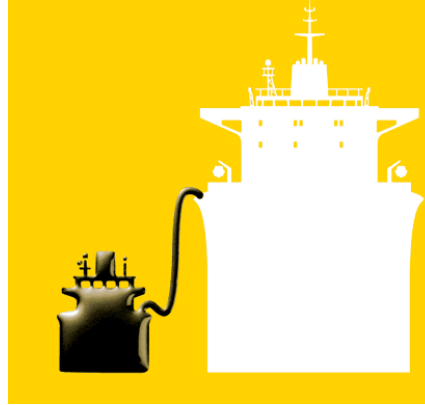


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A.Deniz ERAYDIN

CHAIRMAN

TURKISH BUNKER ASSOCIATION

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- bunker technologies improved approx every 100 years



In 1912 the Diesel driven MV Selandia left Copenhagen into a world with no fuel bunkering possibilities

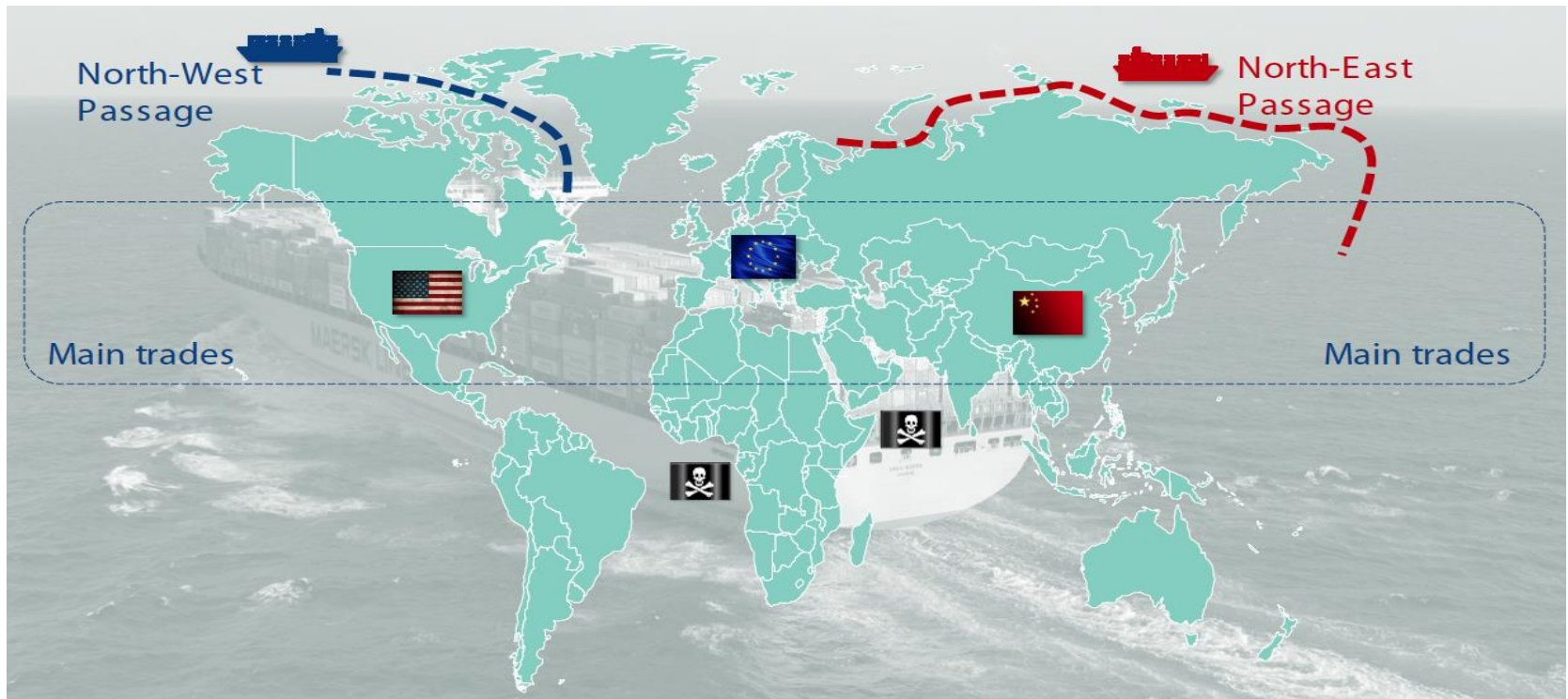


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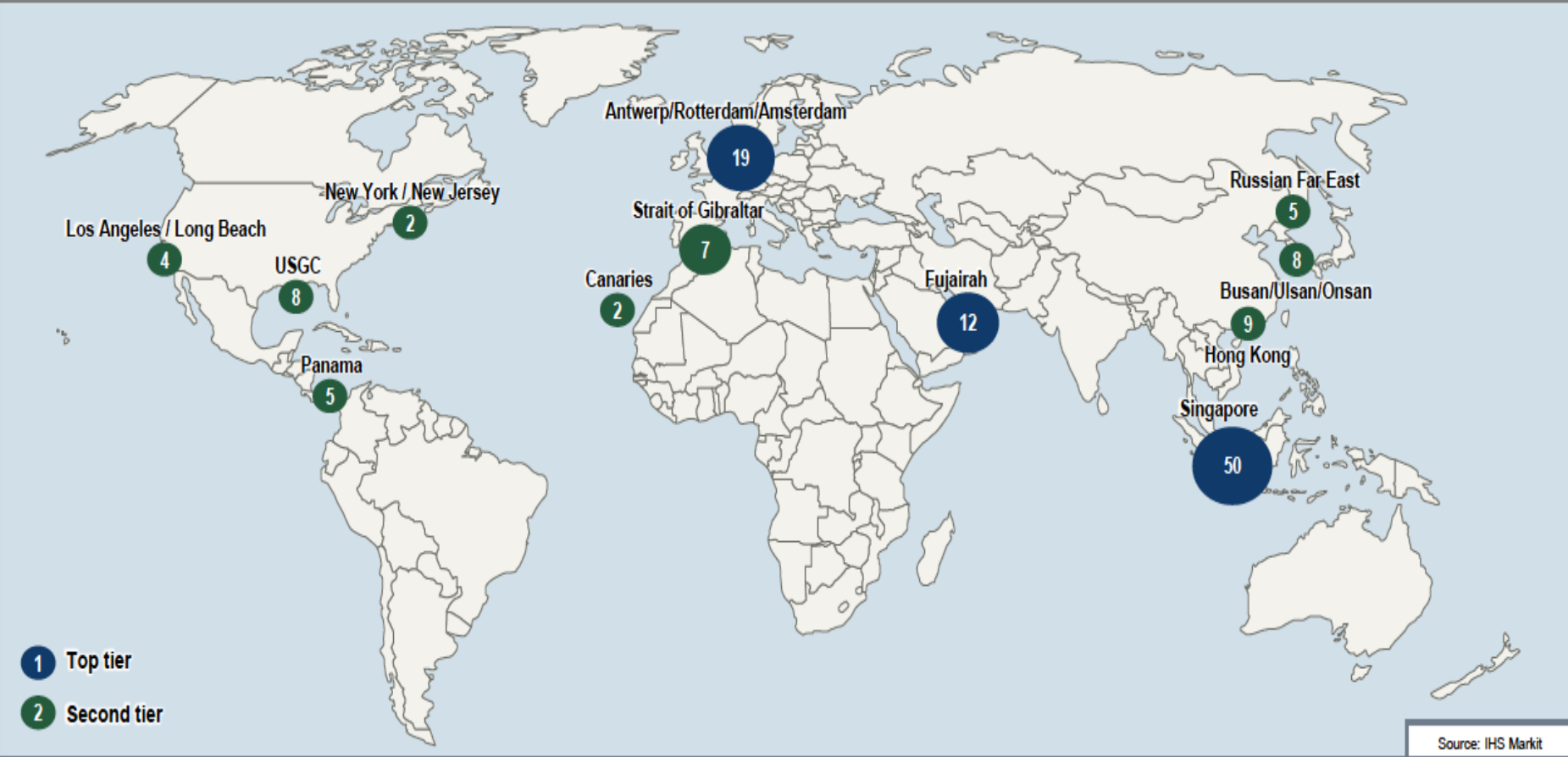
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- 10.5 billion MT goods.
- 60 000 (approx) internationally active vessel
- 350 million MT bunker product
- 280 million MT fueloil.
- 70 million MT gasoil.



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Total marine fuel deliveries in the world's main bunker hubs



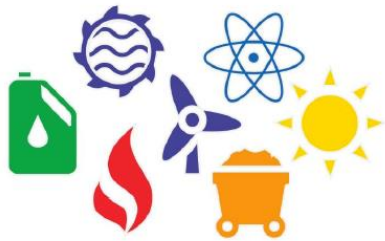
Source: IHS Markit

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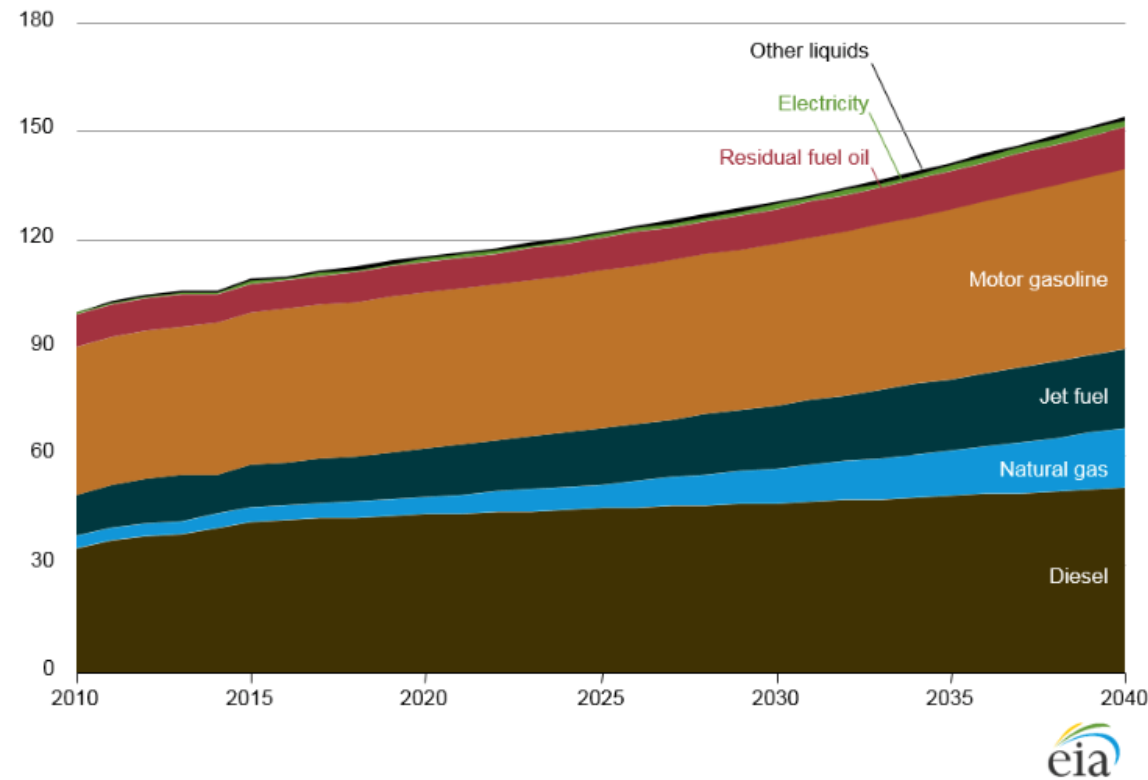


People × living standards = energy needs



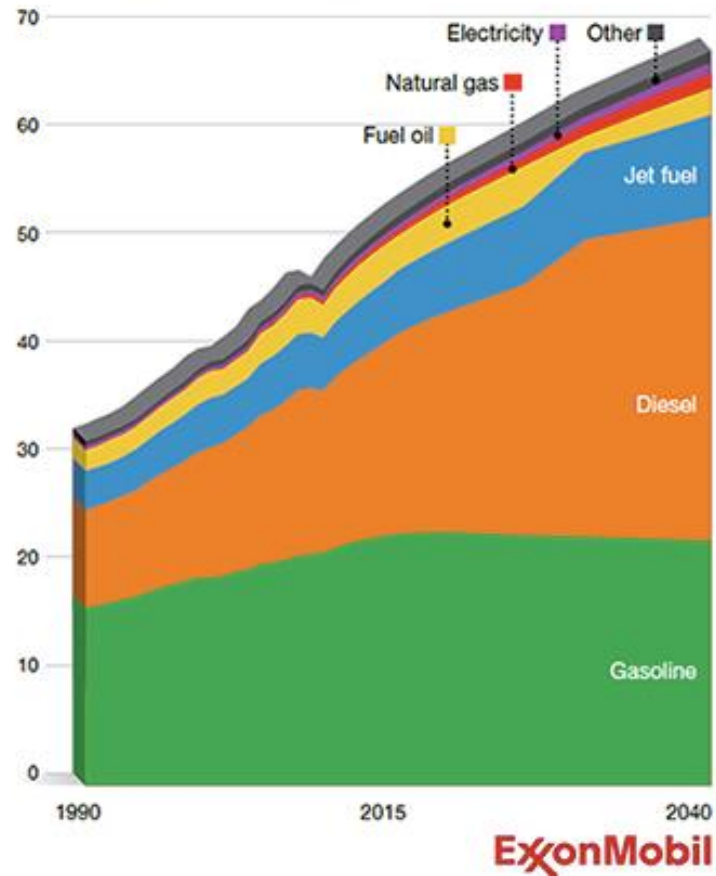
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Figure 8-2. World transportation sector delivered energy consumption by energy source, 2010–40
quadrillion Btu



Transportation fuel demand

Millions of oil-equivalent barrels per day



ExxonMobil

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Energy is the main element



Emerging markets' standarts are getting higher



Geopolitics cause energy variety



Oil is the main source until 2040



LNG is growing faster than any other alternatives



Technology has the biggest potential and uncertainty. Change will come with technology.





One writer in the Times of London predicted In 50 years, every street in London will be buried under nine feet of manure. "



MORTON STREET, CORNER OF BEDFORD, LOOKING TOWARD BLEECKER STREET, MARCH 17, 1893.



Technology has the biggest potential and uncertainty. Change will come with technology.

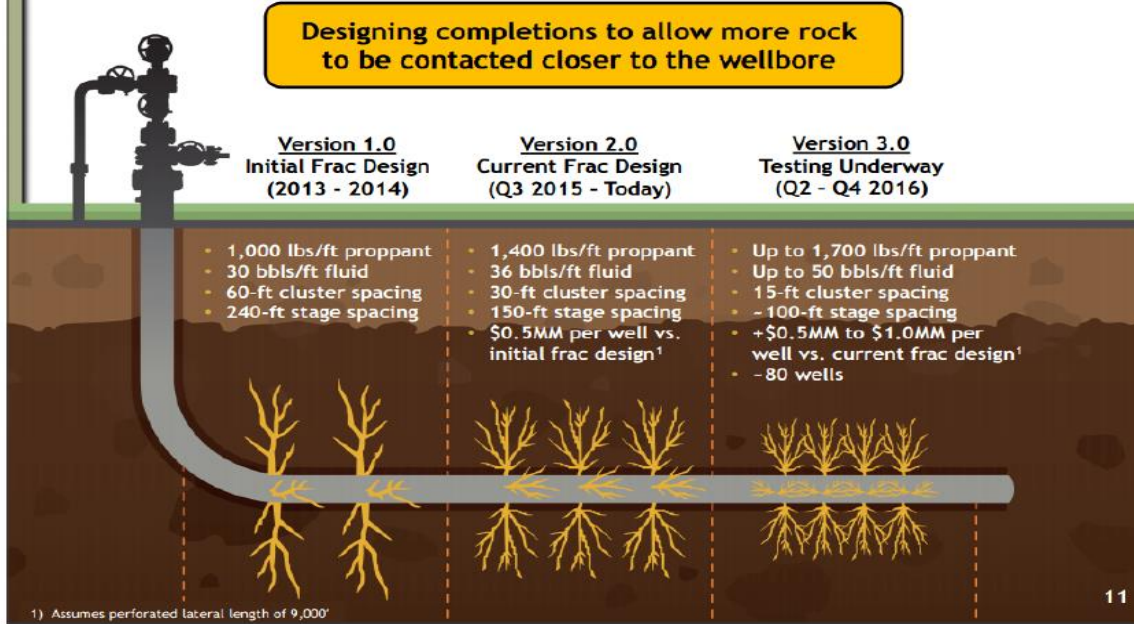


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Completion Optimization Timeline

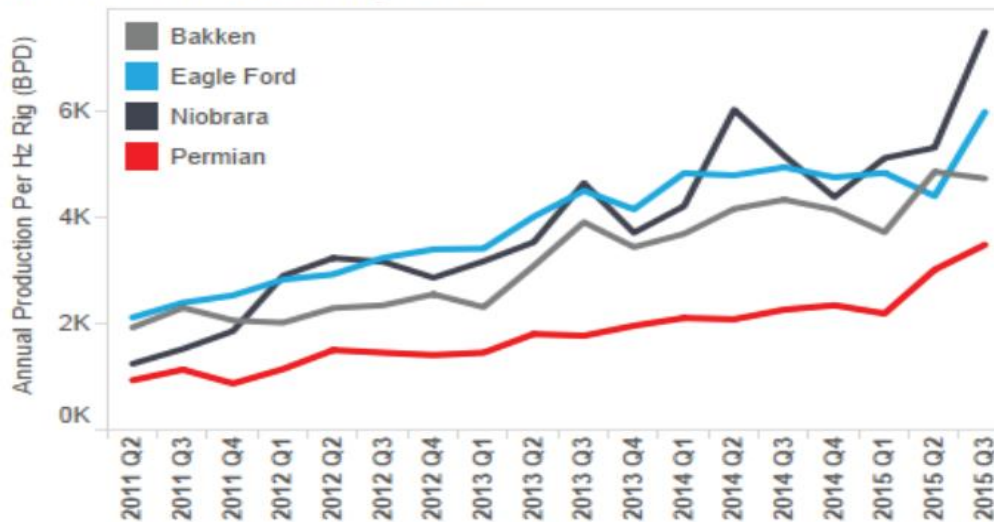
PIONEER
NATURAL RESOURCES

Designing completions to allow more rock to be contacted closer to the wellbore



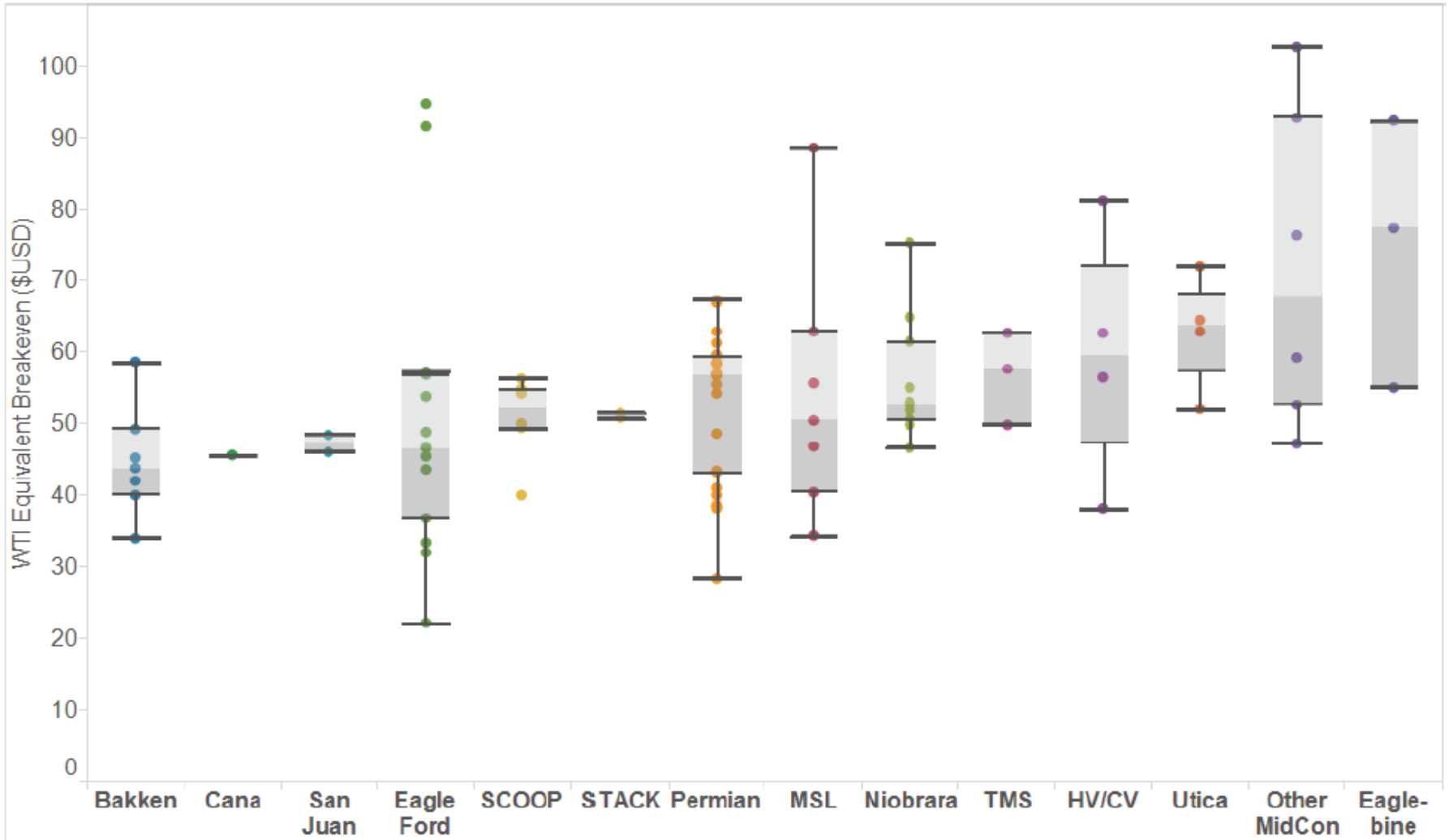
11

Oil Production Per Rig Year



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lower cost for “shale gas”





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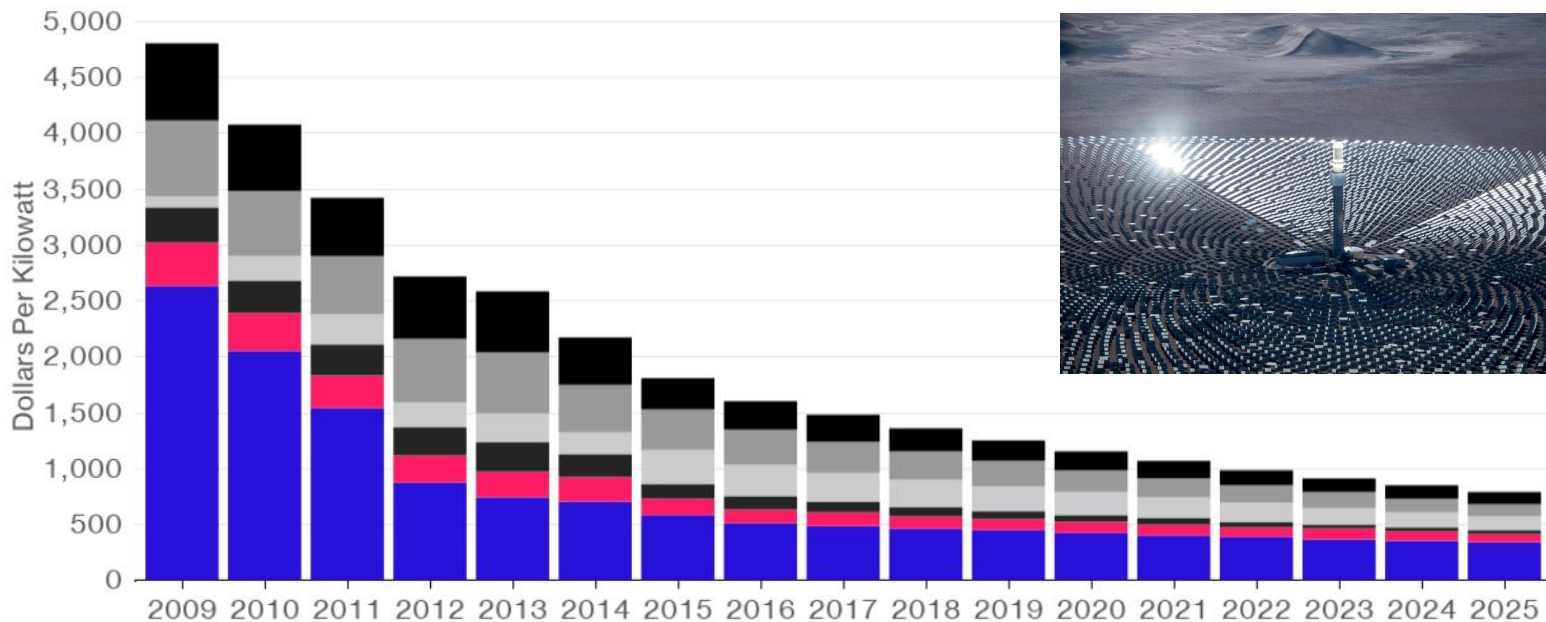
solar energy getting cheaper



Solar Farm Costs Are Shrinking

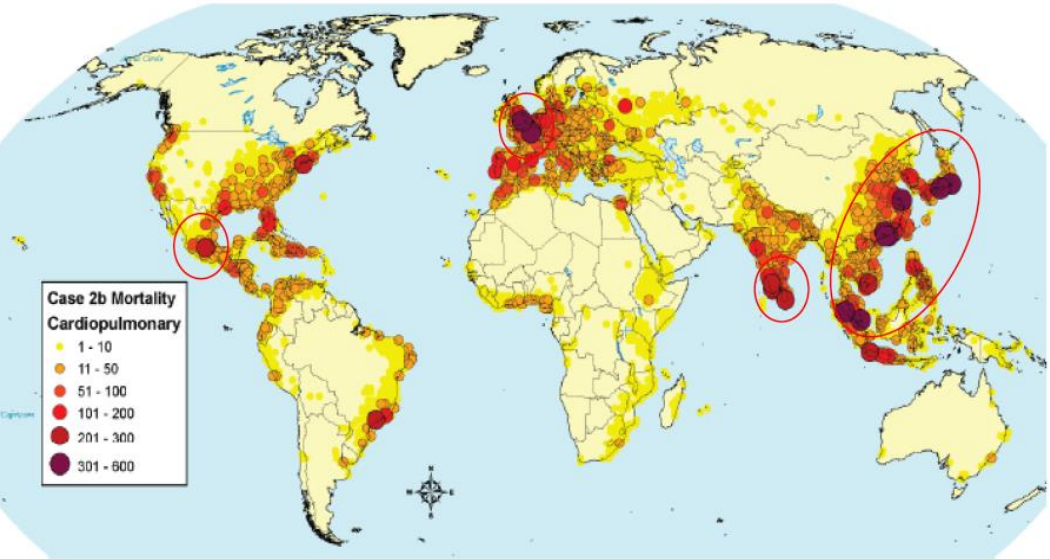
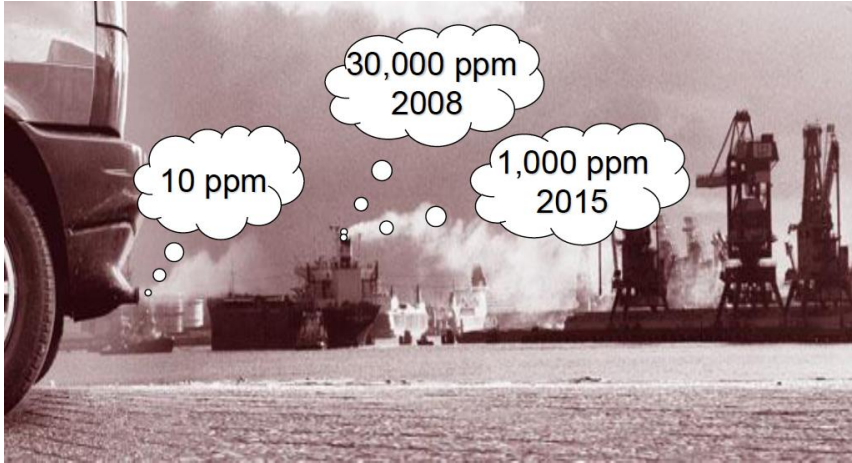
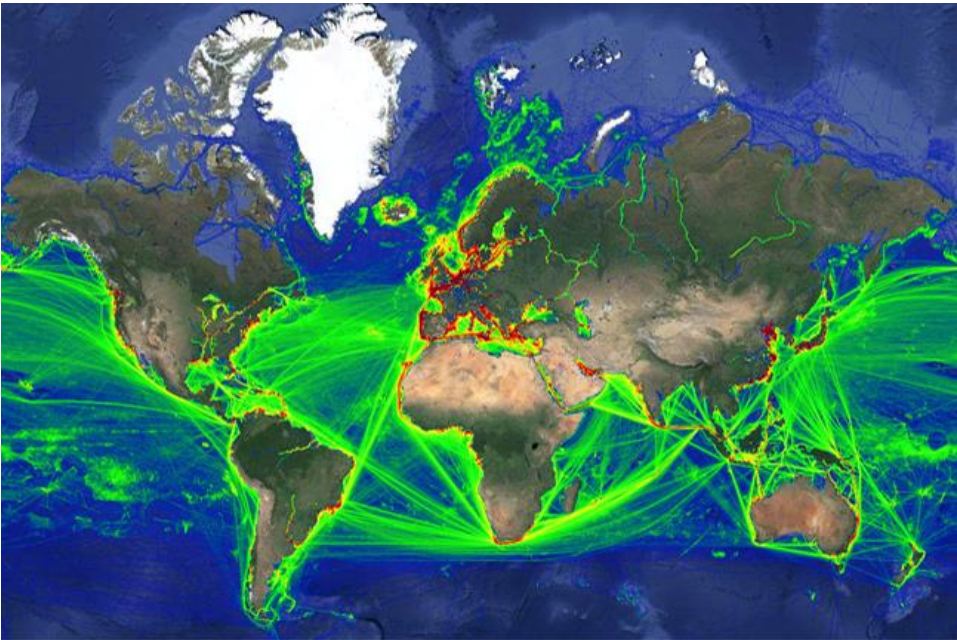
Falling equipment costs are driving record low electricity prices

■ Module
 ■ Inverter
 ■ Racking and mounting
 ■ Other BoS hardware
 ■ Installation/EPC/development
 ■ Other



Source: IRENA analysis and Photon Consulting, 2016

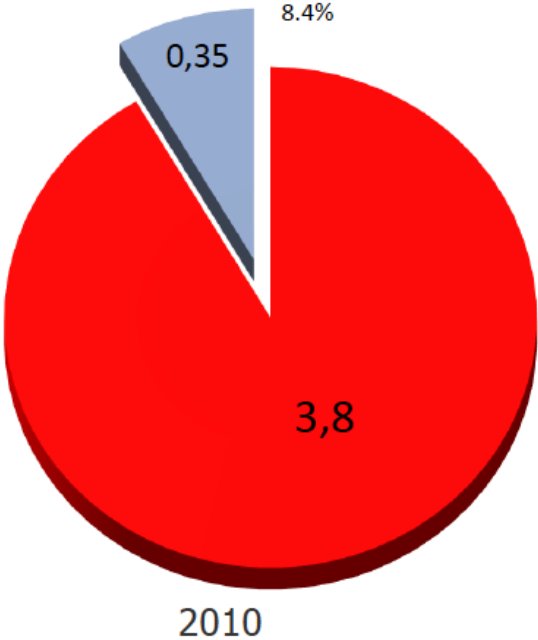
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- Working on diminishing bunker originated emission
- Premature death % increased

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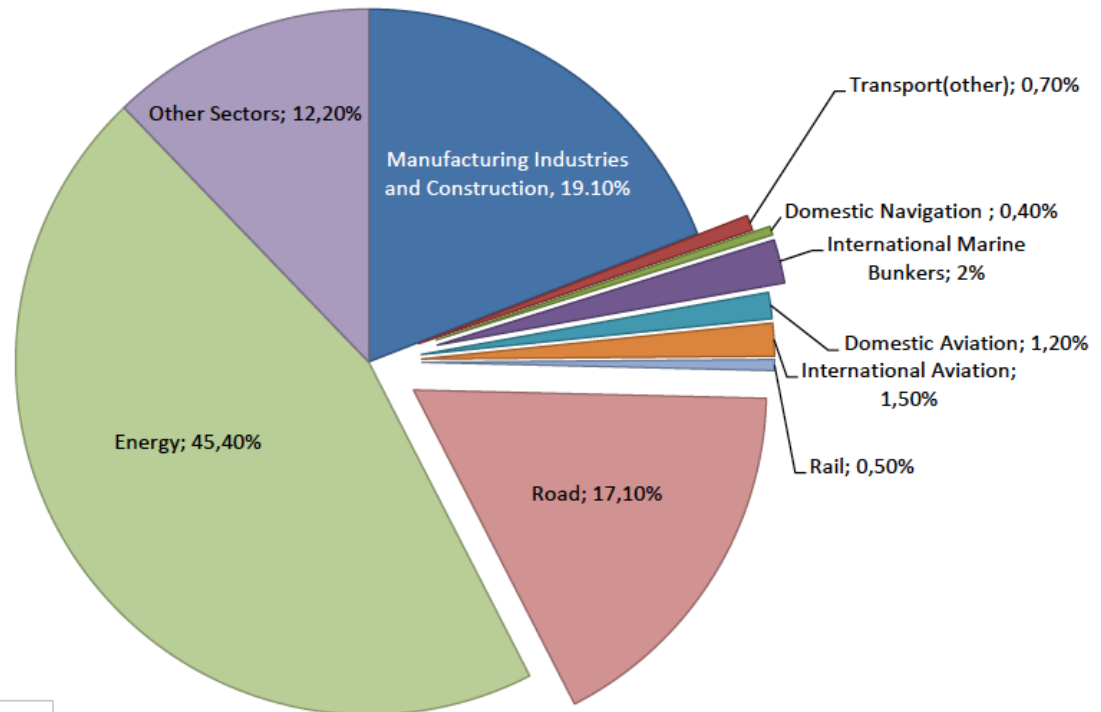
Bunker = 350 million MT/year= 8.4% of world consumption



Source:
Report for the UK Dept of Energy and Climate Change by Purvin & Gertz
June 2011 (Now part of IHS)

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Emission per sectors

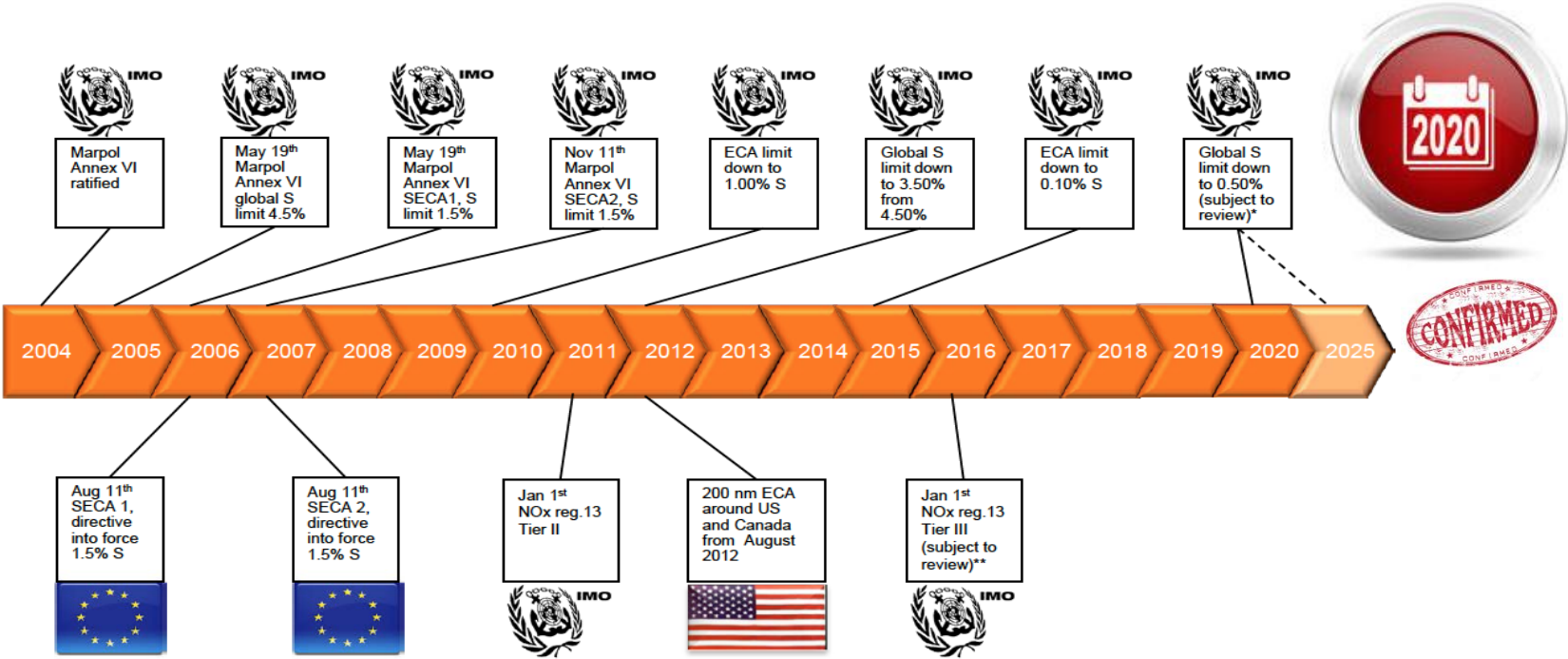


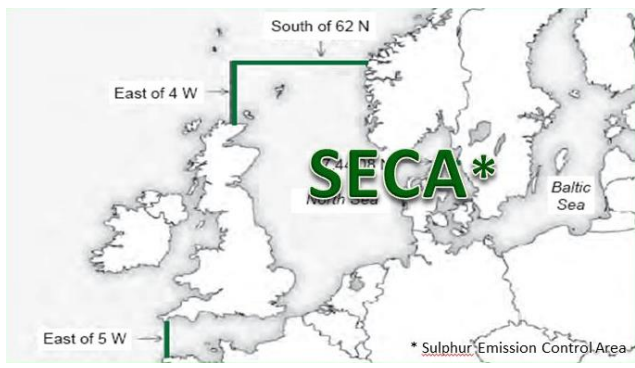
2005, OECD/ITF

Emission by Bunker = 2.4%

Almost 90% of transport = Shipping

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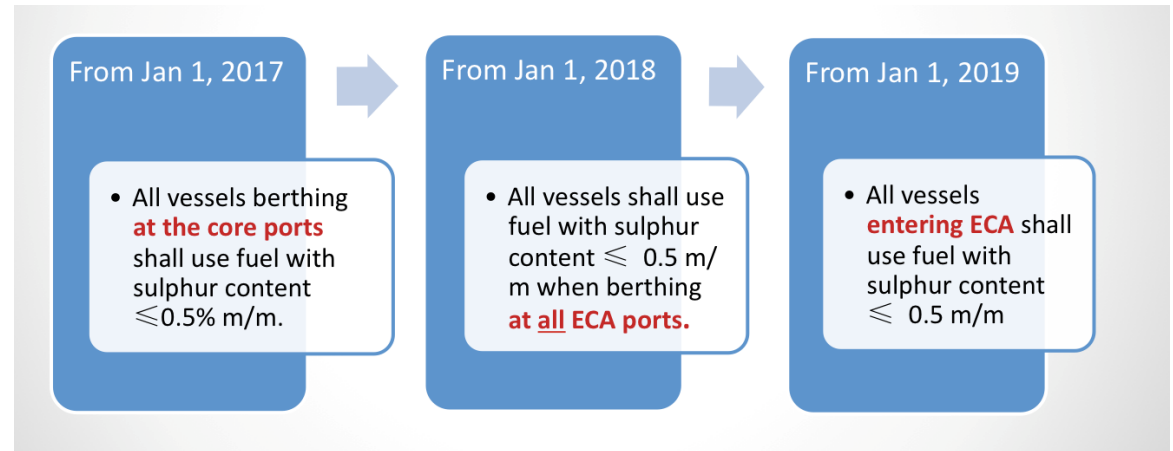




BUNKER 2019

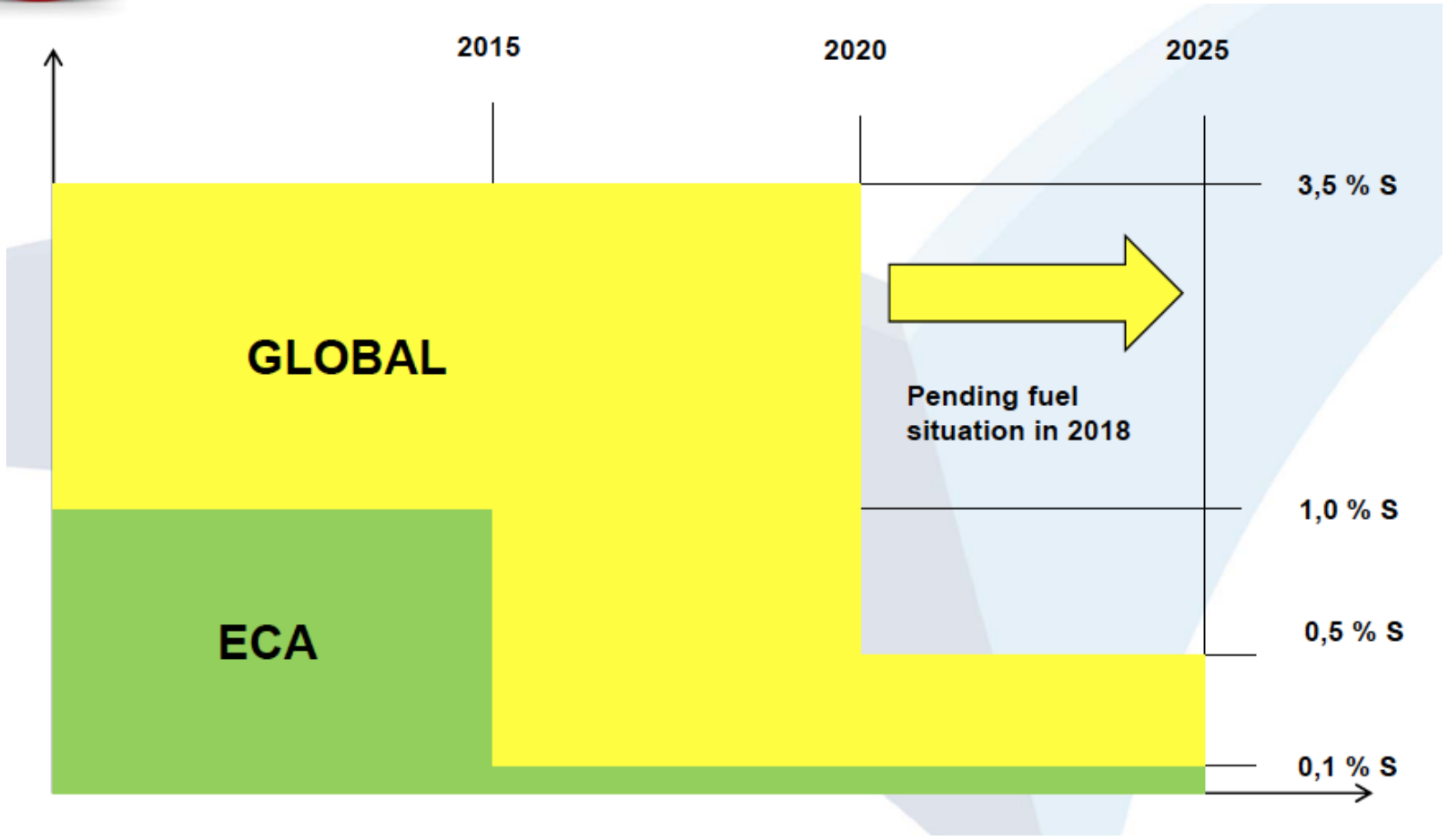


BUNKER 2019 LATEST ECA CHINA





BUNKER 2019



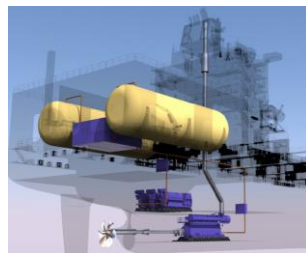
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Gasoil 0.1 V ULSFO



LNG V SCRUBBERS



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IMO 2020 – Compliance Options

IMO 2020 is self-regulation by the shipping industry. Ship owners will determine the compliance option but probably not bear the full cost:

- **HSFO** – Scrubbed
- **0.5% compliant fuels**
 - MGO – DMA (0.1%)
 - VLSFO
- **Alternative Fuels**
 - LNG, LPG, Methanol etc.
- **Non-compliance**



...ship owners are making late decisions after at first deciding to do nothing!

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BUNKER 2015

YENİ YAKITLARLA İLGİLİ BEKLENTİLER

Pazar Payı (Bugün):

Gasoil = %18

Fueloil = %82

Pazar Payı (2035) :

Gasoil = %70

Fueloil = %20

LNG = %10



LNG nin beklenenden daha hızlı gelişme göstereceğini savunanlar da var.

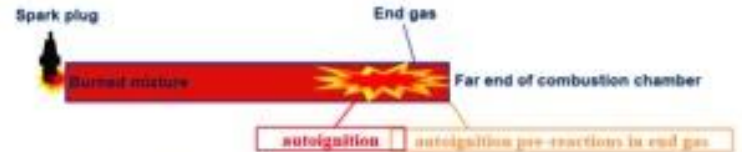
Kalite ve fiyat belirleyici unsur olacak.

20 yılda 6000 yeni inşa (LNG) = rasyonel.

Normal combustion vs. knocking combustion



Normal combustion vs. knocking combustion

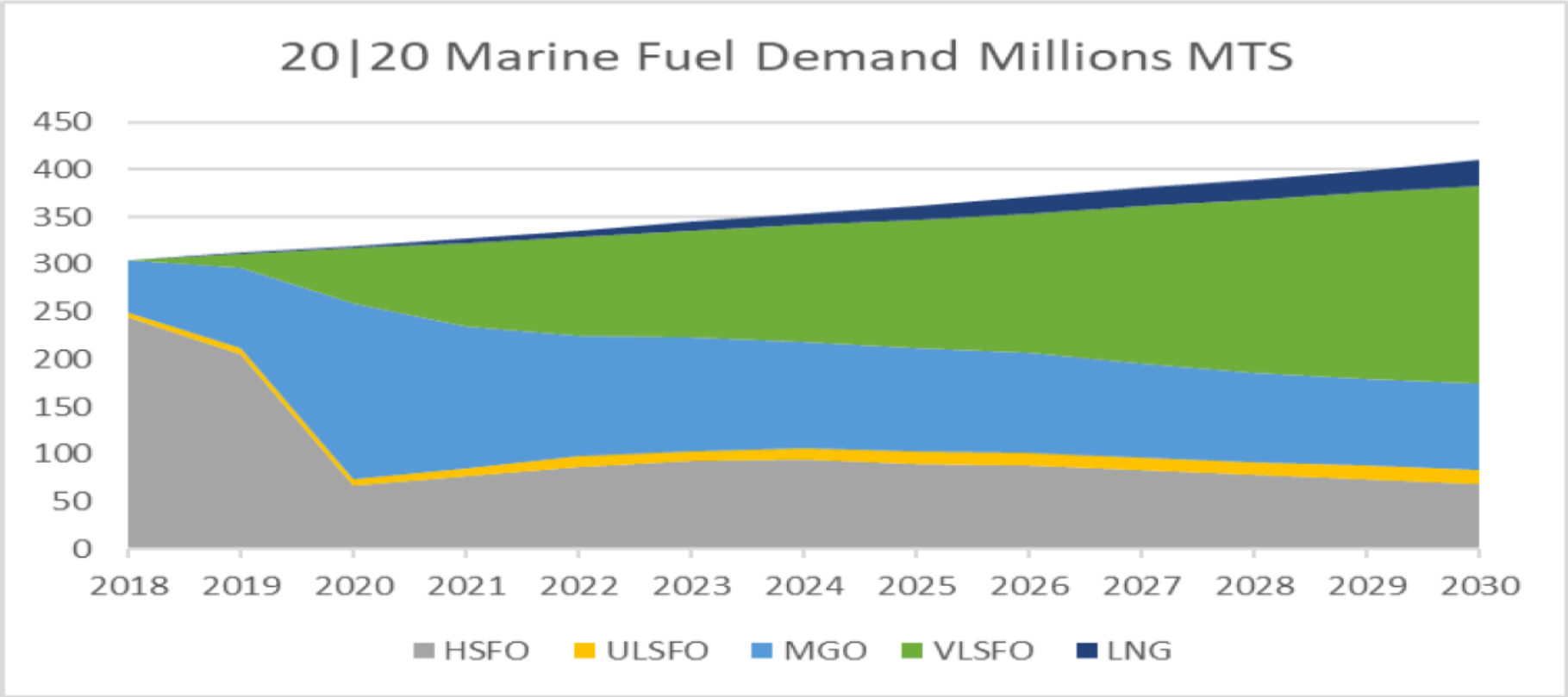


Knocking combustion → end gas spontaneously ignites

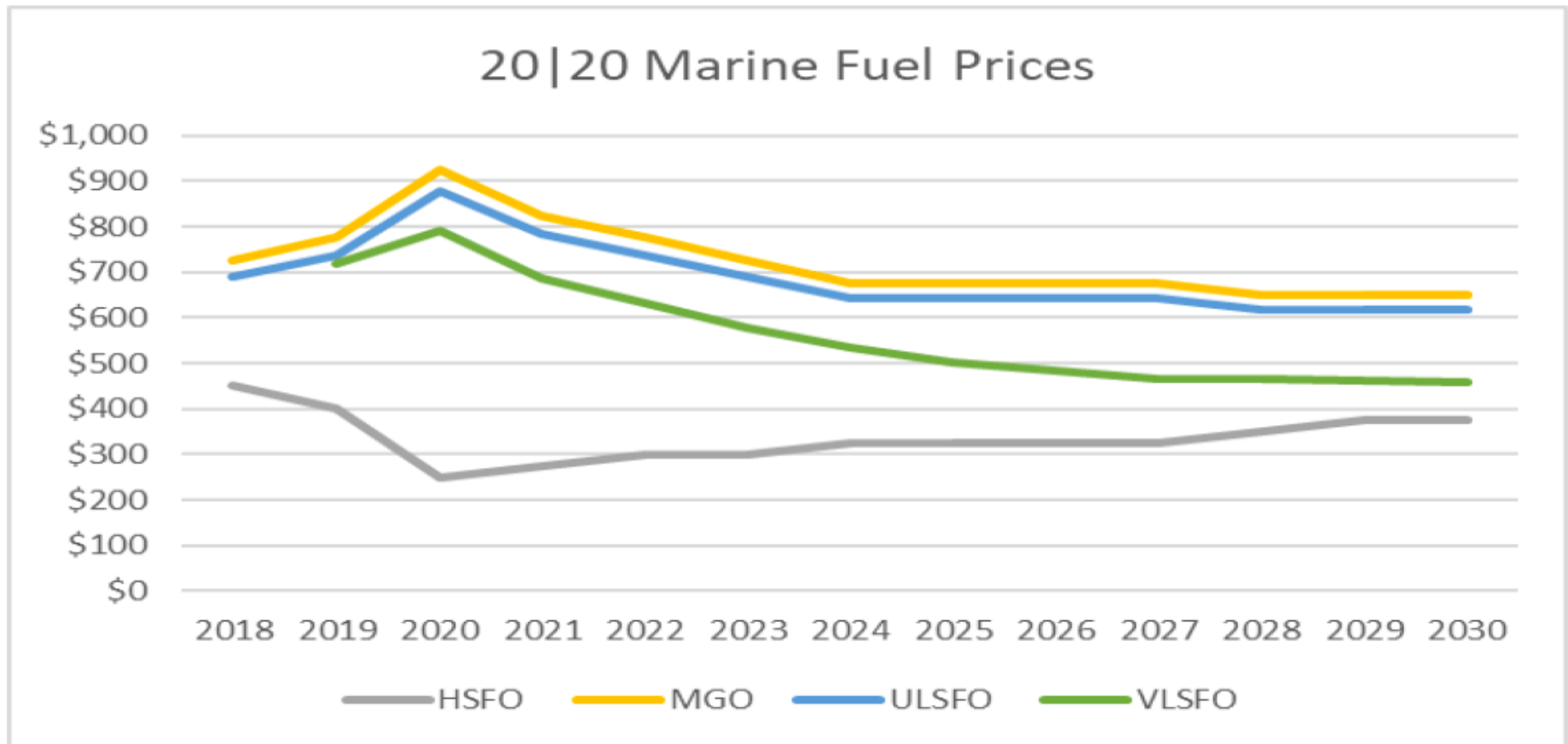
$$t_{\text{autoignition}} < t_{\text{combustion}}$$

BUNKER 2019

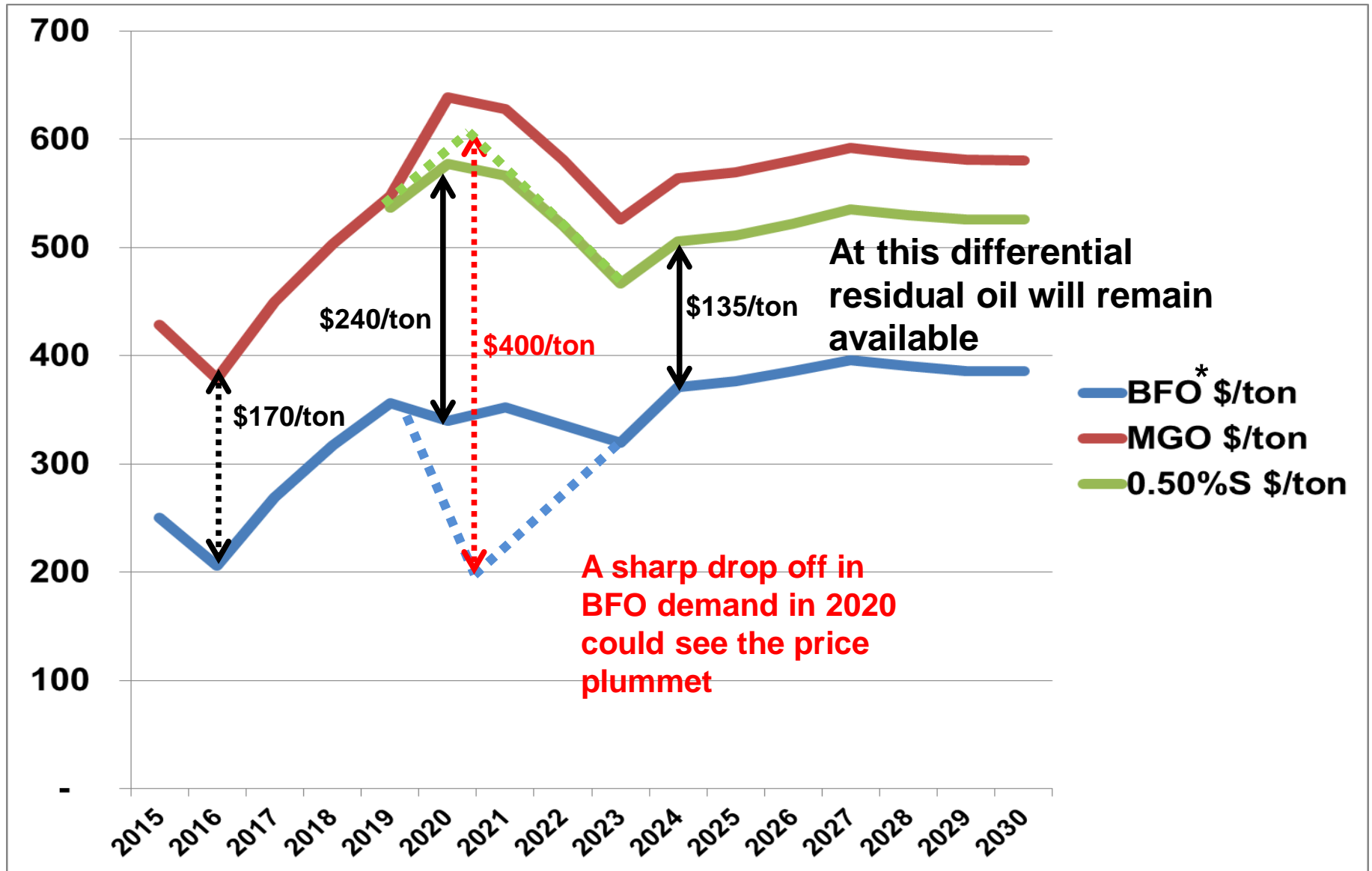
IMO 2020 – Consensus Global Demand



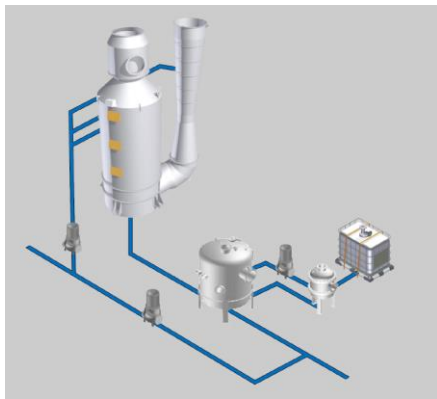
IMO 2020 – Consensus Global Pricing



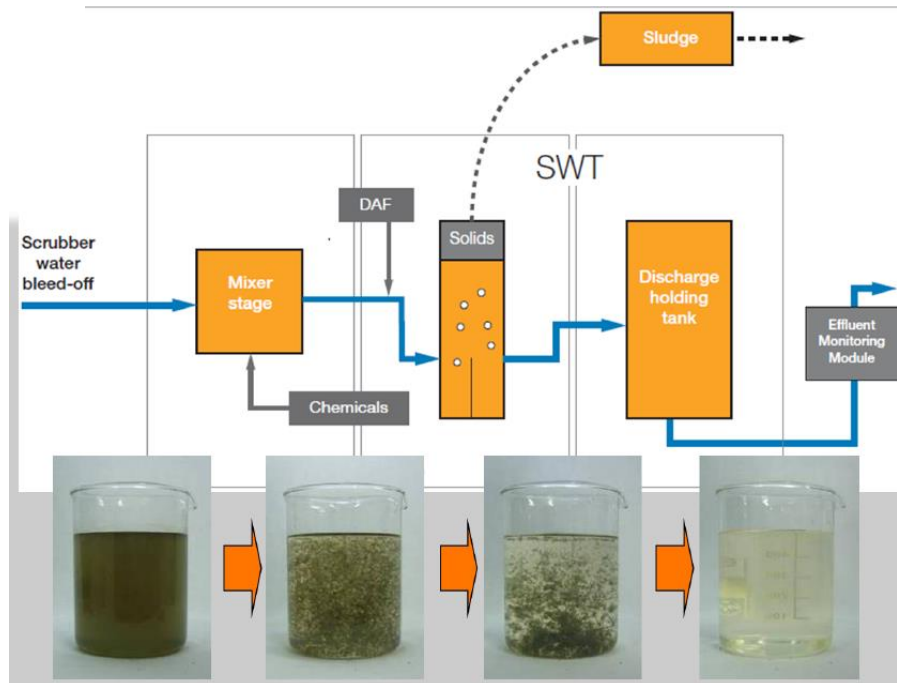
Bunker price differentials expected to deviate after 2020



* High Sulphur Bunker Fuel Oil



“Scrubber”



- Global merchant fleet annual HFO consumption: 300,000,000 tons
- Average HFO sulphur content: 2.7%
- Average world ocean sulphate concentration: 2700 ppm
- Entire world merchant fleet scrub continuously for 150 years
- Resulting world ocean sulphate concentration ???
- 2701 ppm...

CE Delft study for IMO

conclusion:

Sufficient avails for 0.5%S in 2020



*Assumes 0.10% to 0.50%S fuels will be blends

| Fuel type | Demand forecast for 2020 (mill MT) |
|------------------------------------------------|------------------------------------|
| HFO (scrubbed) | 36 (11%) |
| Max 0.10% sulphur fuels | 39 (12%) |
| Fuels between 0.10% and 0.50% sulphur * | 233 (73%) |
| LNG | 12 (4%) |
| Total | 320 (100%) |

*Assumes 0.10% to 0.50%S fuels will be blends



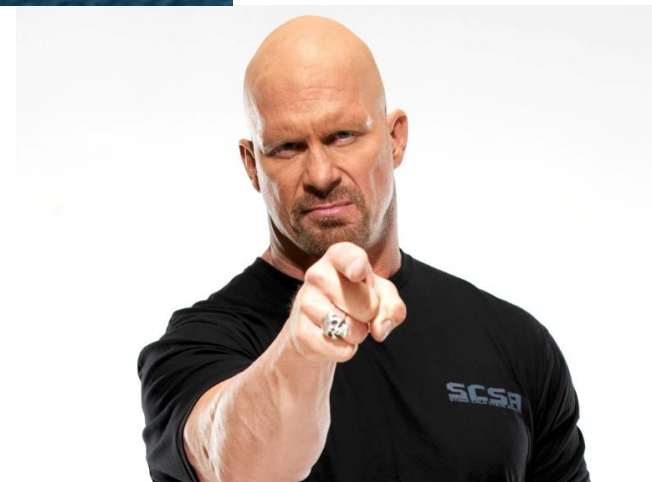
BUNKER 2019



2020 compliance options

Each option for compliance needs to be assessed by vessel owners based on:

- Vessel type
- Route
- Age
- Engine



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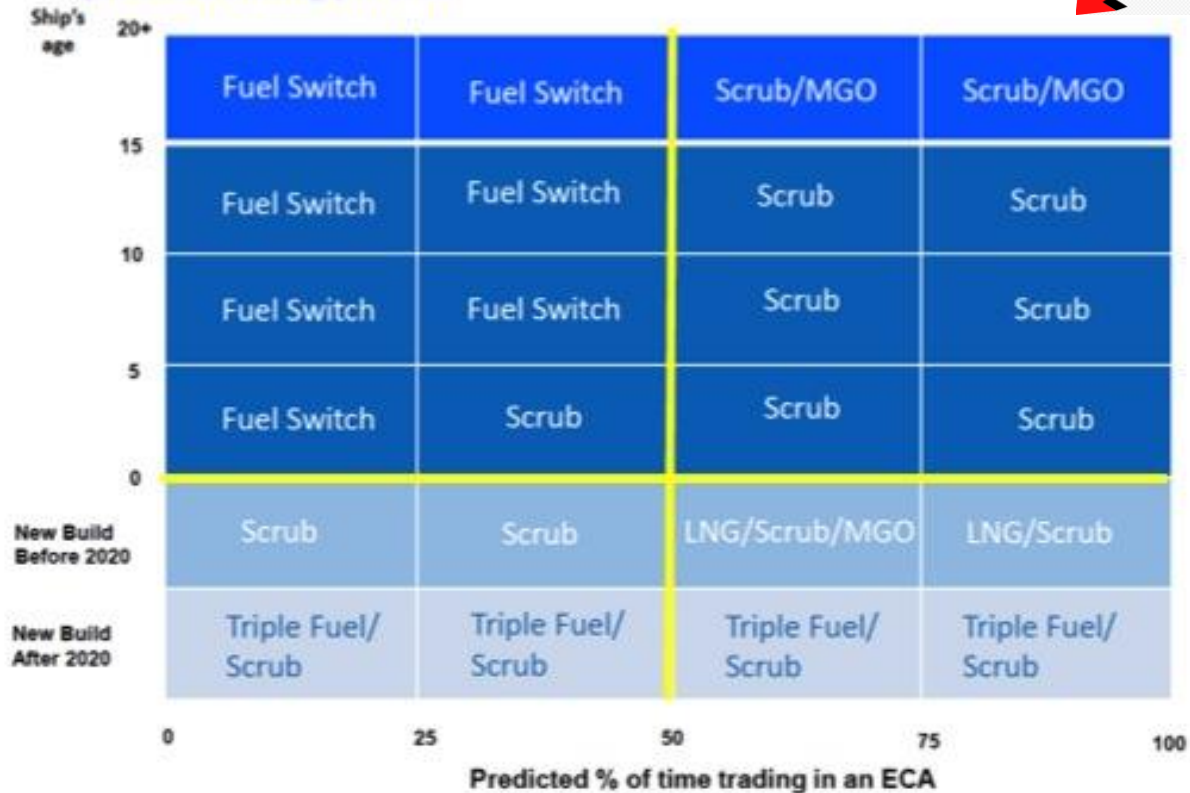


BUNKER 2015 YENİ YAKITLARLA İLGİLİ MALİYET BEKLENTİLER



How best to comply

In the near term this will be principally be a function of vessel age and predicted trading patterns



BUNKER 2019

CE Delft study for IMO
conclusion:



Sufficient avails for 0.5%S in 2020

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MEPEC 73 - October 2018

High Sulphur Fuel Carriage Ban = 1st March 2020

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Tüketilen bunker = gemi tanklarında bulunan bunker = armatör sorumluluğu.

- ISO 8217:2005 – ISO 8217:2012 (E) standartlarında belirtilmeli.
- MARPOL ANNEX VI bunker prosedürü Yakıt İkmali için “MARPOL Annex VI” prosedürü uygulanmalı.
- İkmalden önce kalite sertifikaları
- İkmal sırasında kalitenin canlı izlenebildiği sistemler tercih edilmeli = **Mass Flow Meter**
- Sertifikalı ve Mühürlü Mass Flow Meter
- Singapur 2017
- İstanbul 2014

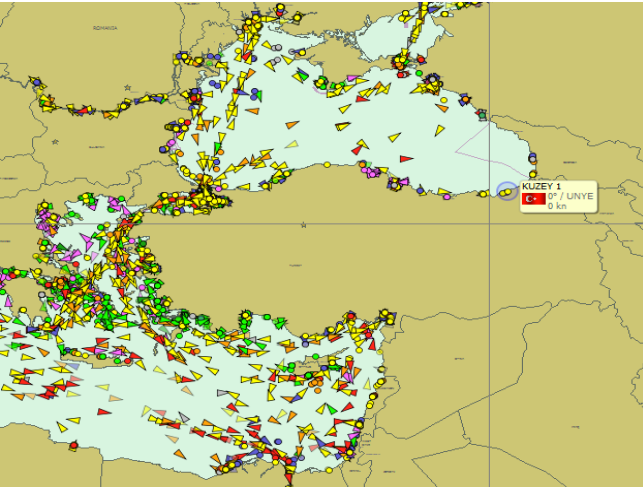




TÜRK BUNKER SEKTÖRÜ 2019

- en düşük bunker kalitesi = ISO 8217:2005
- Marpol Annex VI bunker ikmal prosedürü zorunlu.
- Dünya nın en kaliteli bunker ikmalı = İSTANBUL

- 2013 47 000 gemi 1.4 milyon ton
- 2014 46 000 gemi 1.7 milyon ton
- 2015 43 000 gemi 2.0 milyon ton
- 2016 42 500 gemi 2.3 milyon ton
- 2017 43 000 gemi 2.8 milyon ton
- 2018. 41 000 gemi 2.9 milyon ton





SONUÇ

- Petrol 30 yıl kadar ana kaynak.
- Kaya gazı tahmin edilenden daha hızlı geliyor.
- Yenilenebilir enerji yavaşta olsa geliyor.
- GLOBAL CAP 2020 = Daha çevreci bunker ürünleri = Gasoil 0.1 + LNG + Succrubbers
- LNG bölgesel büyümesini sürdürür. Ana bunker ürünü olması zaman alır.
- Armatörlere daha fazla sorumluluk = Yüksek standartlarda satın alma / Bunker ikmali



2020



BUNKER 2019



thank you



A.Deniz ERAYDIN

CHAIRMAN

TURKISH BUNKER ASSOCIATION