



LOHRMANN
GROUP

Ref.-No.:
ProOil-306



Pre-Owned OIL REFINERY 280,000 bpd FOR SALE AND RELOCATION

- Presented by: Lohrmann International Germany



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1. REFINERY HISTORY

The Refinery was designed by Mobil and built between 1973 and 1976 By Badger Engineering. The original design capacity was 170,000 bpd based on processing Arabian Light and Nigerian Bonny Light crude oils. Being on an advantageous large site, the initial construction layout took into account potential future expansion and additions to the process facilities in anticipation of an extensive construction program.

A catalytic middle distillate de-waxing unit, a process unit that allows greater production of middle distillate and reduced production of fuel oil, was added in 1980, contributing significant flexibility to the diesel and heating oil pools and considerably improving the gross margin achieved.

The Refinery changed the ownership in 1990 and, after extensive refurbishment, the Refinery was re-commissioned in 1991. The new owners further developed the Refinery and improved its performance. This culminated in the construction of a state-of-the-art vacuum distillation unit in 2004. The previous owner began to develop a large heavy oil conversion project (the Deep Conversion Project "DCP") to reposition the Refinery competitively. In parallel, the owner sold the Refinery in 2006 and the new owner worked to develop the DCP further, as well as he has upgraded the Refinery to be able to produce 100% ULSD.

He spent over € 150 million in capital and over € 90 million in maintenance to improve the assets prior to the Upgrade Project. The maintenance expenditure included a major inspection and repair program for corrosion under insulation and remediation of the jetty superstructure and pipelines. Capital improvements included over € 15 million for energy conservation, € 37 million for desuphuration and kerosene treating and over € 25 million for reliability and maintenance of capacity, spread over the period since acquisition.

In 2007, the owner re-appraised the DCP and made certain changes to improve cost efficiency and raise reliability; the most significant being the replacement of a proposed solvent de-asphalting unit, and series of residue gasification/power generation trains, with a delayed coker. This revised project was developed through a full "Front End Loading" process to the current stage where a contract for detailed engineering and construction could be awarded.

Shut down was late 2009 – and can be re-commissioned without significant cost or delay.

New Hydrocracker: the 4 hydrocracker reactors have been delivered and are in offsite storage

New Delayed Coker: the 2 coke drums for the delayed coker were delivered in October 2010

New ULSD hydrotreater: the reactor and its internals were delivered in October 2010

may become part of the deal depending on conditions



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2. BRIEF REFINERY DESCRIPTION & INTENDED UPGRADE PROJECT

The existing “Refinery” is a large-scale 280,000 bpd, relatively low complexity, single train refinery with a hydro-skimming plus vacuum unit and is 100% ULSD capable.

The Refinery has historically processed predominantly light, sweet crude oils. Although an efficient processing unit, the current absence of hydrocarbon upgrading process units means that the Refinery has a clean product yield of c55%, below both that of either a typical cracking refinery in Europe [which is able to convert the mid portion of the barrel (VGO) to higher value light products] or a full conversion refinery [which also upgrades the bottom of the barrel (vacuum residue) into higher value clean products].

The Refinery “Upgrade Project” is designed to cost-effectively transform the Refinery into a full conversion refinery and hence significantly improve its competitive position and economics. It offers the following attractive key features:

- **Ability to process a 100% sour crude slate**

This will enable the Refinery to capture the existing and forecast price differential between light-sweet and heavy-sour crudes and to avoid the incremental transport costs of sourcing more expensive light sweet crude oils. The upgrade project was expected to reduce crude cost by approx US\$ 4 /bbl (2015, nominal).

- **Higher value refined product yield via coking and hydro-cracking configuration**

The Upgrading of lower value products (VGO and fuel oil) to higher value refined products (diesel) will align the Refinery with the EU demand pattern and increase realized product prices. Hydro-cracked diesel, which will make up a significant portion of the Refinery’s diesel pool, is very high quality (high cetane, low sulphur, low density and low aromatics) and the Refinery will be able to produce all diesel to ULSD spec some of which will be sold as low sulphur heating oil for the EU market spec. This improvement is expected to increase the clean product yield to approx 85% and the realised product value by approx US\$ 8 /bbl (2015, nominal).

- **Existing configuration provides ideal platform for the Upgrade Project**

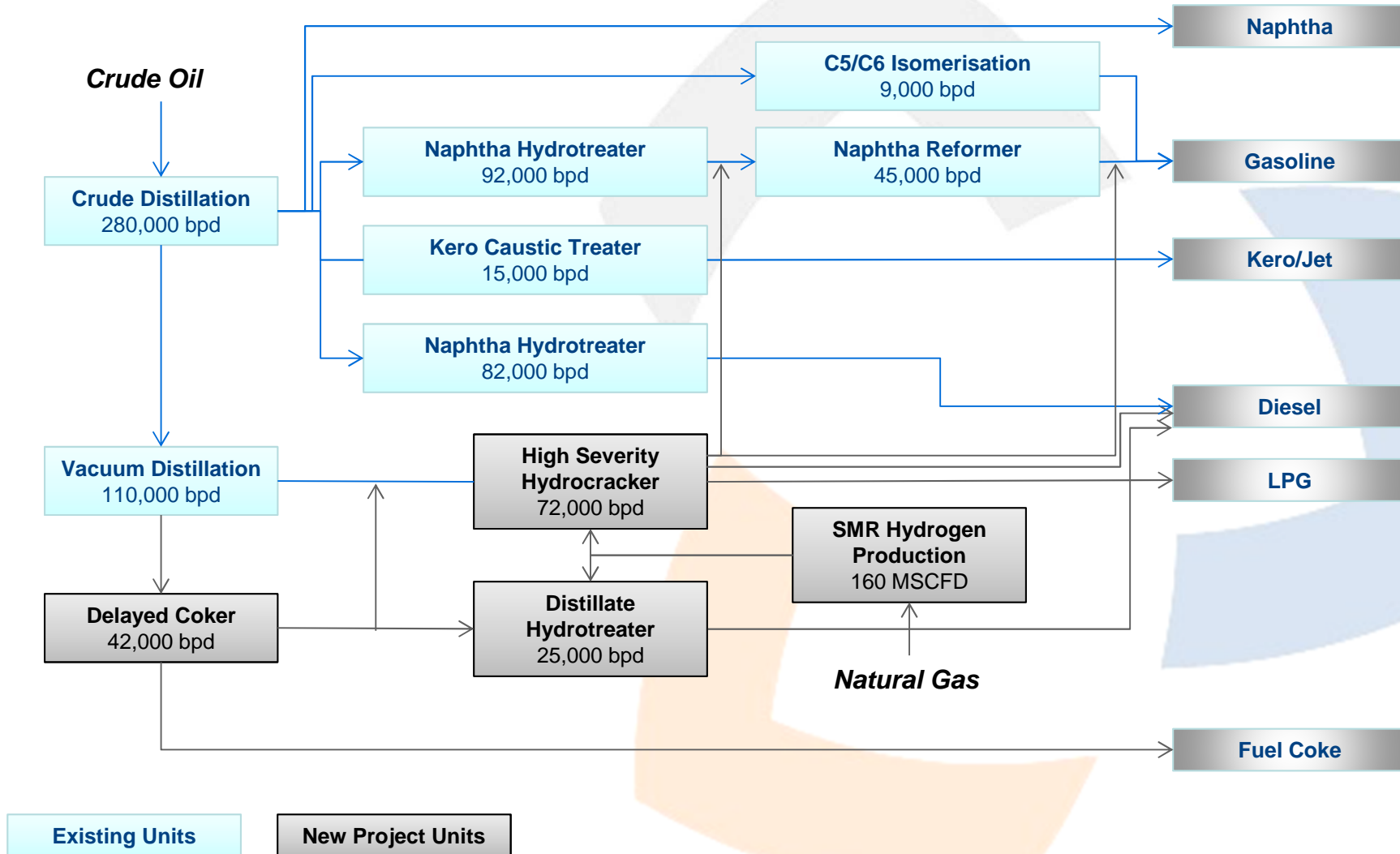
The new unit additions are complementary in terms of scale, layout and unit redundancy avoidance.

- **EPC ready project**

The Upgrade Project is already well developed in terms of engineering and design, with certain long lead time items already manufactured and in some cases delivered and paid. Project development has been ongoing for 4 years. The Project realization time is currently estimated at approx 3 years, versus seven years for a new-build project!



3. Simplified Process Flow Diagram





4. Existing Process Units

Unit	Capacity in m ³ /h (except if specified)		Last Revamp	original date built	Design/ Licensor/ Catalyst	Unit Performance
	Sustained Capacity	Permitted Capacity				
Crude Distillation Unit	1,825	2,050	2005	1974	Mobil/Koch	
Vacuum Distillation Unit	730	800	2005	2004	Fluor Daniel/UhdeEdeleanu	
Naphtha Pre-Treater	585	630	2005	1974	Mobil/Haldor/Topsoe	0.2 ppm
Catalytic Reformer	300	330	2009	1974	Mobil/Criterion	102 RON
Isomerisation	80	80	2000	1974	Mobil/UOP	74 RON@50 m ³ /h
Gas Oil de-sulphurisation	520	690	2009	1974	Mobil/Shell/Criterion	10 ppm (sweet crudes)
Middle distillate de-waxer / De-sulphurizer Nitrogen Unit	4,000 Nm ³ /h by vaporiser 295 Nm ³ /h by membrane unit		-	-	Air Liquide	
Gas oil dryer	150	-	-	2002	Open Art	
Kerosene treatment unit	100	100	-	2009	Open Art	
Saturated gas plant	260	260	1997	1974	Open Art	
Amine Unit	70 T/D S	n/a	-	1974	Open Art	
Claus Unit	2x 50 T/D S	49.9 T/D S	-	1974	Axens	
Sour water unit	73	n/a	-	1974	Open Art	
Flare gas recovery unit	266 Nm ³ /h	n/a	2008	1984	Open Art	
HP and LP Flare	725 T/h	n/a	-	1974	Open Art	
H ₂ S Flare	50 T/h	n/a	-	1974	Open Art	
Waste water unit	300	300	2007	1974	Open Art	
Steam generation system	2x110 T/h	n/a	-	1974	Open Art	
Demin water uni	150	n/a	-	-	Open Art	
Instrument air unit	2,900 Nm ³ /h	n/a	-	-	Open Art	



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5. Upgrade Project Units “delivered”

The owner has already purchased and received certain key long lead time equipment items:

- Hydrocracker: the 4 hydrocracker reactors have been delivered and are in offsite storage
- Delayed Coker: the 2 coke drums for the delayed coker were delivered in October 2010
- ULSD hydrotreater: the reactor and its internals were delivered in October 2010





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6. Pictures





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