PROMETHEUS REFERENCES

ITEM	PROJET	YEAR	CLIENT	PROJECT DESCRIPTION
23.02	Polymer Scheduling Tool for HMEL	2023	HPCL Mittal Energy Ltd (HMEL) - INDIA	Delivery of Polymer Scheduling Software built with SIMRAF technology aimed to model Polymer Plants to schedule polymer grade production sequences to minimise transition costs while respecting inventory levels and market demand. The software builds a MIP Optimisation Model supporting the concurrent management of different polymer plants. *Ongoing*
22.02	CDU-VDU Real time modelling	2022-23	IPLOM Busalla Refinery - ITALY	The project foresees the development of data-based and first principle models of the actual operating conditions of the crude distillation units to predict the value of process variables that the plant's DCS system cannot directly acquire in real time. The availability of real-time estimation of these variables improves the management of the unit both in terms of product quality control and fuel consumption. *Ongoing*
21.02	Blending Optimisation Tool for HMEL	2021	HPCL Mittal Energy Ltd (HMEL) - INDIA	Delivery of Blending Optimisation Software OTTMIX and Proprietary Technology aimed to model daily blending operation for refinery operation Planning, Scheduling and Production Monitoring and control. The software is a Multi Blending Optimiser supporting the concurrent management of different pools simultaneously (gasoline, diesel, fuel oils), defining the optimal destination for refinery and imported blending components.

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21.01	Development of an integrated plan to reform the Tunisian energy sector "TUNEREP". Activity 8 - Strategic study on the production and supply of petroleum products by 2030-2040	2019-21	Agence Nationale Pour la Matrise De l'Energie (ANME) end user Bizerte Refinery - TUNISIA	The Tunisian Government decided to entrust a 360 degrees study focused on the energy sector to identify strategies to supply the country's energy demand at the horizon 2030-2040. Prometheus was the project consortium member entrusted with studying the oil downstream sector. The TOR foresee the execution of two main steps: Pre-feasibility study: consisting of the comparison of alternative refining capacities and processing schemes with crude oils available in the Mediterranean area, considering the expected demand and economics (also assessed within the study), Detailed Feasibility study: this step required an in-depth analysis of the selected configuration with the selected crude oils considering alternative refinery locations, crude oil supply and product distribution logistics, and detailed investment associated with alternative options. The completion of the study took about 18 months.
20.01	Sainshand Refinery Construction	2020-22	Mongol Refinery State Owned LLC - MONGOLIA	The activity foresaw the delivery of the Owner's engineering services to support the client during the preliminary construction phases (basic engineering, feed, technology selection, EPC bidding) of Sainshand Refinery. In this framework, we evaluated and revised BEDPs for Open Art Units, Utilities, Logistics, Support for Plant Licensor's selection, design basis definition, BEDPs revision, up to EPC Packages award. *Ongoing*
19.02	Crude Characterization Tool for IPLOM	2019	IPLOM Busalla Refinery - ITALY	The project foresaw the delivery and customisation of the proprietary CUTS software providing crude oil characterisation data to all the operative tools in the refinery for operation planning, scheduling, production monitoring and control.

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19.01	Crude Scheduling Tool for HMEL	2018-19	HPCL Mittal Energy Ltd (HMEL) - INDIA	Delivery of a Crude Scheduling Software based on CUTS and PRORAF Proprietary Technology aimed to support the Long Term and Short Term Scheduling of refinery crude supply system logistics assets. The software automatically simulates the logistic operations (cargoes reception and unloading to maritime deposit, mixing to fit processing constraints, dispatch via pipeline, reception at the refinery site and processing). The modelled structure includes a maritime terminal with 14 Crude Oil Tanks, a Pipeline of 1000 Km, a refinery Terminal and a Crude Distillation Unit.
18.03	Crude Characterization Tool for ITALIANA PETROLI Group	2018	Italiana Petroli S.p.A. Corporate Headquarters - ITALY	Delivery and customisation of the proprietary software CUTS to Provide crude oil characterisation data to all the operative software tools applied in the Oil Group for refinery operation Planning, Scheduling and Production Monitoring and control. The Group coordinates the activities of two Italian Refineries (Falconara and Trecate sites).
18.02	Gasoil Cargoes Origin assessment	2018	PCS Consulting – PRINCIPALITY OF MONACO	The study is aimed to disprove the origin of Gasoil cargoes from a specific refinery of known feedstock and processing facilities. The study has been carried out with the support of Prometheus Simulation Tools and Multi-Variate Analysis Tools (PCA).
18.01	Due Diligence on the DFS for a new Refinery in Mongolia	2018	KT - ITALY End User Mongol Refinery - MONGOLIA	The Mongolian Government has awarded Kinetics Technology for the execution of Due Diligence on the detailed feasibility study about constructing a new refinery and a new crude pipeline. In this framework, Prometheus worked as a subcontractor and studied all the technical aspects related to market study and alternative processing configurations modelling and analysis aimed at results validation.

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17.01	LP Planning Model Setup	2016-17	IPLOM Busalla Refinery - ITALY	The activity involved developing the new Multi-Period refinery LP Model using SIMRAF technology.
16.01	CDU Atm. Column Process Spec. Revision	2016	STIR Raffinerie de Bizerte - TUNISIA	The technical study aimed to revise the process specification of the new Crude Atmospheric Distillation Column.
15.01	Pilot Plant to simulate an industrial water / solvent distillation process	2015	Laboratori ARCHA - ITALY	The activity involved designing and constructing a pilot plant able to simulate the behaviour of an industrial distillation unit treating solvent-contaminated water produced by various industrial processes. The pilot plant replicates the industrial unit on a laboratory scale. It permits testing in advance of plant feedstocks' foaming and fouling tendency to optimise the management of the industrial plant. Due to the high variability of contaminants involved in the particular operation, attention has been given to the materials of plant components and column internals, which we realised through 3D Printing.
12.01	CUTS e PROLAV Models Upgrade	2011-12	IES Mantua Refinery - ITALY	Update of the models in use for the short-term planning and management of refinery operations (processing, logistics and blending operations scheduling) and crude oil data management system. The activity also included developing the links between the models and the refinery information system aimed at automatically retrieving intermediate and finished product tank information (quality and volumes).

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11.02	Évaluation rentabilité nouveaux bruts pour la raffinerie STIR	2011	STIR Raffinerie de Bizerte - TUNISIA	Use of the technical-economic simulation model developed during the execution of refinery energy audit to analyse the economics of new crude oils alternative to Libyan Essider no more available for political issues.
11.01	Audit Énergétique de la Raffinerie STIR (AO 24250/08)	2009-11	STIR Raffinerie de Bizerte - TUNISIA	A study was carried out jointly with TECI (Tunisian Engineering Company) to analyse actions aimed at energy conservation and production improvement of process units, power stations, product handlings, utilities and electrical devices. Within the study, the consortium Prometheus TECI has globally studied 33 actions and has deepened the valuable ones as follows: • Evaluation of process modifications involved, • Investment assessment, • Analysis of economic returns (project pay-out). In this framework, Prometheus has realised the following optimisation/design studies: • Crude Distillation Unit (12 actions), • Reforming Unit (5 actions), • Auxiliary Units (5 actions), • Power Station (4 actions), • Logistics and Tank Farms (4 actions).
07.01	AORC Planning and Scheduling Project	2007	AORC Libya Azzawyia Oil Refining Company - LIBYA	Within this project, we built a technical-economic simulation model of the refinery (Planning) and a model for managing daily refinery operations (Scheduling).

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05.02	NOC Product Cost Calculation Procedure	2005	NOC Libya National Oil Company - LIBYA	A simulation of AORC refinery production aimed to assess a procedure (cost calculation mechanism) to define the Product Prices based on production cost and incentives for Refinery profitability improvement.
05.01	Develop of new refinery units models (yields and quality prediction from operating conditions and feedstock quality)	2005	IES Mantua Refinery - ITALY	Study to develop shortcut simulation models to calculate the yields and the qualities of Thermal Cracking and Mild Hydrocracking Units. The activity involved the analysis of plant performance and utility consumption data and the development of consistent model correlations.
04.02	Refinery Planning and Scheduling Models Update	2004	IES Mantua Refinery - ITALY	Refinery survey aimed to assess the specific consumptions of all refinery (process and auxiliary) units to align the planning and scheduling models. Within this study, we have assessed all the utility balances (electric energy, steam, fuels, cooling water, district heating, hot oil) starting from the specific contribution of each Unit in different operating modes, defined through rigorous process simulations.
04.01	Egyptian Refineries Optimisation Project	2004	Assiut Oil Refining Co. Assiut Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement of **12.54** Million USD/Year.

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03.04	Egyptian Refineries Optimisation Project	2003	Cairo Oil Refining Co. Tanta Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement **2.26** Million USD/Year.
03.03	Egyptian Refineries Optimisation Project	2003	Cairo Oil Refining Co. Mostorod Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement of **2.25** Million USD/Year. The alternative operating conditions identified permitted to decrease fuel oil production, thus allowing to debottleneck of the global capacity of **15%**.
03.02	Egyptian Refineries Optimisation Project	2003	Alex Petroleum Co. Alexandria Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement of **10.75** Million USD/Year, **30%** of which resulted from thermal integration actions.
03.01	Egyptian Refineries Optimisation Project	2003	Amerya Petroleum Refining Co. Alexandria Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement of **10.43** Million USD/Year, **50%** of which resulted from thermal integration actions.
02.02	Egyptian Refineries Optimisation Project	2002	Nasr Petroleum Co. Suez Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement of **15.21** Million USD/Year.

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02.01	Egyptian Refineries Optimisation Project	2002	Suez Oil Proc. Co. Suez Refinery - EGYPT	Energy audit and general survey aimed to improve refinery profitability. The study highlighted low-cost modifications and alternative operating conditions enabling the profitability improvement of **38.45** Million USD/Year, **5%** of which resulted from thermal integration actions. Furthermore, this study deepened the issues related to the integration with the Suez NPC refinery.
00.03	Strategic Refinery Restructuring Study	2000	IES Mantua Refinery - ITALY	The study aimed to adapt the refinery to the EURO 3 Specifications between 2000 – 2005. The activity involved defining the investments required to align the refinery production to the new specifications. Prometheus also carried out a study aimed at optimising existing HDS capacity and defining the needed additional capacity.
00.02	Revamping of Unit 700 (Diesel Desulphurisation)	2000	IES Mantua Refinery - ITALY	Process Study: the retrofit of an existing HDS unit operating at a higher severity. The study involved the design of new heat transfer equipment permitting the Unit to work at a higher capacity, notwithstanding the reduced furnace capacity.
00.01	Penex DIH - Modifications for using CIT water as heating media	2000	IES Mantua Refinery - ITALY	Process Study: revamping a Deisohexanizer column to change the reboiler heating media from Hot Oil to Hot Water. The study involved the design of new heat transfer equipment permitting the Unit to work with both heating media.

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98.02	Revamping of Unit 100 (Crude Unit) Phase 2	1998	IES Mantua Refinery - ITALY	Process Study: revamping of a Crude Distillation Unit. Retrofit of the heat exchangers trains to improve heat recovery, debottleneck capacity and permit train maintenance avoiding shutting down the Unit.
98.01	Process innovations driven by new EU specs for automotive petrol and diesel fuel	1998	IPLOM Busalla Refinery - ITALY	Feasibility study: Process innovations to improve profitability considering the new European Gasoline and Mid-Distillates specifications 1998.
97.04	Revamping of Units 1100, 1200 e 1400 (VDU, THC, VSB)	1997	IES Mantua Refinery - ITALY	Process Study: Restructuring of Visbreaking and Thermal Cracking units to reduce the coal formation and to increase the conversion capacity.
97.03	Revamping of Unit 100 (Crude Unit) Phase 1	1997	IES Mantua Refinery - ITALY	Process Study: Revamping the Crude Distillation Unit by exploiting the thermal integration with the Hot Oil Circuit.
97.02	Revamping of Refinery Utilities Phase 2	1997	IES Mantua Refinery - ITALY	Process Study: energy conservation project and general rationalisation and balance of refinery utilities Phase 2: • Improvement of Hot Oil circuit, • Improvement of District Heating Capacity up to **21 Gcal/h**, • Reduction of Mid Pressure Steam Production.

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97.01	Revamping of Refinery Utilities Phase 1	1997	IES Mantua Refinery - ITALY	Process Study: energy conservation project and general rationalisation and balance of refinery utilities Phase 1: • Integration of thermal conversions with Hot Oil circuit, • Increase of District Heating Capacity up to **17 Gcal/h**.
96.01	Revamping of Units 200-300-400 (Unifining, Semi Regenerative Reforming, Isomerisation)	1996	IES Mantua Refinery - ITALY	Process Study: Modifications to the refinery Light Ends Treatment Plant to allow the production of low benzene gasoline with the improvement of energy recovery in Unifying and Reforming Plants: • Removal of Benzene precursors from reforming feed, improving Splitter unit fractionation and improving Reformer performance regarding Cycle length, yields and Hydrogen production; • The increase of the octane number of Isomerisation Gasoline through fractioning and recycling of normal paraffin reach stream; • Thermal integration of the units aimed to reduce energy consumption.
95.01	High Pressure Fats Hydrolysis	1995	*Internal research*	Design of a pilot plant to study an innovative process for animal and vegetable fats hydrolysis.
94.03	Feasibility study for short- to medium-term investments of the Mantua refinery	1994	IES Mantua Refinery - ITALY	Feasibility Study: technical and economic evaluation of the refinery and preparation of an investment program for technological updating of plants and logistic structures and energy saving.

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94.02	Design of Sour Water Stripper Unit	1994	IPLOM Busalla Refinery - ITALY	Process Study: Design of the refinery Sour Water Stripper.
94.01	Revamping of Unit 100 (Crude Unit)	1994	IPLOM Busalla Refinery - ITALY	Process Study: Restructuring of Crude Distillation Unit with thermal cycle splitting and pre-flash column installation.
93.02	Active carbon production from olive stone	1993	*Internal research*	Design of a pilot plant to produce activated carbon materials from olive oil processing waste.
93.01	Multifiner process patent	1993	*Internal research*	Develop and register a patent for VGO Mild Hydrocracking technology (Multifiner).
92.01	Revamping of Crude Unit	1992	IPLOM Busalla Refinery - ITALY	Process Study: Restructuring of Main Crude Distillation unit oriented to energy saving and capacity improvement.