

RAFO SA ONESTI -ROMANIA PRESENTATION



2020

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1. General Information



Historical Overview

- The refinery RAFO is located in the north-east of Romania, near to the border to Moldova and Ukraine, and is situated on the petrochemical industrial platform of Onesti town (Bacau district) since 1980 and became part of the largest petrochemical complex in the Eastern Europe (that include the petrochemical complex CAROM and chemical complex CHIMCOMPLEX).

Refinery Overview

- RAFO is one of four of Romania's largest refineries with an installed capacity of 3.5 million tons of crude oil (IRH, IRL, REBCO, URL);
- Crude oil could be delivered from the port of Constanta port via a dedicated crude oil pipeline, pipeline that belong and is run by [Conpet](#) (state owned company);
- The refinery is a fully integrated crude oil processing system including: primary and secondary processing installations, deep conversion installations, and installations to sift production from fuels EURO 4 to EURO 5, after investment/revamping program (Annex 7 of auction documentation), and LPG used as raw materials for the petrochemical sector and market;
- All units have undergone regularly inspections and possess operation permits;
- Over the last years the refinery was under temporary shutdown and new operation permits could be issued prior to start-up of the operations;
- Ultrasonic thickness measurements and hydrotesting's are being performed in accordance with Romanian technical supervision commission (every 2 – 4 years);
- Rafo Onesti it's a refinery Class 4 with a NCI (Nelson Complexity Index) NCI=8.69, over the average om Europe as shown in the table below.



Refinery Class	NCI ranges
Class 1	NCI < 4
Class 2	4 < NCI ≤ 6
Class 3	6 < NCI ≤ 8
Class 4	8 < NCI ≤ 10
Class 5	NCI >10
Class 6	Specialised Refineries for Lubes and Bitumen production.

The 2005 NCI classification for all EU-27 based refineries, as derived from the aforementioned Oil & Gas Journal information, is shown in **Figure 2**.

Worldwide Refinery Complexity								
Region	No. of refineries	Distillation capacity, b/cd	Catalytic cracking, b/cd	Catalytic reforming, b/cd	Nelson complexity Index	Equivalent distillation capacity	Average refinery size, b/cd	Average EDC, 1,000 b/cd
Middle East	49	6,147,420	309,440	635,973	4.2	25,747,457	125,458	525
Latin America	80	6,384,930	1,319,654	402,360	4.7	30,079,429	79,812	376
Africa	44	2,806,971	173,580	331,348	3.3	9,245,757	63,795	210
Europe	116	14,511,763	2,215,010	2,275,858	6.5	94,280,399	125,101	813
Asia	135	14,675,291	2,209,105	1,654,269	4.9	71,467,873	108,706	529
C.I.S.	56	10,060,951	526,571	1,247,587	3.8	38,353,278	179,660	685
Other	32	2,671,694	321,334	366,504	5.3	14,283,870	83,490	446
Canada	23	1,848,450	379,000	349,500	7.1	13,204,820	80,367	574
U.S.	169	15,354,140	5,283,450	3,623,193	9.5	145,732,015	90,853	862
World total	705	74,451,610	12,737,144	10,886,592	5.9	442,394,898	105,605	628

*Source: Oil & Gas Journal (see bibliography)

INSTALLATION	DESCRIPTION	CAPACITY (mt/yr)	COMMISSION DATE	LICENSOR
DAV	Atmospheric & Vacuum Distillation	3.5	1979	ICITPR(IPIP)
HB	Gasoline Hydrofining	0.8	1980	ICITPR(IPIP)
HP	Gas Oil Hydrofining	0.34	1985	ICITPR(IPIP)
HM	Gas Oil Hydrofining	0.7	1985	ICITPR(IPIP)
RC	Catalytic Reforming	0.5	1980	UOP
FG2	Gas Fractioning	0.186		ICITPR(IPIP)
GF(IV)	Gas Fractioning	0.199		ICITPR(IPIP)
HDV	Vacuum Distillate Hydrofining	1.2	1985	UOP
FCC	Fluid Catalytic Cracking	1.2		UOP
Hydrogen	3 Hydrogen Plants	5,132kt/yr pure	1984	SELAS
MTBE+TAME	Ether Plant	56,84kt/yr	2007	INCERP/IPIP
HM2	Diesel Hydrotreating	0.34	2004	ICITPR(IPIP)
DGRS	Gas Desulphurisation and Sulphur Recovery	20kt/yr sulphur	1983	ICITPR(IPIP)
IZOMERIZATION	Izomerization C5 cuts	0.1	1999	ICITPR(IPIP)



Refinery Overview. Land, Utilities and infrastructure

- Refinery's area is about 260 ha. RAFO may also acquire at least;
- 100 ha area of the former enterprise Carom at the same industrial area;
- Power supply: power supply network of Romania. In-house industrial gas production and natural gas supply from local networks (in the future - without any extra charges for the city area network);
- Industrial water is being supplied from the river Trotus (water supply facility of Romanian Waters Company). Demineralized water is produced directly at RAFO;
- RAFO possess in-house mechanical, chemical and biological waste treatment plants. Biological treatment plant is located at about 5 km distance and is connected with the refinery by the underground pipe. Mechanical and chemical treatment plant is located directly at the refinery's area.
- RAFO storage facilities consist of different tanks with total capacity for crude oil up to 150 kt and for semi- and final products of 240 kt;
- RAFO benefits from very extensive rail marshalling yard and rail loading facilities for liquids (diesel, gasoline), solids (Sulphur and coke) and liquefied gases LPG and propylene, trucks loading facilities.

Refinery Overview. Capex

- Feasibility study for aromatics production complex based on existing equipment has been finalized. Basic engineering works are commenced;
- Obsolete delayed coking unit was dismantled at RAFO. Parts of the delayed coking unit of Darmanesti was relocated to RAFO where it is stored now. Engineering for upgrade of the delayed coking units from 450 to 650 thousand tons is partly done, foundations for coke chambers are installed;
- Hydrotreating reactor (Axens study in auction documentation) for the hydrotreating vacuum gasoil unit was acquired. This unit will enable the switch to EURO 5 fuel standards. Foundations for all hydrotreating units (gasoil and vacuum gasoil) are ready;
- Equipment for Sulphur recovery (Le Gaz Integral study) is acquired, supplied and partial installed at RAFO. This would provide for Sulphur recovery in the course of new operation regime of the hydrotreating units;
- New hydrogen unit (KTI study) needed for hydrotreating units was acquired and partial installed;
- Gas pipe to the main gas pipe-line was built, remain to acquire measurement station. This investment would save about 20% on gas supplies (no additional costs of distribution network);
- Nitrogen units are acquired, supplied and installed. RAFO units are under nitrogen now;
- Revamp control system for instrumental air has been finalized by in-house experts and put into operation;
- The underground pipe system of industrial water was partially put on to the surface (about 3,5 km as of today);
- The underground pipe system for firefighting water for concrete storage tanks has also been raised on to the surface (about 6 km as per today);
- 4 sludge depositaries have been restored. Overall volume reclaimed: 81 ktn.

2. Logistics and Markets



Logistics

- The crude oil is supplied by ships to Oil Terminal Constanta;
- Oil terminal is ready to provide storage facilities for the feed stock which RAFO would process and for refined products which RAFO would export by sea;
- Alternatively, RAFO could be supplied with crude oil or another feedstock via rail way;
- Final products (liquid, solid and gaseous products) are delivered by railway trains and trucks. RAFO has storage and loading facilities (for railway and road tankers), which can serve refinery's full production capacity;
- After the retrofit of production/products, the part of inland market as soon as the markets of Ukraine and Moldova become great opportunity for the refined products of Rafo;
- The products may be dispatched to the wholesalers by trains, loaded on the railway loading dock having a capacity of 2,73 million tons per year of gasoline and diesel;
- The transportation of the products will be performed with the RTCs provided by the buyers or based on the contracts concluded between RAFO and railway transport operators, such as CFR and Unicom Trans;
- RAFO's road trucks loading dock, has a capacity of 1 mln tons per year of refined products.



Products

- Diesel and gasoline could be sold on regional markets, where RAFO was well-known as supplier of high-quality motor fuels;
- Diesel is sold in the Romanian market with premium to Platt's quotations for wholesale buyers and retailers, direct or by swaps with other refineries;
- The Wholesale sale could increase by building/acquiring storage facilities and could balance to retail by building/acquiring a further network of filling stations.

LPG

- LPG is used in the market for fueling cars and heating purposes;
- RAFO had a strong position in selling LPG in Romania, Bulgaria, Serbia and Moldova;
- RAFO also has the technical possibility (namely, pipeline) to supply LPG to LPG bottling station, located on its territory. The loaded LPG bottles are distributed all over North-Eastern part of Romania, mostly for domestic users;
- The loading of LPG will be done by using RAFO's facilities - road cars and railway cars loading skids.



Propylene

- RAFO can deliver propylene on domestic market and within European Community;
- Main areas of propylene utilization are polypropylene, propylene oxide (polyurethane component), phenol and acetone;
- The price for propylene will be established based on spot prices. The delivery will be made by rail;
- The consumers on the domestic market are Oltchim, Rompetrol Petrochemicals. European market: Ineos, Lyondell Basell;
- It is possible to consider setting up own polypropylene production at site.

Coke

- Sphere of use: cement industry and feedstock for energy plants;
- Consumers: cement producers in Romania (Carpatcement Holding, Holcim, Electro carbon) and export.

Sulphur

- To be used for fertilizers production;
- Market: domestic (Romania) + export.

3. Opportunity and Options



- The cost to build a refinery in terms of capacity in bbl/day is 25.000 \$/bbl – 95.000\$ \$/bbl, depending on the complexity.
- On the other site to build a refinery you have to take into considerations:
 1. Depending on your configuration, you need to secure land, anywhere between 50-200 MW of electricity, steam, water and other utilities. At the same time, you will also need to seek regulatory body approvals depending on the jurisdiction. This varies wildly depending on which country, which company and other factors.
 - Rafo has the utilities and due to the fact that the refinery was in operation has permits and authorizations that has to be renewed.
 2. You need to sort out your corporate entity, license to operate, investment financing etc. before you even think about breaking ground.
 3. Taking this into account, building a complex, hydrocracking, catalytic cracking refinery, can cost anywhere between 20.000 \$ - 30.000 \$ /dbbl excluding land, cost that in our case lead to a cost only for building of 1.4 – 2.1 billion \$
 4. Duration from breaking ground to achieving full complexity & throughput can range between 3-8 years depending on the scope of the project.
- With appropriate resources, revamping, set and start running a refinery like Rafo take between 2-3 years.

4. PROCEDURES



The participation and acquisition of Rafo – Oil Refinery are based on:

- Tender Book - on demand

It is set of full documentation, reports, studies and give you the right to participate to the sale procedure.

To access all about mentioned and grant the right to participate to the acquisition, the full documentation and the **Tender Book** is available to be acquired.

For further information on the subject, including site visit, you are welcome, and you can contact our team.

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