



حور الهندسة النفطية

PROPER UTILIZATION OF NATURAL RESOURCES FOR GASOLINE PRODUCTION IN LIBYA

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Abstract

Libya is exporting the raw materials mainly crude oil & condensate which they are the proper natural resources for gasoline production since 1964, historically 1st time gasoline production in Libya was at Briga area by Esso company through small scale refinery (10,000 BPD) then in the end of 1974 started production of considerable quantities from Azzawiya Oil Refinery but not all the intermediate product of SRN is processed to produce gasoline. Another two small scale refineries in Sarir & Tobruk also started production of small quantities for the use of nearby areas.

Overall gasoline production in Libya not more than 700 thousand tons per year from all the above-mentioned refineries without any improvement in the last 3 decades, while the consumption now is more than 4 million tons per year, which mean 3.3 million tons per year is imported and causing the high loss of money due to the replacement of the crude oil by final products such as gasoline and diesel.

It is to be mentioned that in Libya there is good natural source for gasoline production which is the condensate (C5 ~ 300°C cut) in the last 3 years some techno-economic studies (in house & international) [1] were done and the problem of gasoline shortage in Libya could be solved by utilizing the available 50 thousand BPD and implementing the Condensate Treatment Project which will increase gasoline production by 1.4 million tons per year.

Based on above it is advised to give time frame to stop importing any oil product its natural raw material is available in Libya.

This paper will focus on how to improve gasoline production in Libya and what will be the technical and economical impact on the country in general.

Key words: Natural resources, Gasoline, Crude oil, Condensate

ملخص:-



ليبيا دولة للنفط الخام والمكثفات منذ سنة 1964م وهذه المصادر تعتبر من أهم الموارد الطبيعية لإنتاج بنزين السيارات تاريخيا مصدرة بدأ إنتاج بنزين السيارات بمرسى البريقة عن طريق شركة أيسو من خلال مصفاة صغيرة طاقتها التكريرية 10 آلاف برميل يوميا. وفي سنة 1974م بدأ إنتاج كميات مناسبة بمصفاة الزاوية مع عدم استغلال كل كميات النافثا غير المعالجة لإنتاج بنزين السيارات ويتم تصديرها كمنتج غير نهائي طيلة العقود الخمس الماضية تحت إشراف الإدارات المتعاقبة بالمؤسسة الوطنية للنفط.

بالرغم من إنشاء بعض المصافي الصغيرة بطبرق والسرير الا أن إنتاج بنزين السيارات لا يتجاوز ال 700 ألف طن سنويا بينما الاستهلاك السنوي تجاوز 4 مليون طن مما نتج عنه استيراد كميات تفوق 3.3 مليون طن من بنزين السيارات وكان له الأثر السلبي على الاقتصاد الليبي واضطرت الدولة الليبية إلى مفاضة النفط الخام بالمنتجات وعلى رأسها بنزين السيارات.

في نفس الوقت الذي تتوفر فيه موارد طبيعية يمكن من خلالها إنتاج كميات مألولة من بنزين السيارات وهي مادة المكثفات والتي يوجد بها ما نسبته 64% من مادة النافثا غير المعالجة والتي تستعمل كتغذية لوحداث إنتاج بنزين السيارات وهذه النسبة لا يمكن الحصول عليها من النفط الخام. خلال السنوات الثلاث الماضية تمت دراسة امكانية الاستفادة من هذا المورد وكانت نتائج الدراسة مشجعة ومن خلالها يمكن إنتاج كميات من بنزين السيارات 1.4 مليون طن سنويا والتي تفوق مجموع الإنتاج الحالي بليبيا.

التوصية المطلوب اتخاذها هو إعطاء مهلة محددة لوقف استيراد المنتجات النفطية التي تتوفر الموارد الطبيعية لإنتاجها محليا وعلى رأسها المكثفات والنافثا غير المعالجة.

الكلمات المفتاحية: الموارد الطبيعية، البنزين، النفط الخام، المكثفات.

Introduction: -

In Libya the raw materials for production to many oil final products are available but unfortunately most of them are not probably utilized. As a result of that the local market is completely depend on the imported products. In this paper I will concentrate on the gasoline production and the ongoing wrong utilization of the available raw material (mainly condensate) for the last 5 decades. It is to be mentioned that National Oil Corporation is continually exporting more than 50 thousand BPD [1] for last 19 years till now while this condensate is containing more than 64% special cut called SRN could be used for gasoline production. In addition



to that about 40% of the SRN produced from Azzawiya Refinery is exported since 1975 which if probably utilized the gasoline production in Libya can be increased by 300 thousand ton per year. More or less the scenario can be applicable for Ras-Lanuf refinery. However, the target of the paper is to improve the gasoline production by utilizing the raw material & intermediate products such as condensate & SRN. By implementing such projects, the big gap between the final oil products and the local consumption will be reduced sharply.

Actual Gasoline Production in Libya:-

Since the problem is real shortage of the gasoline production in Libya compared with the local consumption while the raw material for gasoline production is available and exported.

The main gasoline production is from Azzawiya Oil Refinery which is about 650 thousand ton per year and about 50 thousand from other small-scale refineries at Tobruk, Sarir & Briga.

The local gasoline production is less than 20% of the actual local consumption which is exceeding 4 million ton per year [1]. In order to improve the local gasoline production and achieve the advertised goal as per this research it is required to implement all proposed projects mainly condensate treatment at Millitah & surplus SRN at Azzawiya Refinery and also at Ras-Lanuf in case it restarted. However, the scope of this research is to clarify the gap between the actual situations and the proposed improvement from technical and economical point view.

How to improve gasoline production from existing refineries:-

1. Azzawiya Refinery as indicated above that 40% of the SRN since 1975 was not treated and exported as intermediate product. In 1990 feasibility study was done to treat that quantity in order to improve the gasoline production by 300 thousand ton per year but all the trials were failed thanks for the technical staff at Azzawiya Refinery because the faille is not their fault.
2. Ras Lanuf Refinery is not oriented to gasoline production but to produce petrochemicals. It is to be mentioned that the same scenario is repeated in Ras Lanuf in which may the same percent of SRN is surplus for feeding the ethylene plant is exported as intermediate product in case decision is made to be treated at Ras-Lanuf it will improve the gasoline production by considerable amount. Pyrolysis gasoline as by product from ethylene plant some time blended with the gasoline pool at



Azzawiya but most of the time affecting on the approved Libyan specification from Benzene content[2] point view.

How to Improve Gasoline production from other resources in Libya: -

To reach the advertised goal of research it is required to consider the treatment of the entire exported intermediate product of SRN from Azzawiya & Ras Lanuf refineries for the last 5 decades which will improve the gasoline production to a certain limit. in addition to that there is a high-quality raw material as main natural resource for gasoline production if it ideally utilized the gasoline production in Libya will be increased by 1.4 million ton per year which is called the white gold available in Libya or (CONDENSATE).

Since 2005 after successful operation of west Libya gas project a considerable amount of white product called condensate more than 35 thousand BPD was produced from Mellitah Complex only and already there is old production from other fields about 15 thousand BPD which mean that NOC exporting more than 50 thousand BPD for the last 2 decades.

Due to the fact that the condensate is the top most source for gasoline production and cannot be compared with any crude oil because it contains SRN which is the intermediate product for gasoline production 3 times more than any other crude oil

Her, we will concentrate and diagnoses what was done during the last 5 years in order to convince the higher authorities to consider this project as a key for solving the fact of gasoline shortage in the local market.

• In house simple study shows the overall composition of the available condensate at Mellitah Complex the result of the study approve that the condensate contains the following cuts [3]:-

- SRN = 65 vol.%
- Kerosene = 23 vol.%
- Light Diesel = 12 vol.%

From these results it confirmed that the available SRN as source for gasoline production from the existing condensate is considerably very high compared with any crude oil which is normally not more than 25 vol. %.



So, farther step was taken and decided to go in detailed study with an international company through NOC and the result was very attractive.

Summary of the study: -

Feed stock quality

Proposed feed quantity for the project is 50 thousand BPD[4].



Feed stocks quality

Mellitah Condensate (Core lab assay July 2020)

Cut (°C)	% wt	Cumul % wt	SPGR	% S
< 15	0.0407	0.0407	0.5734	0.0000
C5 - 65	0.1983	0.2390	0.6410	0.0091
65 - 100	0.2054	0.4444	0.7189	0.0085
100 - 150	0.2266	0.6710	0.7600	0.0079
150 - 185	0.1188	0.7898	0.7790	0.0173
185 - 220	0.0836	0.8734	0.7981	0.0263
220 - 250	0.0505	0.9239	0.8133	0.0872
250 - 280	0.0360	0.9599	0.8298	0.3050
280+	0.0401	1.0000	0.8486	0.7120
Total	1.0000			0.0592

Mellitah Blend LPI assay

Cut (°C)	% wt	Cumul %wt	SPGR	% wt Sulfur
C4-	1.33	1.33		0.000%
C5 - 70	6.92	8.25	0.6344	0.010%
70 - 175	23.69	31.94	0.7244	0.013%
175 - 235	13.04	44.98	0.8005	0.025%
235 - 350	21.72	66.70	0.845	0.069%
350 - 550	26.83	93.53	0.9141	0.210%
550+	6.47	100	1.0081	0.470%
Total	100.00	100	0.8179	0.109%

Mellitah Condensate feasibility study

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From the above table it appears the big difference in the SRN content between the condensate and the crude oil which will be used as feed stock for gasoline production.

As a credit of the condensate treatment, it is approved that jet-fuel & diesel can be produced directly from the condensate fractionators without any farther treatment and no fuel oil production from such refinery.

Many schemes were evaluated in order to select the best option from technical and economical point view and bellow option **B** which was selected in order to maximize gasoline production is **Maxi Gasoline + Diesel + Jet fuel – CCR** for technical & economical reasons [4].

Schèmes comparaison

	A	B #	C	D	E	F	G	H
Gasoline *	1342	1447	1450	1102	1102	1333	1405	963
Diesel*	472	260	379	145	447	460	366	1071
Jet Fuel*	0.0	119	0.0	544	241	0.0	0.0	0.0
LPG*	106	93	92	126	126	121	113	56
CAPEX**	1081	1082	1097	965	1013	1014	1019	+ 446
POT***	8	7	8	6	7	7	8	25

* Thousand ton/year

** Million \$

*** year

Selected option

Mellitah Condensate feasibility study 6/27/2024

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Many schemes were considered and scheme B was selected in which this scheme is represent the optimum case where the gasoline production was maximized and lowest POT is 7 years with moderate investment about 1.08 MM\$ in case the project implemented within Mellitah Complex the impact of implementation of this project will be: -

- Gasoline production 1.44 million ton per year while the actual production is not more than 700 thousand tons per year for the last 50 years since started operation of Azzawiya refinery.
- Considerable amount of diesel product about 260 thousand per year.
- Considerable amount of jet-fuel about 119 thousand tons per year.
- Considerable amount of LPG about 93 thousand per year
- Less capital cost due to most of utilities could be provided from Mellitah Complex.

Conclusions & Recommendations:-

From the above and due to no movement in the oil & gas sector especially in the refining side since 1985 it is to be mentioned that the technical staff in concerned companies they propose and did the required studies to overcome this problem and increase the local production for gasoline but the higher authorities frozen all the studies and keep going of importing most of the refining products and exporting raw



material such as crude oil, condensate and even SRN which is an intermediate product based on that it is highly recommended to:-

1. Libya is an oil & gas producing country since 1964 and has no enough production for all the oil products based on that strong action must be taken to take proper decision to optimize the utilization of natural resources.
2. Let the higher authorities take the decision to implement the project of Mellitah Condensate treatment in order to increase the local gasoline production by 1.4 million tons per year and improve the level of local gasoline production,
3. Stop the exporting of the SRN from Azzawiya refinery as an intermediate product and must be treated in order to increase gasoline production by 300 thousand tons per year. The same recommendation applies on Ras Lanuf in case re-activated and restarted its operation.
4. In case we need to utilize the natural resources of the oil & gas in Libya we have to fix limited time and stop importing the final products which depend on it.

Nomenclature

NOC : National Oil Corporation
SRN : Straight Run Naphtha
POT : Pay Out Time
BPD : Barall per Day
LPG : Liquefied Petroleum Gas
CCR : Continues Catalytic Regeneration

References: -

- [1] NOC news letter
- [2] Motor Gasoline Libyan Specification
- [3] In house condensate study
- [4] Condensate feasibility study.