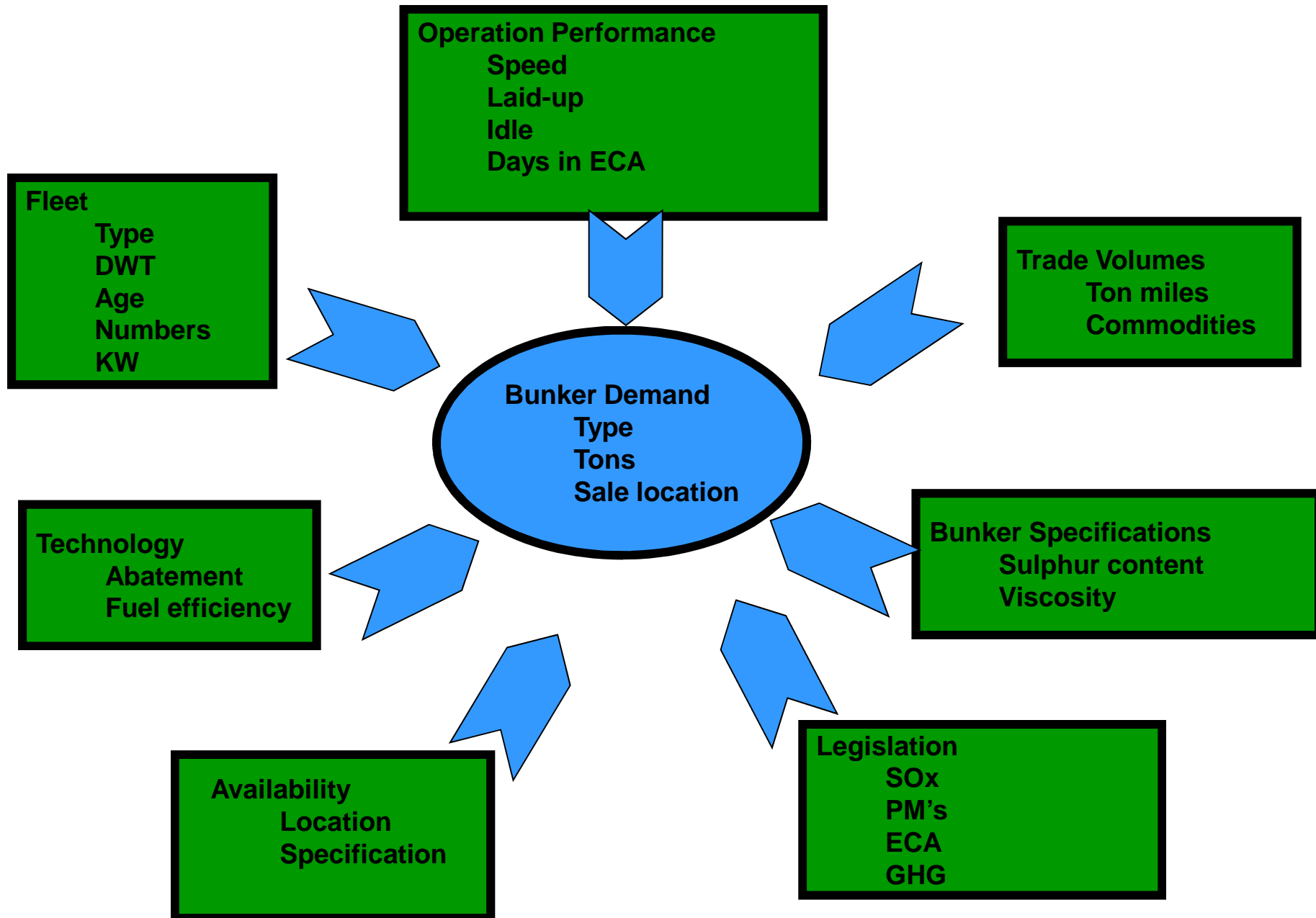
Primarily by

- The demand for marine transport
- Environmental regulations
- Refiners propensity to invest

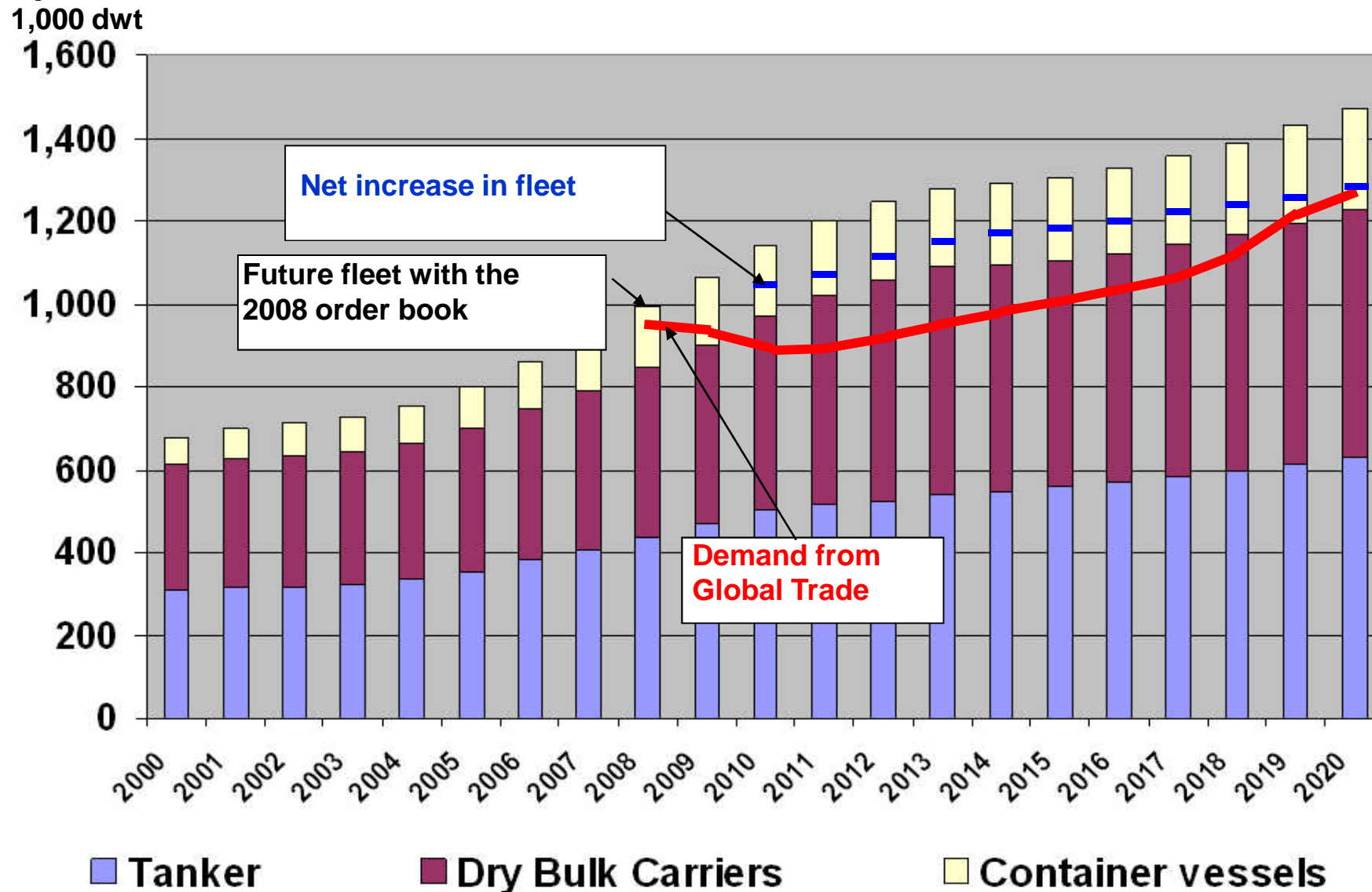
Secondarily by technological advances in

- Fuel efficiency
- Use of alternative fuels
- Abatement

The demand equation has changed



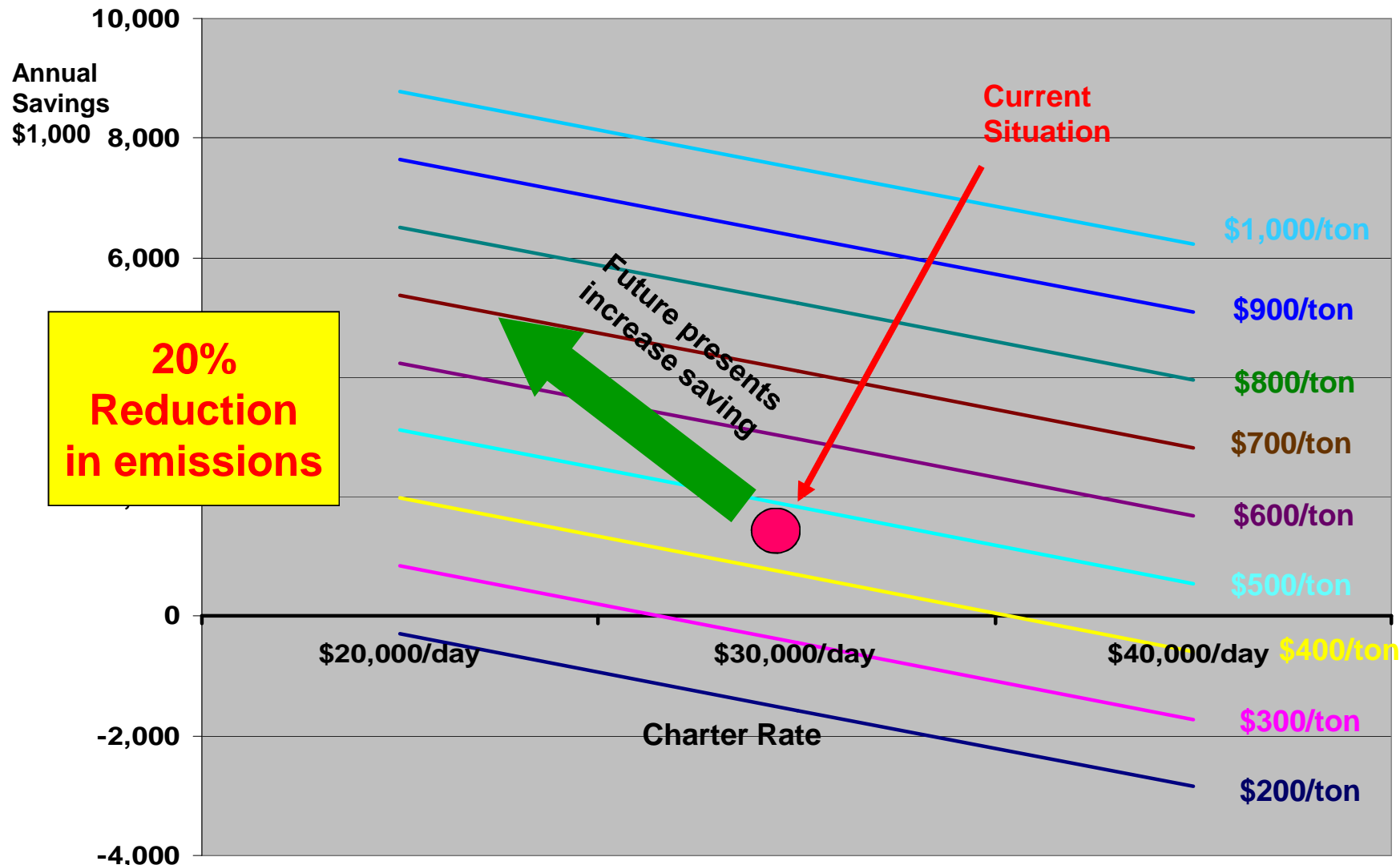
The imbalance in the supply and demand for shipping will have profound impact on bunker demand



Freight rates will be generally soft for a decade

Slow steaming is likely to be with us for some time

Slow steaming has become more attractive as bunker prices continue above \$400/ton and charter rates have come down



Reducing speed by a third reduces costs by total costs \$2 million pa while delivering the same volume of cargo pa

Doubling bunker costs will increase savings fourfold

Based on a 3,500 teu container ship reducing speed by a third

High prices and environmental legislation together are the main drivers developing marine technology

Reported percentage gains in efficiency from existing technologies

	Existing Ships	New Buildings
Main Engine efficiency rating	2	
Main Engine optimisation		2
Waste Heat Recovery		7
Optimize hull shape		6
Optimized propeller	2	4
Maintenance of wetted hull surface	3	3
Improved anti fouling paints	5	1
Twin skeg + twin propeller		5
Trim optimisation – large block factor ships	1	1
Trim optimisation – small block factor ships	>10	>10
Miscellaneous fuel saving devices	3	3
Additives	5	5

- Expectation that on average existing ships can reduce fuel consumption by 10%
- And some new building by as much as 25%
- But there will be increased capital and non-bunker operating costs
- The poor trading conditions will slow investment in fuel savings for many owners

Alternative fuels

Solar

Photo electric cells

Solar Furnace

Very minor impact on marine

- Too costly
- Requires a lot of space

Wind

At least five types of sail

Sky sail current favourite

Can provide up to 20% improvement

- Max speed 15 knots
- Unreliable

Ocean Currents

Improving current data

Better software

Up to 4.5 knots of speed improvement with same consumption

- Following currents versus shortest route
- Could improve efficiency by 15% on some routes

Vegetable Oils

Edible

Non-edible

Algae

Unlikely for marine

- Compete with food
- Uneconomic
- Not stable but low emissions

Alternative fuels continued

Biofuels

Cellulosic sources

Municipal waste

Ethanol

Becoming more viable

- Still twice cost of fuel oil on energy basis
- Low emissions

Coal

Low cost of energy but

- Dirty
- Low energy content
- Awaits technological break through

LPG

Available globally

Marine technology exists

Some 40% most costly on an energy basis than fuel oil

- Requires 40% more tankage volume

Future of LNG as a marine fuel

- **Lowest cost fuel**
- **Lowest emission fuel**

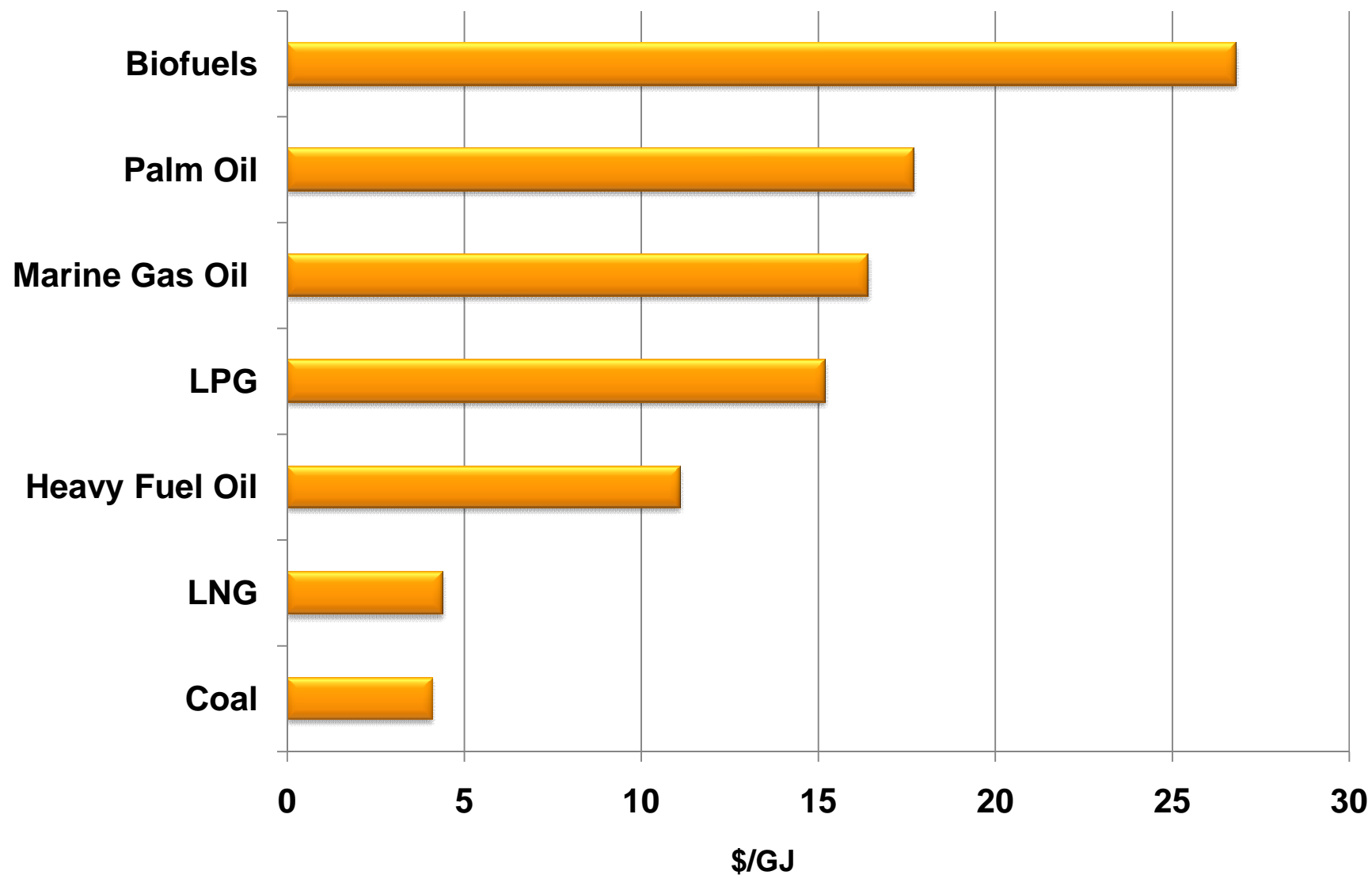
BUT

- **Costs of retrofit are prohibitive – likely to be only a very small number**
- **The “chicken and egg” effect of provision of multiple LNG bunkering points and sufficient LNG propelled ships to justify them will inhibit LNG powered new buildings**
- **Need for larger hulls to accommodate equivalent cargo capacity**
- **New builds expected to be 20% more costly**
- **Less safe on board and ashore – high flash and need for intense crew training**
- **Methane is 20 times more potent than CO₂ as a GHG with the expectation of more leakage with bunkering**

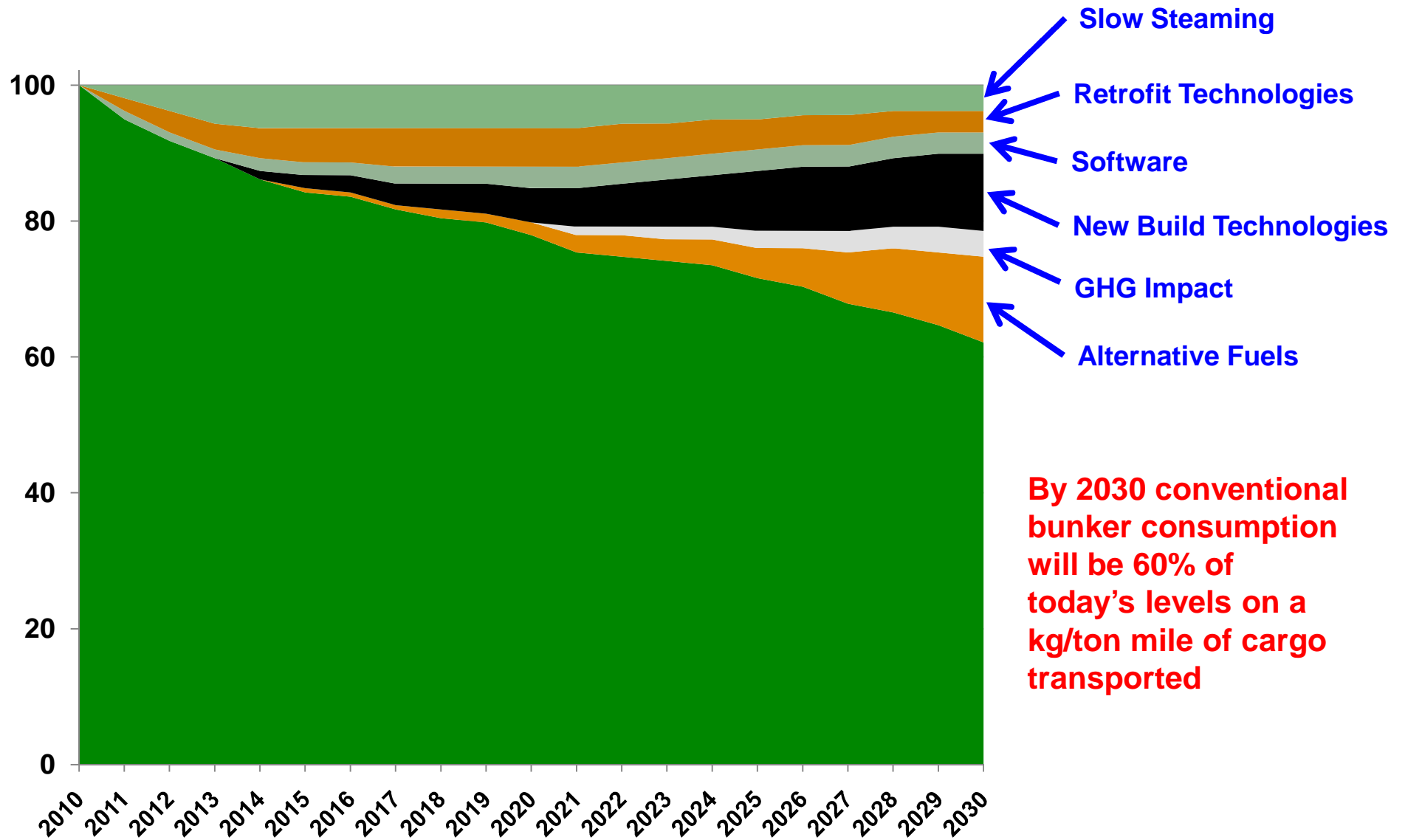
- **Unlikely there will be a significant number of LNG powered vessels but they will be attractive for**
 - **Shuttle tankers in gas producing areas**
 - **Operations in ECA of feeder vessels**
 - **Ferries**

- **LNG might account for 5% of bunker consumption by 2025**

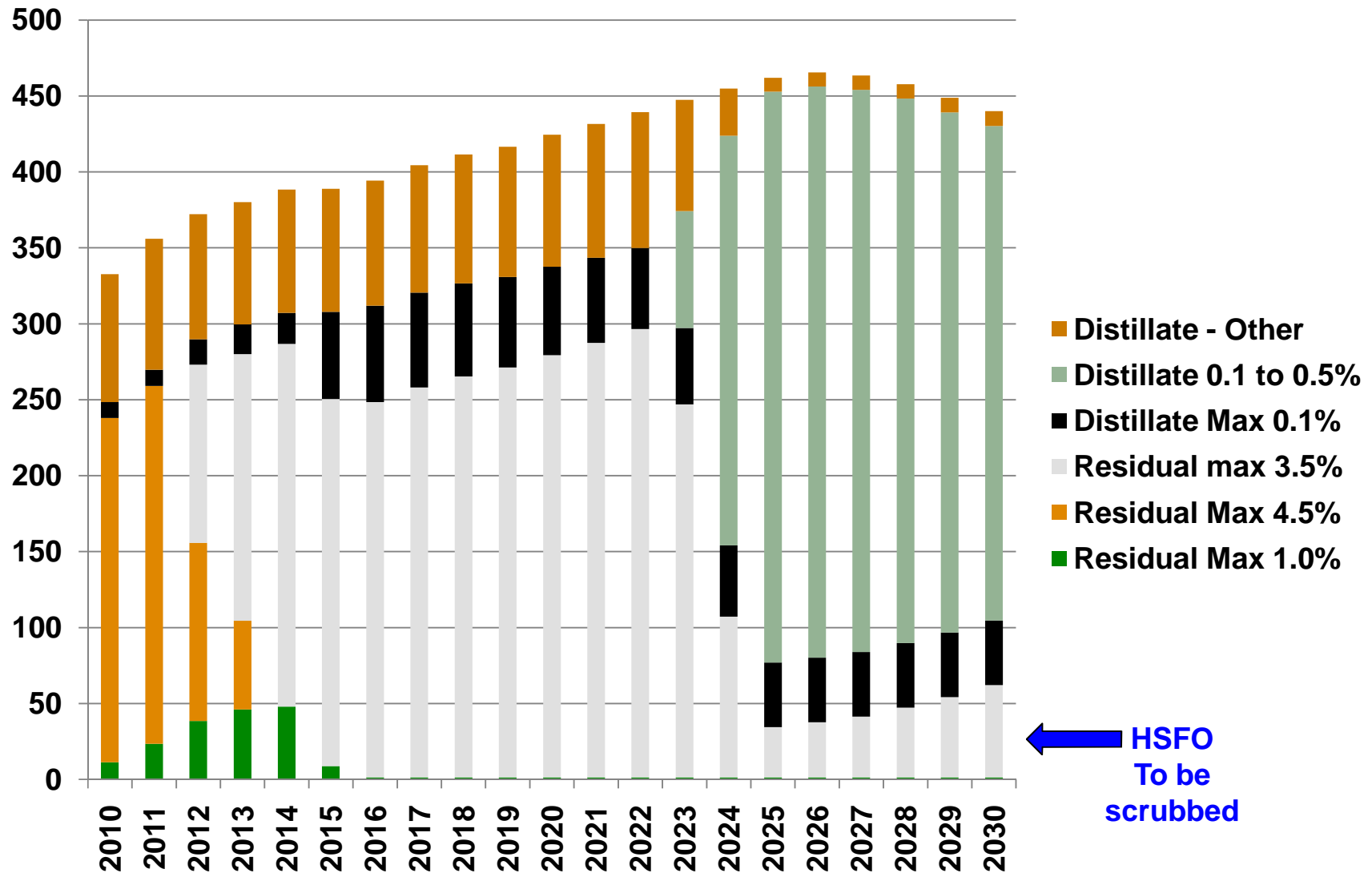
It is unlikely that the price ranking will change over the next 20 years



The demand index for residual and distillate bunkers

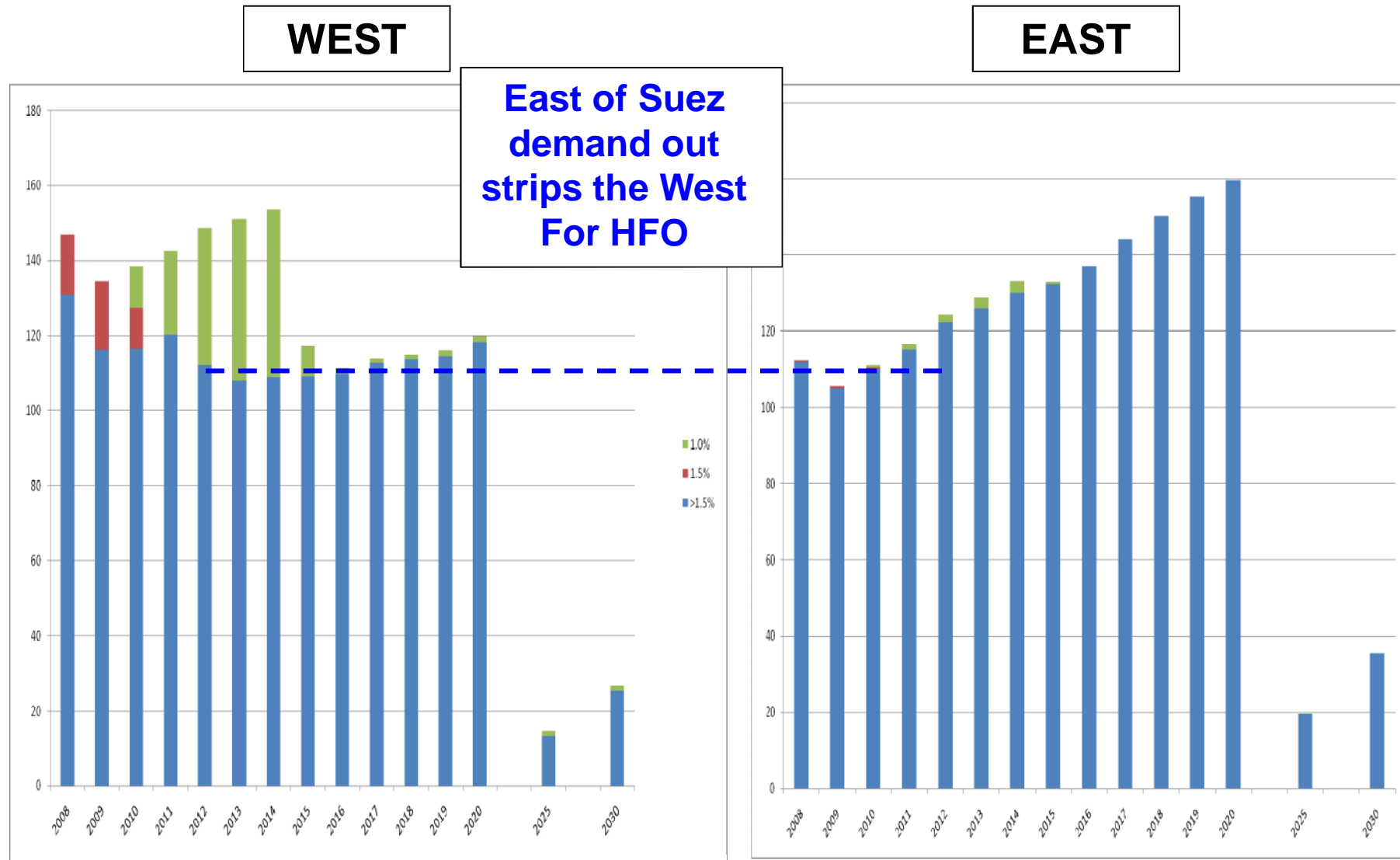


Demand for residual and distillate bunkers are likely to peak by 2025

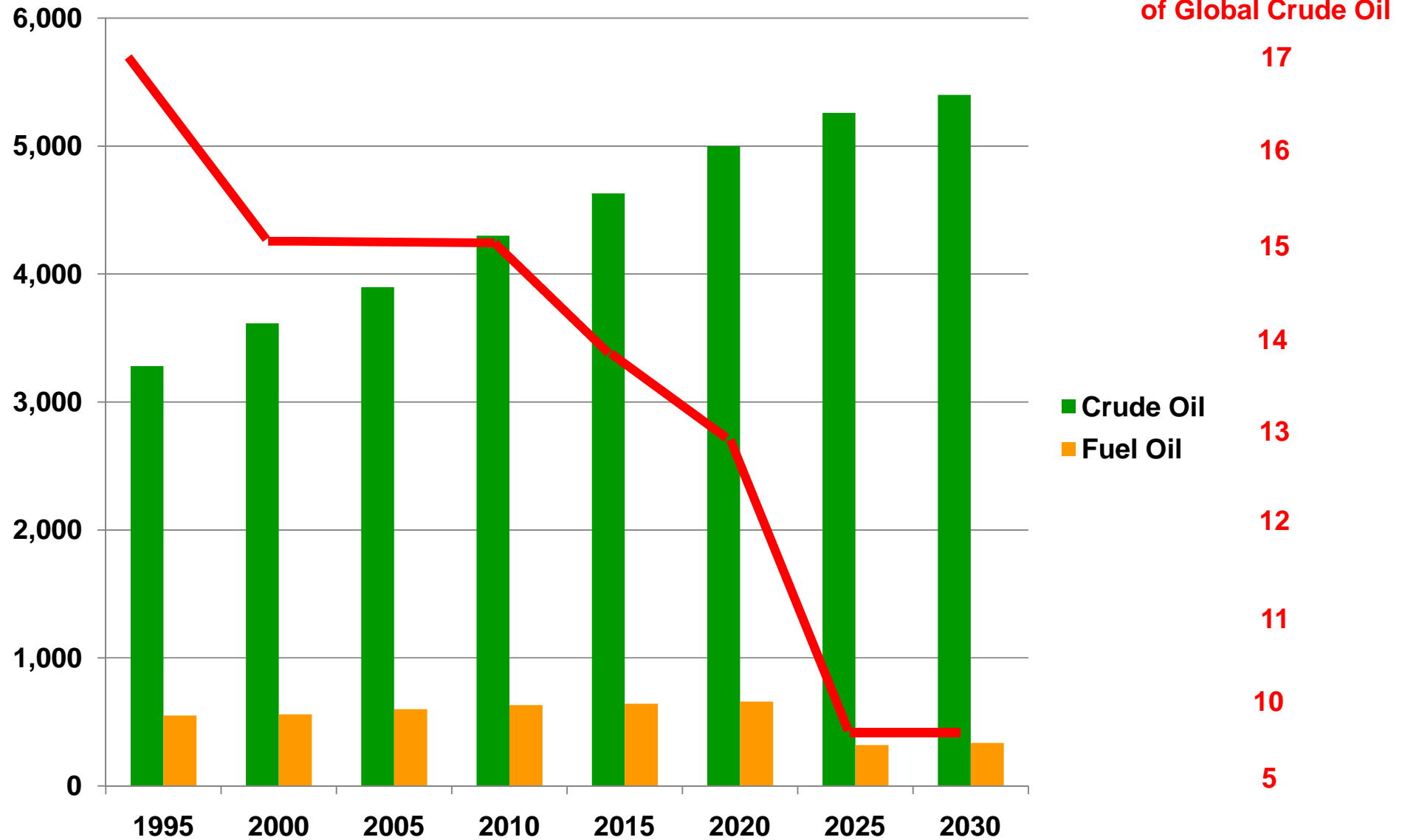


← HSFO
To be
scrubbed

Demand for residual bunkers in the East and West

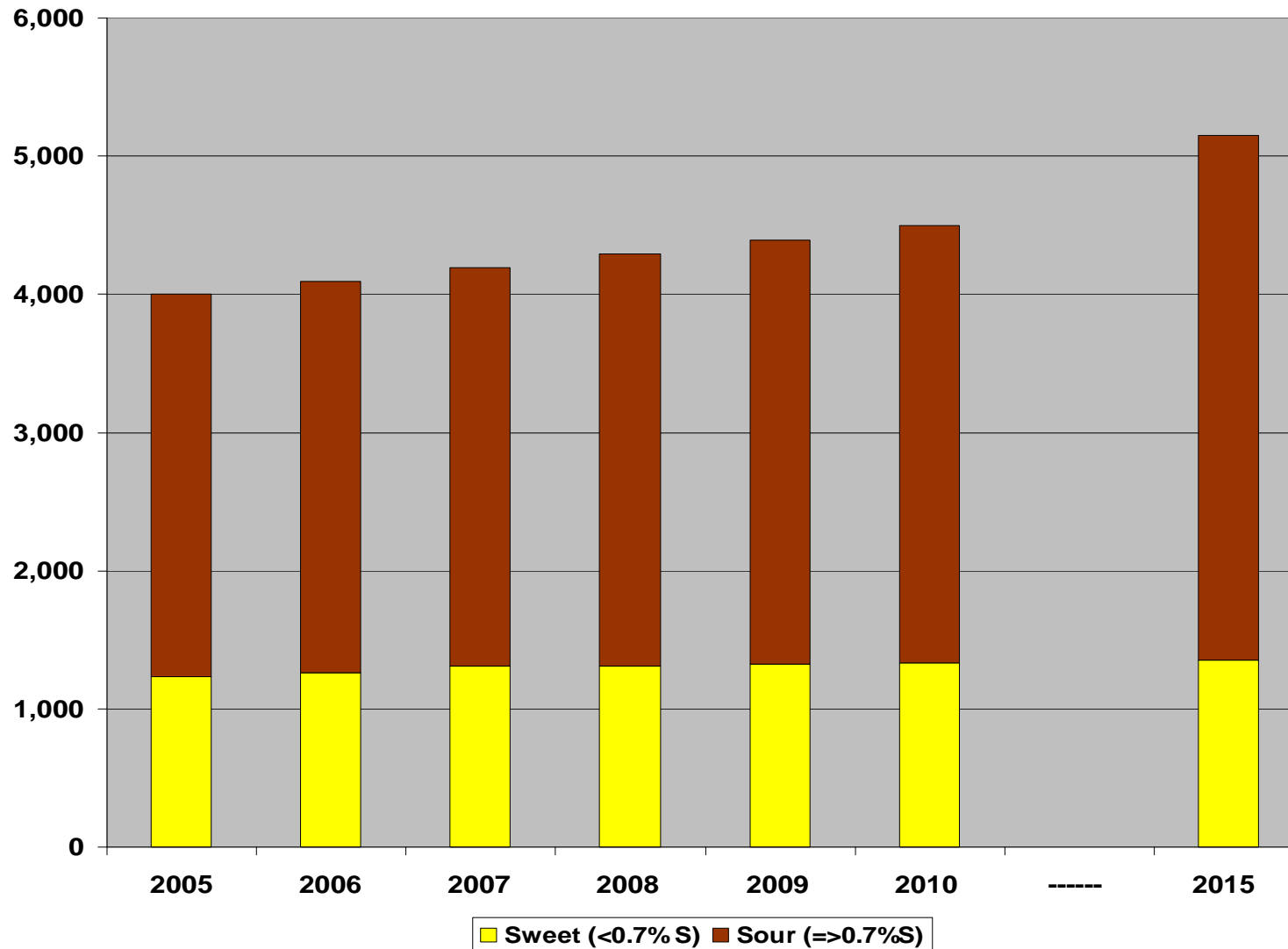


Reduced growth in fuel oil demand will increase investment in cracking and coking capacity



The question is – can the refiners meet the targets

Proportionally the avails of lower sulphur crude oils is diminishing further proportionally reducing the avails of LSFO

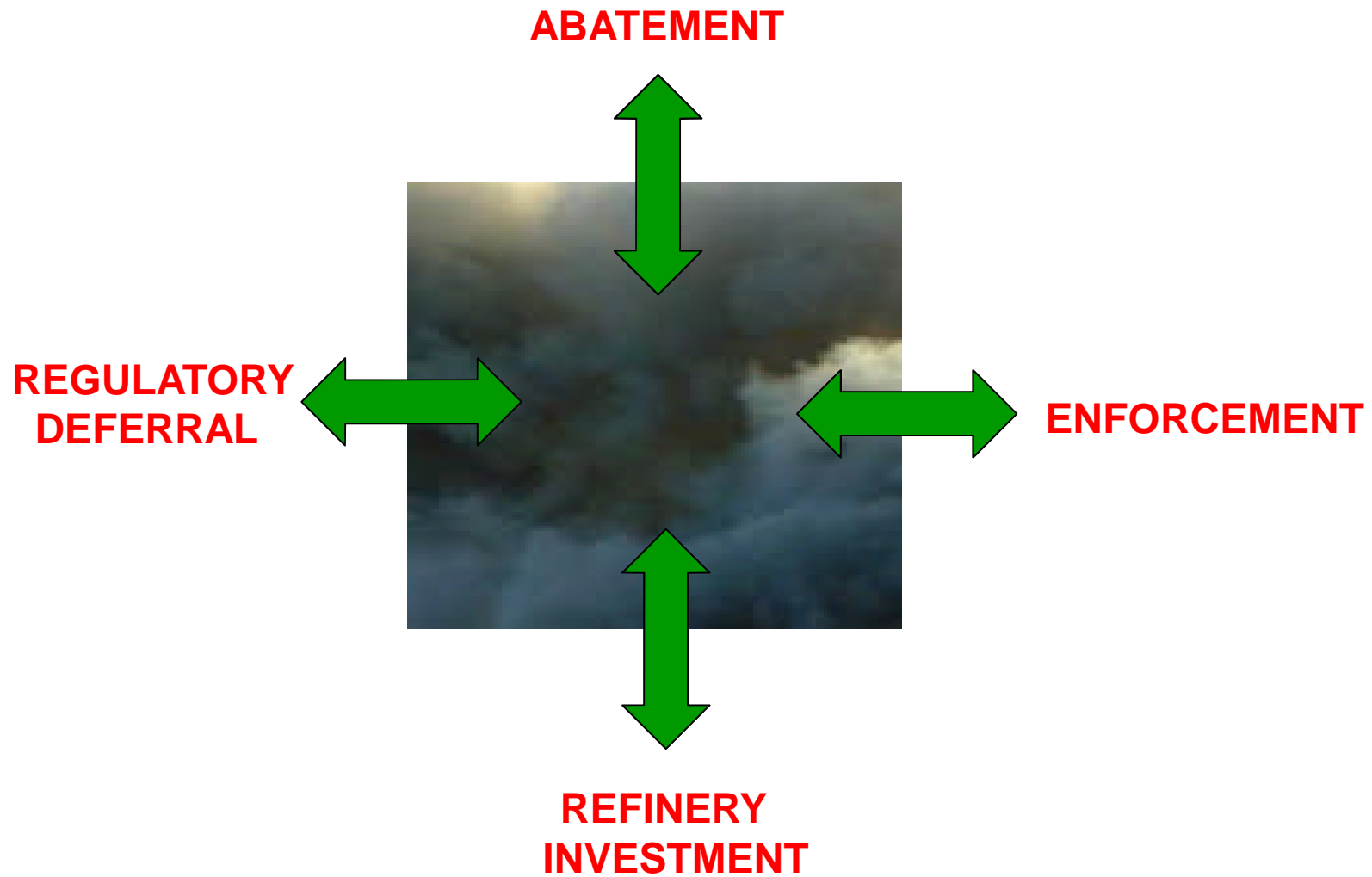


This situation is not expected to change drastically in the future

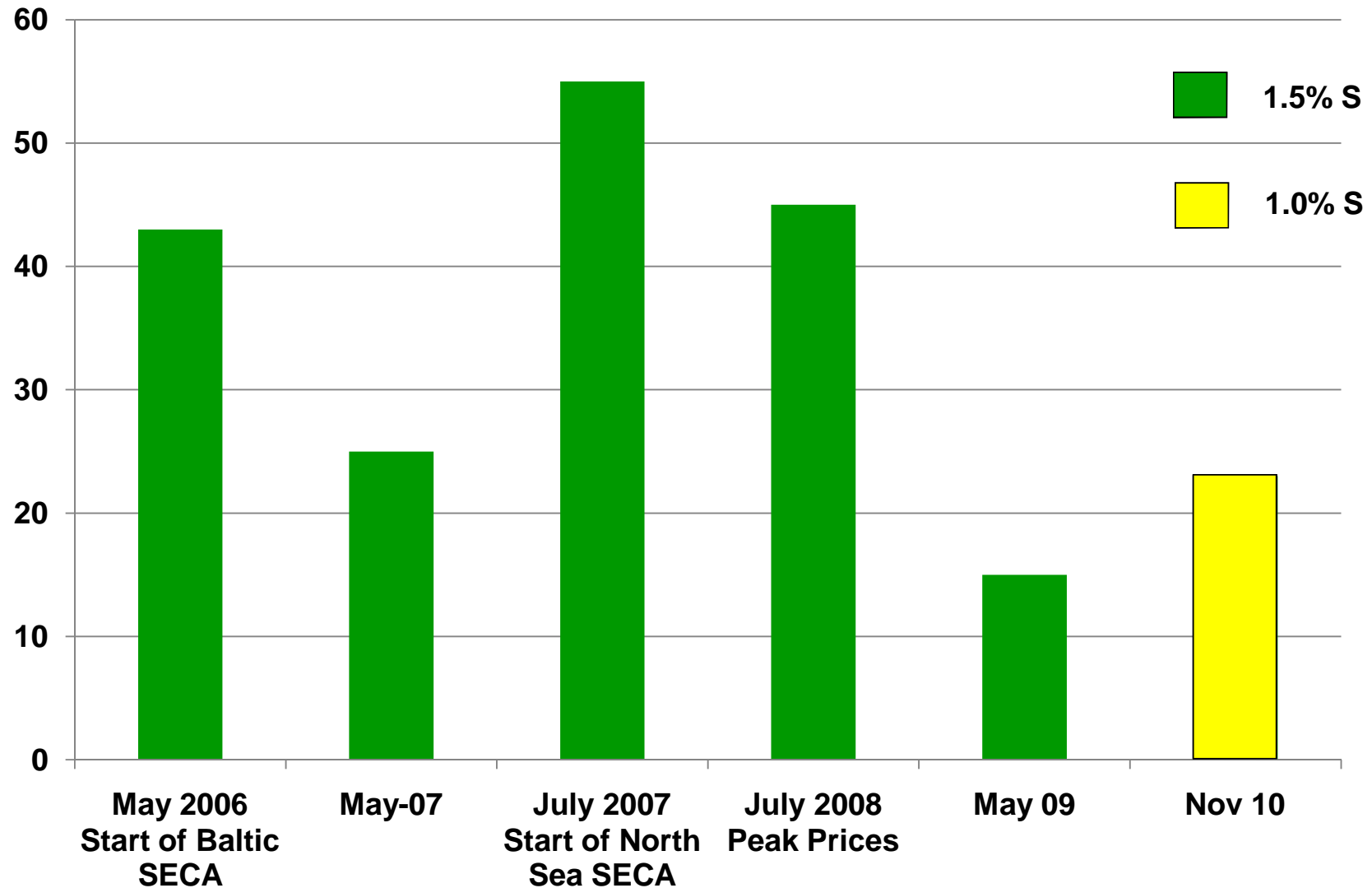
The All Diesel Option can not be met by 2010

- The days of the bunker market being a convenient “sulphur sink” for refiners is coming to an end
- But most refiners have little interest in the market and fuel oil is a loss making by-product
- Fuel oil desulphurisation is very unlikely
- Mid distillates are already the tight part of barrel – a switch by bunker market could not be supplied by 2020
- Meeting switching all bunkers to distillates would need investment approaching \$200 billion in secondary refinery capacity
- Refining industry will not invest ahead of change and the uncertainty in the timing of the introduction of the 0.5% Global Cap is exasperating the indecision

The aims of Annex VI will only be met by an integrated solution



The premium between high and low sulphur bunkers in the ARA has ranged from over \$50/ton to less than \$15/ton



The switch to 1.0% sulphur has had less impact than originally expected

The 1.00% sulphur premium in Northern Europe is averaging about \$23/ton



Great Belt \$28

St Petersburg \$45

Riga \$13

Gdansk \$42

Hamburg \$15

Piraeus \$37

Lisbon \$22

Gibraltar \$35

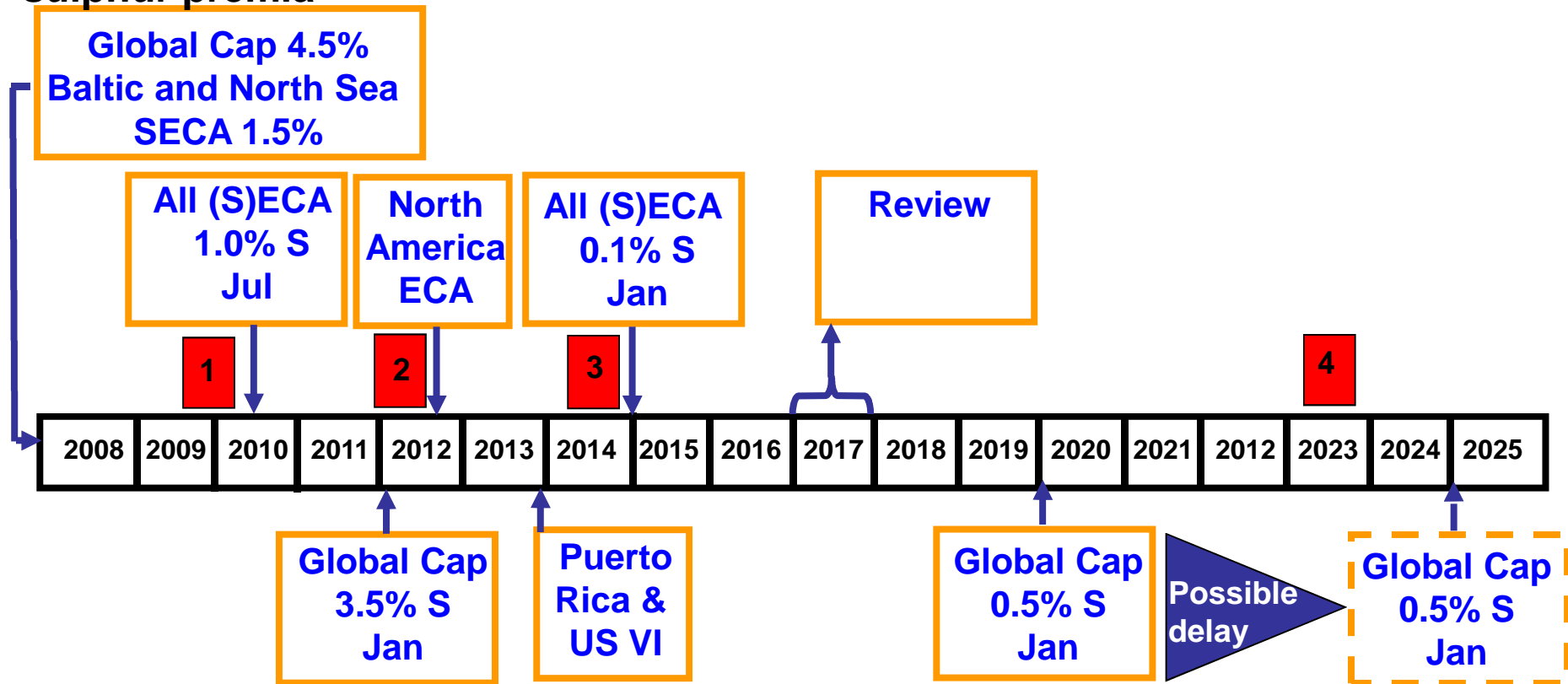
Differentials little increased on 1.5% premium

the US ECA will impact differentials in 2012

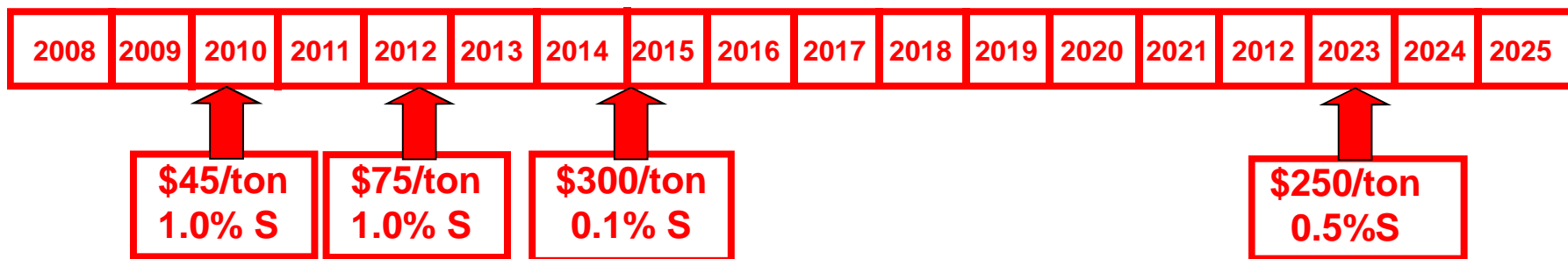
Rotterdam \$/ton		
	380 cSt	180 cSt
HS	457	476
LS	480	499
Diff	23	23

Source: bunkerworld
22 Nov 2010

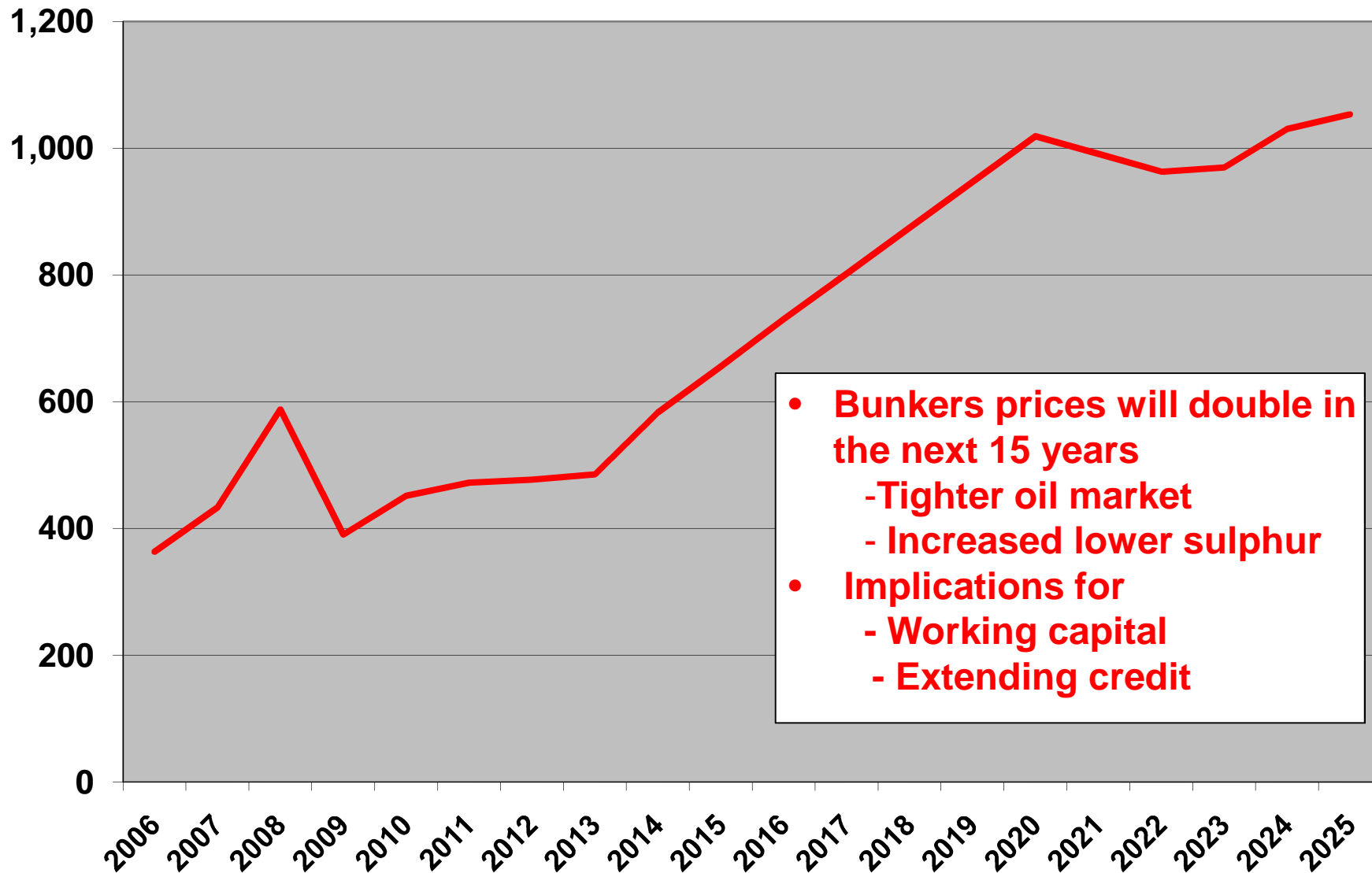
Implementation schedule has **four** key steps that will influence sulphur premia



Estimated price differential on HSFO



Indicative global average bunker price – all products \$/ton



Total world annual bunker sales are expected to be \$174 billion in 2010

	HFO	Distillate	Total
Global sales (mill tons)	259	95	345
Average stem (tons)	700	140	350
Number of stems p.a.	370,000	680,000	1,050,000
Average stem value (\$1,000)	315	84	400
Global sales (bill \$)	117	57	174
Global sales 2020/5 (bill \$)	10	300	310

Average prices
380cSt \$450/ton
MDO \$600/ton

This is a 4% pa growth in revenues

Summary

- The improvements in marine propulsion efficiency will accelerate
- Residual bunker demand will peak around 2020
- The use of alternative fuels will accelerate after 2020
- Cumulative investment in abatement will be over \$15 billion by 2025
Scrubbing some 50 million tons of HSFO pa
- The bunker business is mature in the West but East of Suez will see growth of over 3.5% pa
- The aspirations of Annex VI can only be met by 2025 through an integrated solution
- The fuel cost of propelling a ship will double by 2025
- Increasing gross revenues to suppliers four times
- Increasing counterparty risk and supplier's credit lines without any guarantee of greater margins

The future will become increasingly complex for us all

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