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Abstract Title: Fuel Oil Conversion Project at Kuwait Petroleum International RaM Refinery: Strategic Response to 2020 Challenge

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IMO 2020 will cause a dramatic shift in the demand of marine fuels used globally from High Sulfur Fuel Oil (HSFO) to 0.5% sulfur marine fuel (ULSFO). As the IMO 2020 is an international regulation, refineries in all corners of the world will be impacted. According to the BP 2016 Statistical Review of World Energy distillate production (excluding kerosene and jet fuel) was 28 million bpd and fuel oil production was 8 million bpd half of which is marine fuel.

Key price differentials for refiners will likely change markedly in 2020, producing significant changes in processing strategy for many refiners:

Distillate prices will increase markedly relative to high sulfur residual fuel products. Vacuum residue yield and sulfur content will cause crude price differentials to widen between low and high sulfur crudes.

After IMO becomes active in 2020, only ships fitted with an on-board scrubber can continue to use HSFO. Currently only few ships have on-board scrubbers and it is not clear how many ships will invest in this technology.

From a refinery perspective, the best option to move away from the bunker fuel market depends on configuration, location, markets and strategy. The following technologies are available:

Delayed Coking Unit (DCU) is used in many refineries combined with hydrocracking for residue conversion. The DCU will produce significant amounts of coke which is a low value product.

In the Flexicoking process, the produced coke is converted in-situ to power.

Solvent Deasphalting (SDA) with Hydrocracking of the produced Deasphalted Oil (DAO). With the modern catalyst systems, it is possible to remove the high metal content and handle the high CCR content of the DAO.

Gasification can handle highly viscous and unstable residues. The gasification process can be used to produce power but it is also possible to produce synthesis gas or hydrogen.

Moving bed hydrocrackers (Ebullated-bed or Slurry-Phase) can be used upgrade the bunker fuels to clean fuels. Kuwait

Petroleum International and ENI jointly own Raffineria di Milazzo (RaM refinery). With the upcoming IMO regulations and declining demand of bunker fuels for power generation, the Milazzo refinery has started the last step in the deep conversion project which is aimed to achieve 0% fuel oil production.
Deep conversion projects started in RaM in the late 90's with the construction of an LC-Finer (Vacuum Residue Hydrocracker with ebullated bed technology),
Hydrogen production and Sulphur recovery units. In 2015, a comprehensive revamping of FCC unit was implemented (FCC Resid max) in order to maximize feed
including DAO to further increase conversion.
To finish the deep conversion projects the following is studied: the SDA unit is fed with LC-Finer Vacuum or Atmospheric Residue. The DAO product is sent to the
FCC unit and the remaining residue (pitch) is fed to the gasification unit that produces syngas, which is converted to hydrogen.

This presentation gives an overview of the local business environment, underlying strategy and projects that were already implemented leading to the final
configuration.