Bunkering and oil refining markets in the International Maritime Organization's changing regulatory environment in 2017–2030

Analytical report

April 2017

RPI

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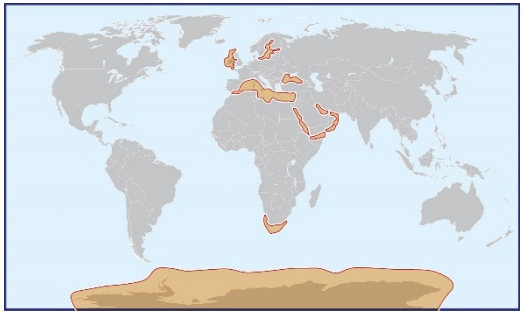
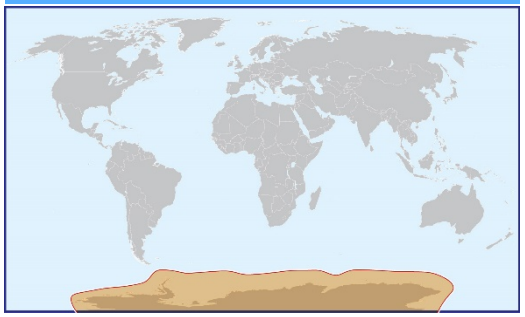
Emission Control Area (ECA)

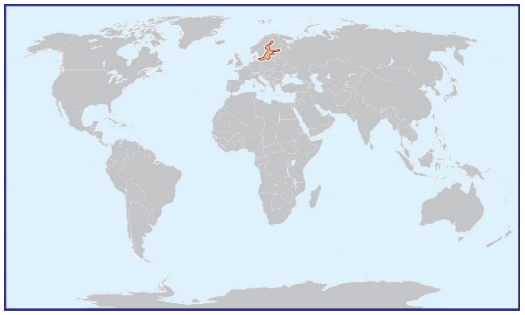
ANNEX I



ANNEX II

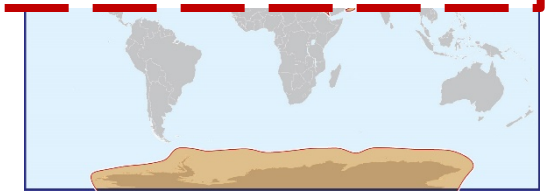


ANNEX IV

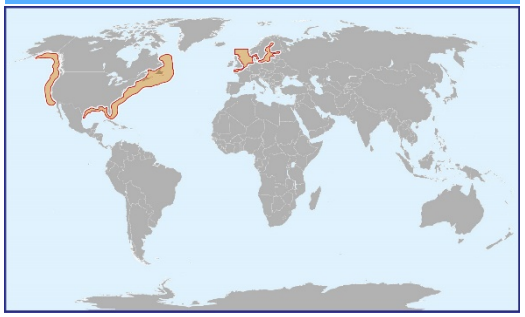


Emission Control Area (ECA) – sea area wh
oceanographic and environmental features req
special preventive measures[1]. Such areas are
determined and listed in Annexes I-VI to MARP

- Annex I – Regulations for the Prevention of Pollution by Oil
- Annex II – Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk
- Annex III – Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form
- Annex IV – Prevention of Pollution by Sewage from Ships
- Annex V – Prevention of Pollution by Garbage from Ships
- **Annex VI - Prevention of Air Pollution from Ships**



ANNEX VI



2015 → Introduction of requirement to use more eco-friendly bunker fuel (containing no more than 0.1% of sulfur)

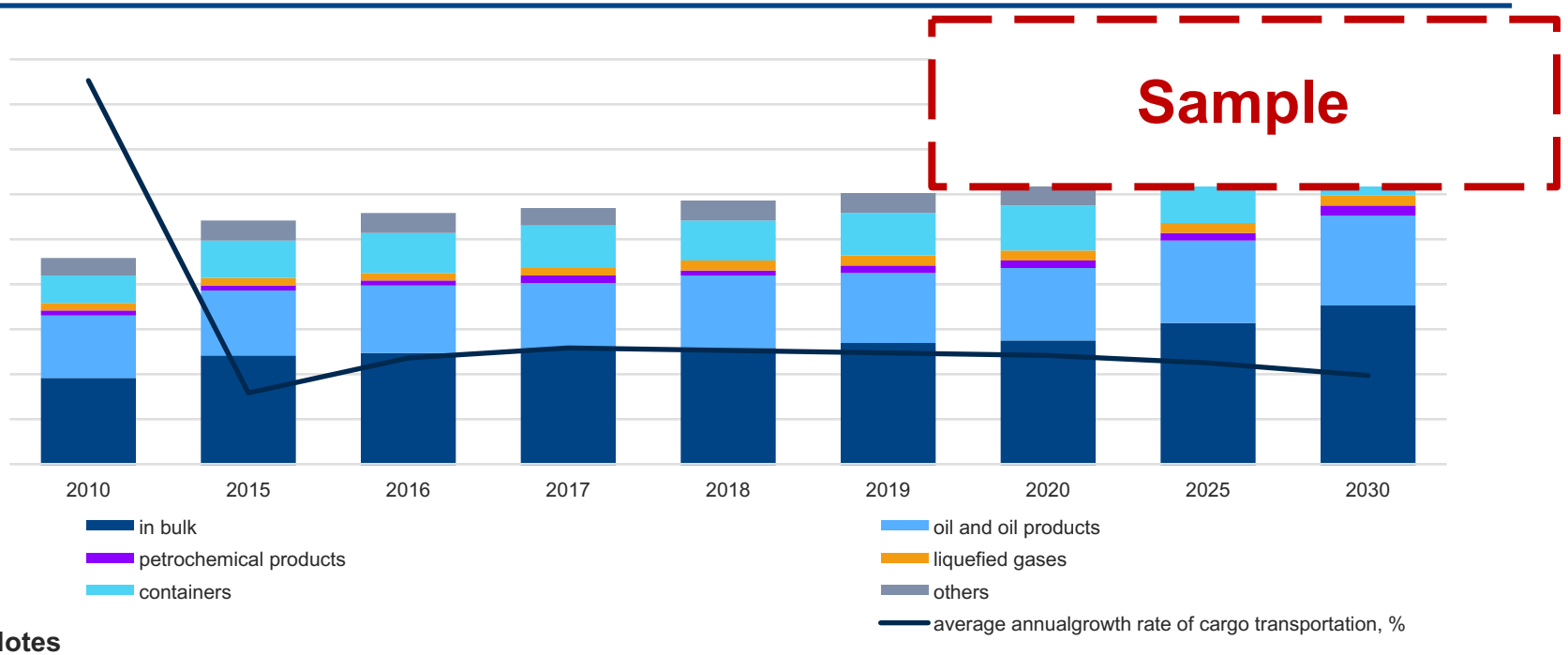
2020 → Global ECA extension[2] and ban on bunker fuel with more than 0,5% of sulfur

[1] Military and government-owned non-commercial ships are exempt from this rule

[2] Approval of final version still pending

Size of maritime cargo-shipping market

Changes in size of maritime cargo-shipping market, billion tons

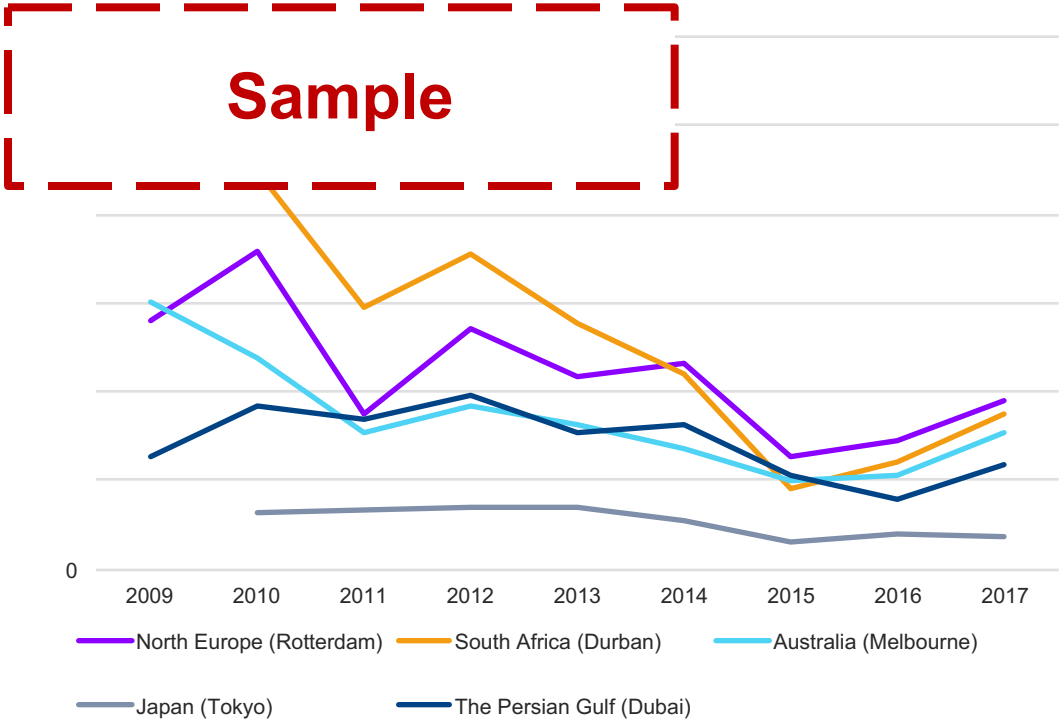


Notes

- In 2010-2016, the fastest-growing segment of the maritime cargo-shipping market was the chemicals segment. The growth was XX%, however, chemical products account for less than XX% of the total global market.
- The biggest growth in absolute terms was registered in the bulk shipping segment, totaling XX billion tons
- In 2012-2030, an increase in LPG shipping is expected due to high demand for eco-friendly fuel. Its growth rate may reach XX%
- Container shipping is in 2nd place primarily due to continuing growth of manufacturing in Asia and rising consumption in Europe, America and Africa.

Size of maritime cargo-shipping market

Changes in freight rates from China (Shanghai), US$/TEU

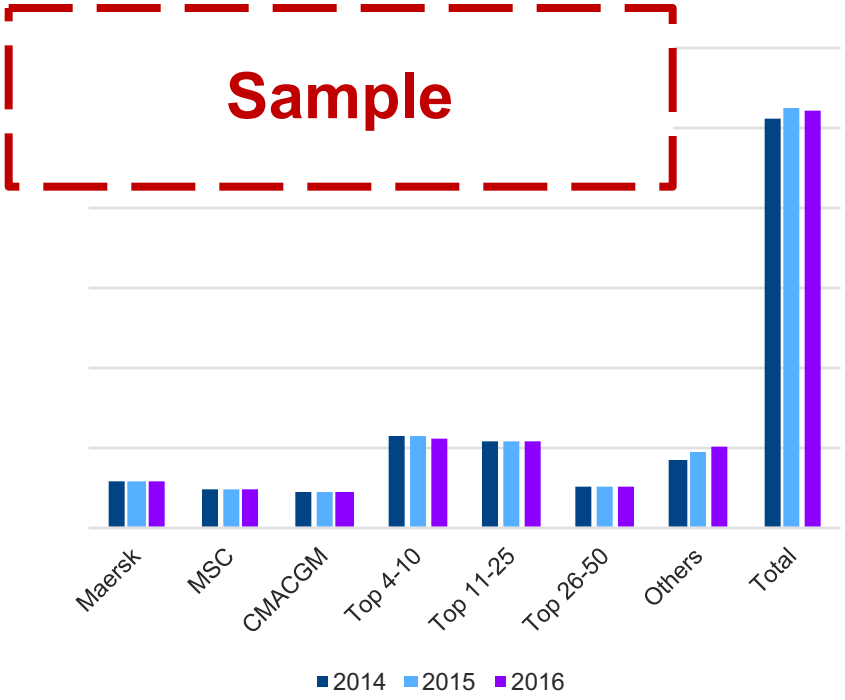


Notes

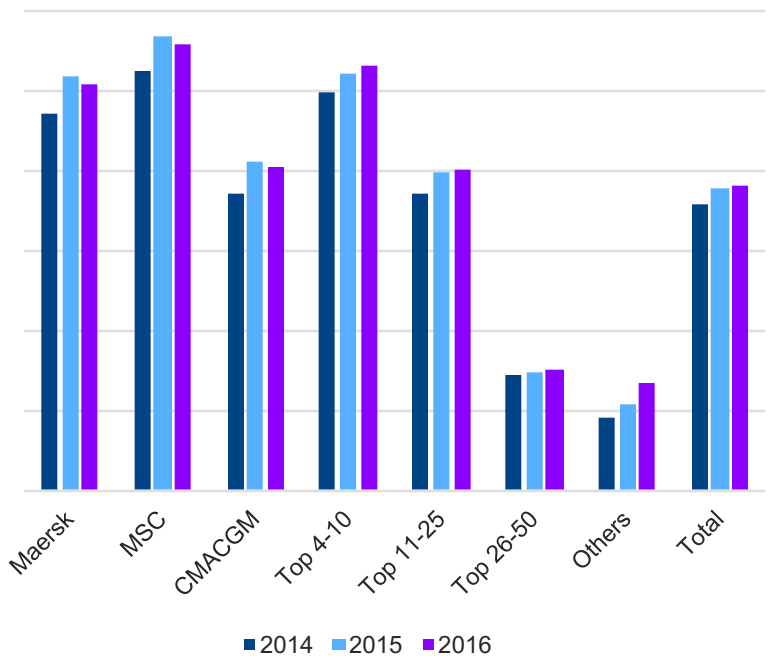
- In 2009-2015, freight costs decreased on average by XX%. Introduction of IMO's new restrictions in ECA zones did not have decisive impact on freight costs due to oil prices drop
- In 2016-2017, freight costs started to grow again. This occurred due to following factors: oil and oil products price rise, utilization of large numbers of ships, shipowners' losses. By the end of 2017 freight costs are expected to grow by XX%.
- In 2020-2021, XX times growth of freight costs is likely to take place as IMO's new restrictions are introduced

Size of maritime cargo-shipping market

Vessel fleets by company, pcs



Average vessel deadweight, TEU/ship



Notes

- Globally, about one-third of all ships are owned by three major companies, however, the share of other shipowners' has risen by XX% over the last three years, indicating the process of gradual demonopolization of the market.
- Average deadweight of the 10 largest companies is XX% higher than the market average
- Average tonnage of large ships is steadily growing, while the number of vessels is changing slightly

In 2020-2024, it is expected that shipowners will be forced to refrain from using fuel oil in favor of low sulfur diesel-based mixes

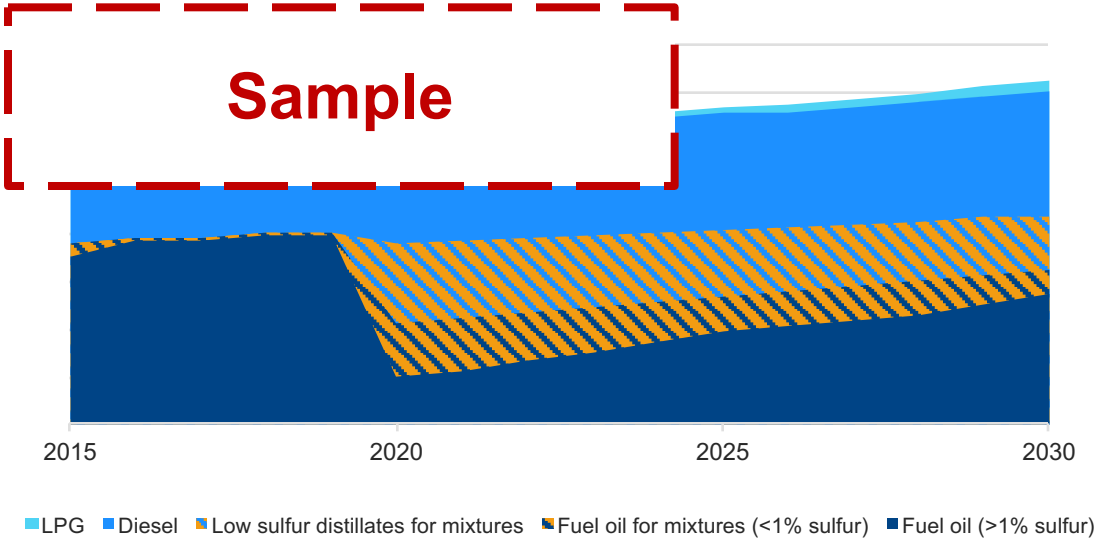
Types of fuel to replace high-sulfur fuel oil

		g costs	Fuel availability	Shipping/ storage requirements	Fuel consumption	Other
fuel + scrubbers			Surplus	Need for raw materials for scrubbers and cuttings storage tanks	Above medium	-
Low-sulfur hybrid bunker fuel	Above medium	Low	Manufacturing capacity shortage	-	Medium	Possibility to mix diesel with low-sulfur fuel oil at refinery and ports
Medium distillates	High	Low	Manufacturing capacity shortage	-	Medium	-
LPG	Low	Very high	Shortage caused by poor logistics infrastructure	Special tanks	High	Highly eco-friendly

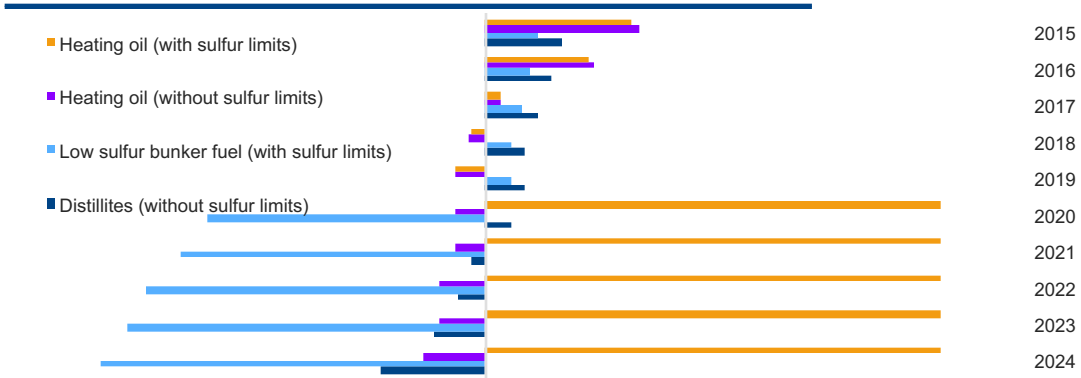
- As IMO's new restrictions are introduced, necessary volumes of fuel could be replaced with a mixture of low-sulfur heating oil (1%) and low-sulfur distillates
- This mixture can be produced at refineries and ports, and thus simplify fuel supply logistics for ports. If new regional restrictions are introduced, the creation of a flexible product line of hybrid bunker fuel is possible
- Low-sulfur hybrid bunker fuel and medium distillates have slight differences in terms of cost and quality and they will be the main substitute in the first years following the new restrictions' introduction, however, over time customers will stop using them due to economic reasons
- Due to a high number of deterrents LPG is likely to become the substitute for high-sulfur fuel oil only in long term

In 2020-2024, it is expected that shipowners will be forced to refrain from using fuel oil in favor of low sulfur diesel-based mixes

Bunker fuel demand, million tons per year



Deficit/proficit of bunker fuel 2015-2025, mln t/year

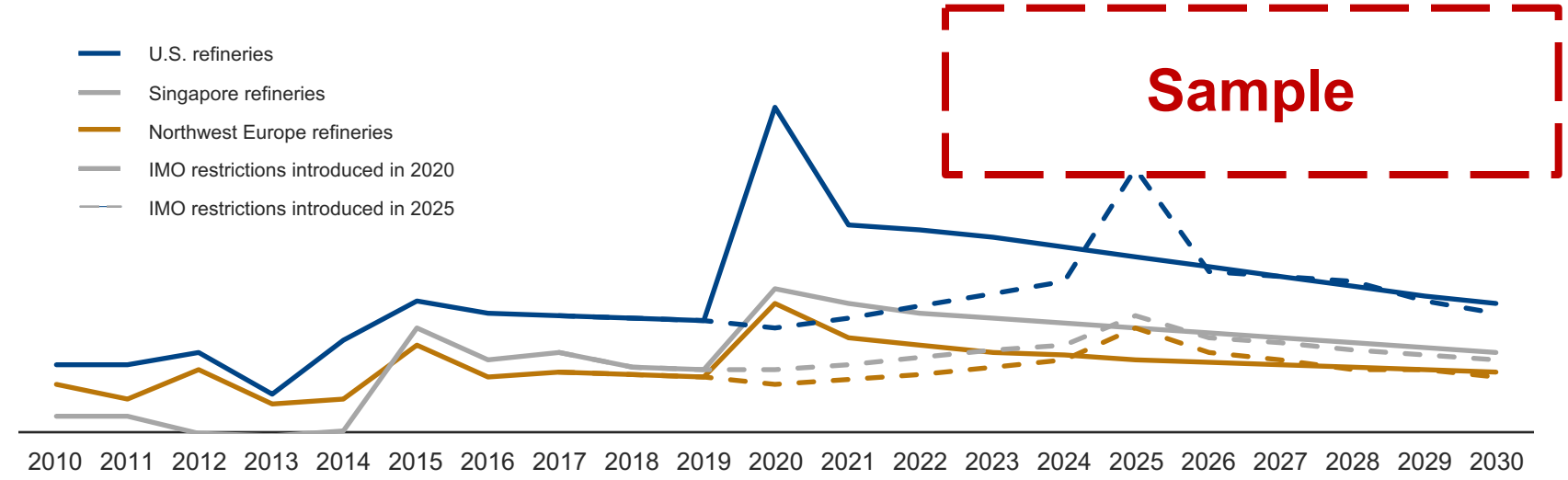


Notes

- As IMO restrictions are introduced the share of high-sulfur fuel oil in the total volume of bunker fuel will be reduced from XX% to XX%
- Due to shortage of scrubbers almost all lost demand for fuel oil is expected to be replaced by low-sulfur fuel oil and distillates mix
- Lost demand will account for XX% of the total fuel oil market, and will make an impact on prices, bringing about change of direction in the oil refining sector
- Due to the low-sulfur fuel oil and distillates demand growth, the differential between low-sulfur and high- sulfur oil will increase, the Brent-Urals spread in particular
- As the cost of fuel oil declines, most countries will have to introduce preventive measures so that companies don't abandon their eco-friendly fuel programs

Change of refineries' margins as regulations on bunker fuel sulfur levels are tightened

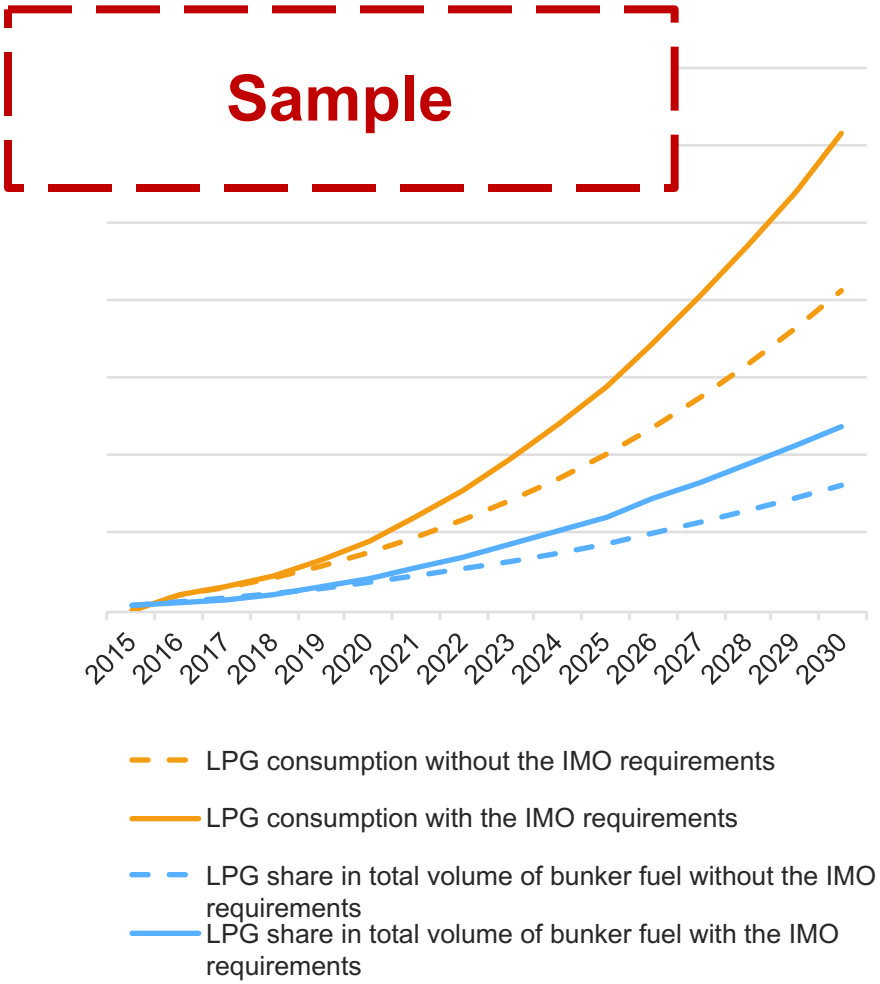
Changes of refineries' margins depending on actual times of IMO requirements' introduction, US$/bbl



- The introduction of IMO's new requirements will require an increase in the volume of distillates and low-sulfur fuel oil that will see the margins grow at refineries manufacturing these products
- As the new requirements are introduced in 2020, margins will growth XX times in the year of introduction, and then gradually decrease in the following years back to current levels as demand drops and production grows
- A five-year delay will let refineries to balance production and will let shipowners increase the share of ships equipped with scrubbers and LPG. Meanwhile, margins will grow XX times during the first year of new restrictions in place
- As they use cheaper raw materials with lower sulfur content and low output rates of fuel oil (about XX%), U.S. refineries will post significantly higher margins following the introduction of IMO's new restrictions, likely to reach XX US$/bbl

Impact of IMO's new requirements on LPG market

Dynamics of global LPG consumption in bunker fuel market, million tons

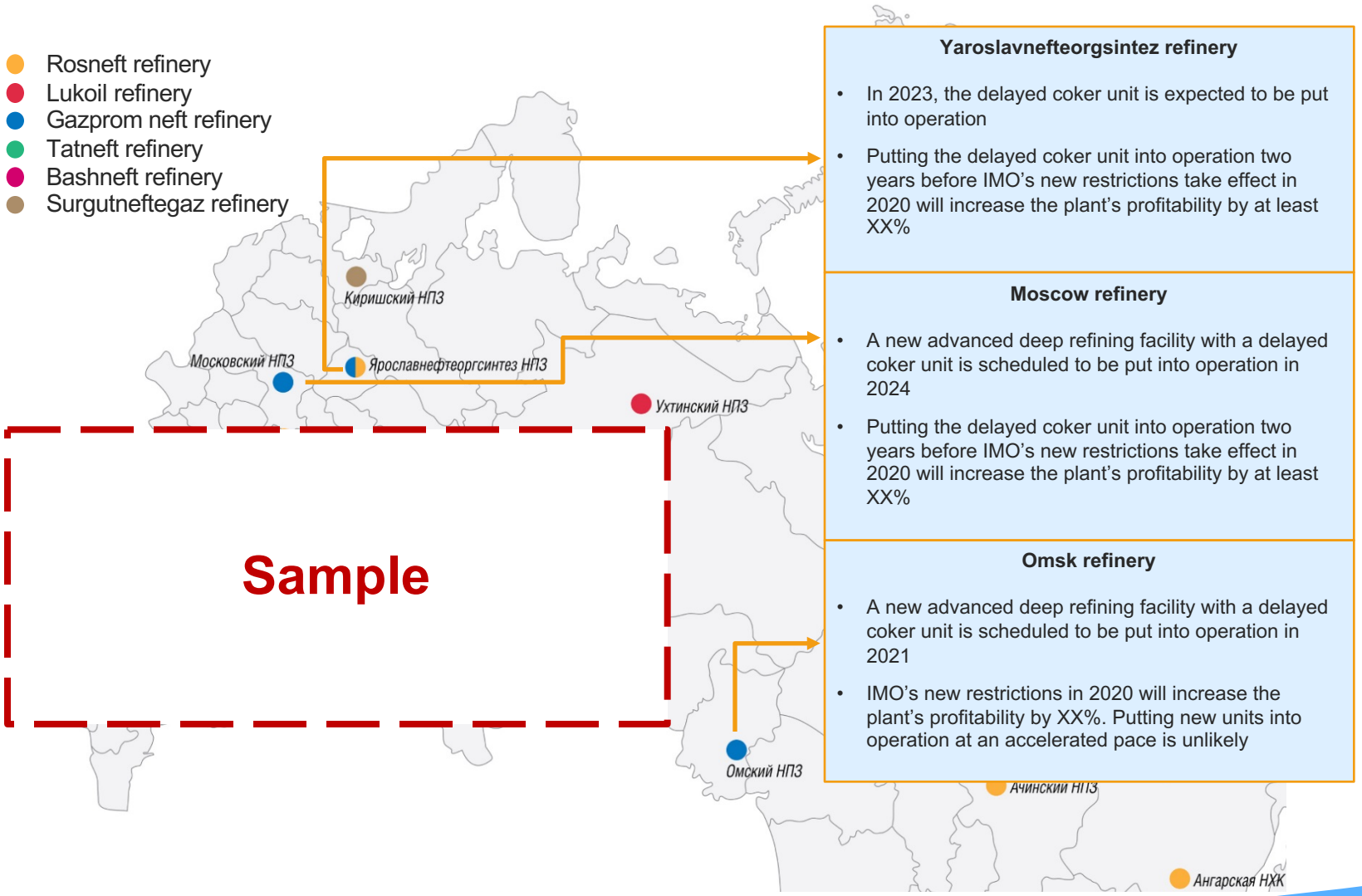


Notes

- For now LPG share accounts for XX% of the total bunker fuel market and the introduction of IMO's new requirements will stimulate its growth by 1.5 times reaching XX%
- European countries will drive the growth of LPG consumption due to high interest in eco-friendly technologies and the availability of basic infrastructure for large-sized ships
- As its manufacturing of medium distillates posts grows significantly, America is expected to see limited growth in this sector
- The Asia-Pacific region is characterized by high LPG demand and sizable hydrotreating capacity, which are going to limit demand for LPG demand as bunker fuel
- Due to poor development of LPG infrastructure at ports, LPG tankers are expected to be the first to use this fuel
- Other restraining factors include high costs of ships retooling and tougher security rules on LPG storage, shipping and fueling

Impact of IMO's new regulations on specific projects to upgrade oil refineries in Russia

- Rosneft refinery
- Lukoil refinery
- Gazprom neft refinery
- Tatneft refinery
- Bashneft refinery
- Surgutneftegaz refinery



Yaroslavnefteorgsintez refinery

- In 2023, the delayed coker unit is expected to be put into operation
- Putting the delayed coker unit into operation two years before IMO's new restrictions take effect in 2020 will increase the plant's profitability by at least XX%

Moscow refinery

- A new advanced deep refining facility with a delayed coker unit is scheduled to be put into operation in 2024
- Putting the delayed coker unit into operation two years before IMO's new restrictions take effect in 2020 will increase the plant's profitability by at least XX%

Omsk refinery

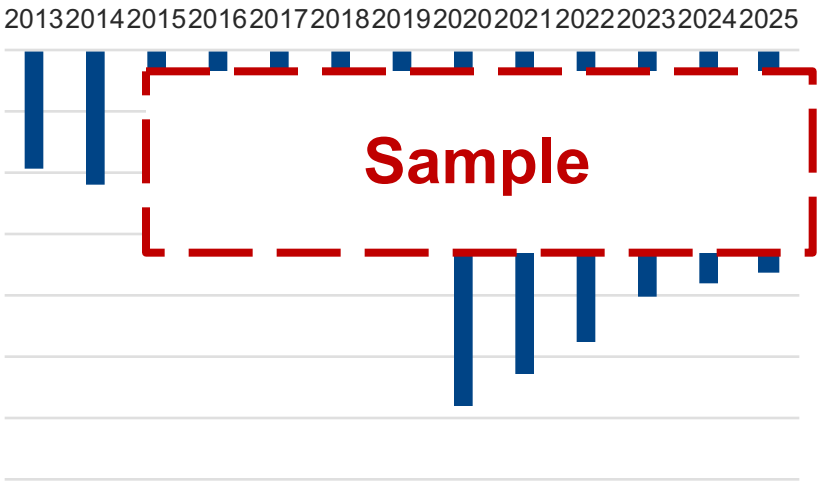
- A new advanced deep refining facility with a delayed coker unit is scheduled to be put into operation in 2021
- IMO's new restrictions in 2020 will increase the plant's profitability by XX%. Putting new units into operation at an accelerated pace is unlikely

* In 2016, Bashneft was acquired by Rosneft

Oil and oil products pricing changes

- As oil output is restricted and demand grows (also spurred by higher refinery utilization rates) oil prices will be increasing
- As demand for low-sulfur fuel oil and distillates grows, the Brent-Urals spread will grow more than twice
- Gradual decrease of Urals quality is likely to make an impact as well
- However, as demand for low-sulfur bunker fuel declines due to scrubbers installation, the spread will gradually start to shrink
- In 2014-2015, oil product prices declined considerably as oil prices plunged

Brent/Urals spread forecast, US$/bbl, 2013-2025



Dynamics and forecast for oil and oil product prices, 2013-2025