

ENSURING ENERGY SECURITY FOR PAKISTAN

DR. ILYAS FAZIL

Background

The current situation at the country's borders requires a national strategy that ensures timely and disruption-free Petroleum Oil Liquids (POL) supplies especially for the armed forces.

The continued and sustained supply of POL is important even during business-as-usual (peace-time) in order to keep the engines of the economy operating smoothly.

This, however, becomes even more critical when the situation at the borders dictates the supplies mainly for our armed forces: the Army, Navy and Air Force.

Our country faces multiple challenges: IMF pressure, recent crises in availability of essential commodities (sugar, wheat, cooking oil) at affordable prices, the June 2020 petroleum product crisis, the gas crisis, ongoing LNG availability crisis. All these challenges provide an opportunity not only to learn from them but also to chart a course based on the lessons learnt that could help avoid their recurrence, besides leading to a stable and sustainable future.

In this report, we discuss proposals for ensuring energy security in the short, medium and long term.

1. THE NATIONAL SCENARIO

- Pakistan's indigenous sources of energy are oil, gas, hydel, coal, nuclear, and renewable (solar/wind). The contribution of various sources to the primary energy supplies in 2018-19 was oil 25.7%, gas 35.0%, imported LNG 10.6%, hydroelectricity 7.8%, coal 15.4%, nuclear power, 1.3%, LPG 1.1%, renewable 1.3%, and imported electricity 0.1%.
- Gas has witnessed a NEGATIVE Annual Compound Growth Rate (ACGR) of $\sim 1\%$, i.e. minus 1.1 % over the last 6 years.
- As of June 30, 2019, the figures for gas were:
 - Original Recoverable Natural Gas (NG) Reserves 57.44 Trillion Cubic Feet (TCF)
 - Cumulative Production 39.75 TCF
 - Balance Recoverable Reserves 21.45 TCF
- In other words, we have already used up $\sim 69\%$ of our natural gas (NG) reserves.
- The usage of gas in various sectors is as under:

| | |
|------------------|-----------------------|
| Power Sector | $\sim 35\%$ of NG Use |
| General Industry | $\sim 17\%$ |
| Fertilizer | $\sim 16\%$ |

The remaining is consumed by cement, commercial, domestic and transport sectors.

A number of projects and investments are being touted in all the areas of energy supplies, but most of them are either on the drawing board or have long gestation periods, made more uncertain because of lack of clarity or government policy. The additional energy resources arising out of these projects cannot be a quick-fix for our problems as they would come to fruition at least 3-4 years after the commencement of the respective projects.

Downstream Oil Sector

It is important to understand the structure of the Downstream Oil Sector for a fuller comprehension of the challenges faced by it.

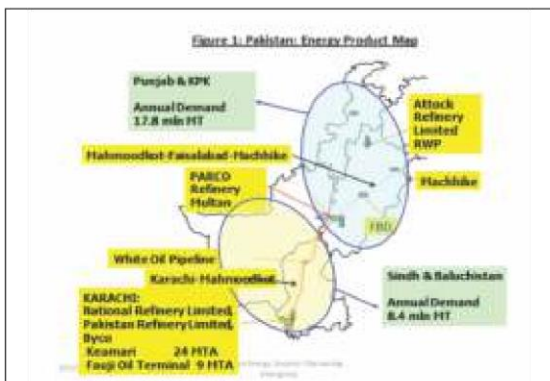


Figure 1 depicts Pakistan's Energy Map of 2017-18

Our annual refined product demand was around 26 Million Tons per annum in 2017-18. Of this, Punjab and KPK account for 68%, with the balance consumed by the other provinces. This demand saw a decline of 23% in 2018-19, reducing to ~ 20 Million Tons.

In 2017-18 Pakistan spent over US\$ 10 Billion on the import of Crude (processed by the local refineries) and Petroleum Product (primarily Gasoline, High Speed Diesel and Furnace Oil).

The oil import bill during 2018-19 was US\$ 9.6 Billion during July 18 – Feb 19, triggered, despite fall in international prices, primarily by the fragile rupee.

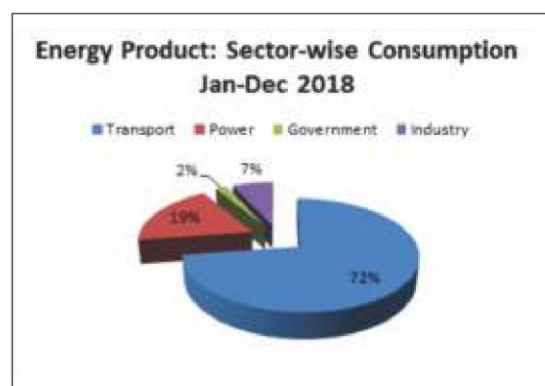


Figure 2 gives consumption of POL

Refined product consumption has been mainly concentrated in three sectors, namely transportation, power generation and industry, with smaller volumes being consumed by the domestic sector, the agricultural sector and the government.

Transportation and power together account for almost 90% of POL usage of the country.

We have five domestic refineries, with National Refinery Limited (NRL), Pakistan Refinery Limited (PRL) and Byco located at

Karachi, Pak Arab Refining Company (PARCO)'s Refinery located mid-country at Mahmoodkot near Multan, and Attock Refinery Limited (ARL) located at Morgah Rawalpindi.

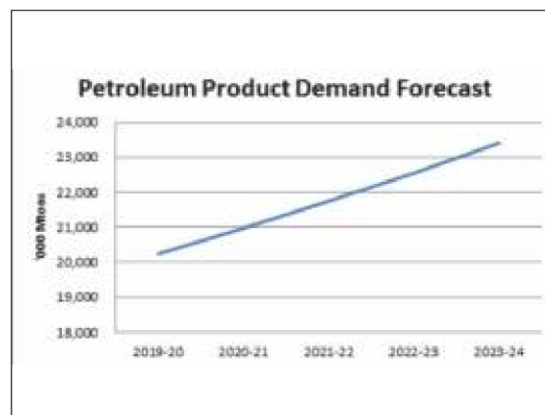
Whilst all other refineries are primarily dependent on imported crude, ARL is totally dependent on local crude, and in fact also processes all the heavy crudes of Pakistan.

The domestic refining capacity stands at 19 Million Tons per annum. In 2018-19, the local refineries' capacity utilization stood at only 12.4 Million Tons (or 65%).

As far as the crude diet of our refineries is concerned, we imported almost 78% of our domestic crude needs. Therefore, the sustained availability of imported crude is essential to the operation of the majority of our refiners.

Demand Forecast

In order to plan a strategy, it is necessary to also recognize what the expected growth in POL consumption is going to be.



Major portion of demand will be of transport sector, driven by the demand for PMG and HSD.

Power sector consumption will show a negative growth owing to elimination of old furnace oil plants and no addition of new plants. This assumption is supported by the recent developments and the impressive influx of RLNG, which has resulted in stoppage of any further HSFO/LSFO imports.

2. FACTORS IMPACTING OUR ENERGY SECURITY

We face the following challenges:

1. We are not self-sufficient in product availability.

We import almost 40% of our Gasoline and 50% of our HSD requirements

2. Our refining capacity is not 100% utilized.

Our capacity utilization falls short by 30-40%.

3. We have a refining shortfall i.e. not enough refining capacity.

Given the anticipated demand growth, we are in dire need of more refineries.

Having more refining capacity and importing crude makes more strategic sense.

4. We are highly dependent on imports.
This alone is overloading our ports and causing severe congestion.

5. Our infrastructure is not adequately utilized.

Our pipeline infrastructure is under-utilized and we are more dependent on transportation of fuels by road (unsafe and insecure)

6. We do not have strategic storages.

This, in our opinion, is a very critical drawback and is long overdue for resolution.

7. Our Downstream Petroleum Policy is not suited to the Sector's current dynamics.

Although the Downstream Sector has undergone a sea change since 1997, there has been no change in the Downstream Petroleum Policy which, in its present form, falls way short vis-à-vis ground realities and challenges.

Having listed the factors impacting our energy security, we will now

attempt to suggest how to address each one of them.

3. DEALING WITH CONSTRAINTS

3.1 Ports

Our Ports suffer from congestion as well as under-utilization

• Present Ports and their utilization is as follows in Million Metric Tons per Year

| Port | Capacity | Utilization |
|---------------|----------|-------------|
| KPT (Keamari) | 24 | 50% |
| FOTCO (PQA) | 9 | 100% |

Pakistan: Port Infrastructure for POL and Non-POL Imports

| Port | Throughput Capacity (Million Tonnes Per Month) |
|---|---|
| A. Karachi (Mainland Port, Karachi South) | |
| Oil | 8 |
| Oil (2) | 8 |
| Oil (3) | 8 |
| Total Oil | 24 |
| B. Port Qasim (Khanpur, PQA, Karachi South) | |
| Oil | 9 |
| Oil (2) | 4 |
| Total Oil | 13 |
| C. Port Qasim (Khanpur, PQA, Karachi South) | |
| Oil | 12 |
| Oil (2) | 12 |
| Total Oil | 24 |

The existing port infrastructure is not adequate to handle the projected crude and product volumes. Although Keamari's three piers are called 'Oil Piers', their use by non-POL tankers has led to serious import constraints.

Recommendations:

Proposed measures include:

A. Dedicate two of the Oil Piers at Keamari to oil only. This had already been discussed by the Industry with Chairman KPT in October 2018 but yet needs to be implemented.

B. Debottlenecking of the existing jetties

The present Byco Single Point Mooring (SPM) also needs to be better utilized to shift some of the volume from Keamari to the SPM and reduce the load on KPT. Due to the drastic fall /ban in Furnace Oil imports, a second jetty at Port Qasim may not be required.

C. Ensure and fast-track Keamari-Port Qasim Connectivity Project.

The implementation of this connectivity has been pending since over a decade and must be fast-tracked in order to fully utilize the KPT's Keamari Port.

These measures will help utilize existing national assets to their full potential.

Crude Imports In case of Blockade of the Strait of Hormuz

Another critical factor that needs to be addressed urgently is to develop a contingency in case of a blockade of the Strait of Hormuz, due to any conflict in the Middle East. This

has the potential to not only impact our refineries but also the imports reaching our shores.

The oil exports of the Kingdom of Saudi Arabia (KSA) are the domain of Saudi Aramco. Saudi Arabia is located near two of the world's busiest chokepoints, and most of its crude oil and petroleum liquid exports travel through them.

The Strait of Hormuz, which connects the Persian Gulf with the Gulf of Oman and the Arabian Sea, is the world's most important chokepoint. The oil flow through this strait accounts for about 30% of all annual seaborne-traded crude oil and other liquids. In 2016, a record 18.5 Million BPD flowed through the Strait. This Strait is also an important route for the Persian Gulf countries for oil and liquefied natural gas exports.

Another regional chokepoint, Bab el Mandeb, links the Gulf of Aden and the Red Sea. This waterway is a strategic link between the Mediterranean Sea and the Indian Ocean. An estimated 4.8 Million BPD of crude oil and refined petroleum products flowed through this waterway in 2016.

KSA's total crude oil export and loading capacity is over 13 Million BPD. The three primary export terminals are:

Ras Tanura

It is the world's largest offshore oil exporting port and has a combined handling capacity of 6.5 Million BPD. It can handle 500,000 dead weight tons (dwt) and KSA's crude oil grades are loaded here.

Ras al-Juaymah

Having an average handling crude oil capacity of about 3.1 Million BPD, and because of the availability of six single-point mooring buoys, this terminal can handle some of the largest tankers (700,000 dwt) for crude loadings. KSA's crude grades are loaded at this terminal, along with bunker fuel (at a maximum loading capacity of 120,000 BPD).

Yanbu King Fahd Terminal

Located on the Red Sea, it has a loading capacity of 6.6 Million BPD. Most remaining volumes are exported from here. It has seven loading berths and can accommodate tankers up to 500,000 dwt. Total crude storage capacity at the terminal is 12.5 Million Barrels. Only Arab Light crude oil grade is loaded at the Yanbu terminal.

KSA also planned to begin exports from the overhauled Muajjiz oil terminal on the Red Sea by end 2017. This would raise KSA's total

loading and export capacity to over 16 Million Tons per annum.

Muajjiz will be integrated into the Yanbu crude oil terminal. Before the Iraqi Pipeline in Saudi Arabia (IPSA) was converted to a natural gas line, Muajjiz was used as an export terminal for the Iraqi crude oil that flowed through the IPSA.

KSA operates more than 90 pipelines and 12,000 miles of crude oil and petroleum product pipelines throughout the country, all of which link production areas to processing facilities, export terminals, and consumption centers.

The 746-mile Petroline, also known as the East-West Pipeline, runs across Saudi Arabia from its Abqaiq complex to the Red Sea and consists of two pipelines with a total nameplate (installed) capacity of 4.8 Million BPD. One pipeline of 56-inch diameter has a capacity of 3 Million BPD, while the second of 48-inch with a capacity of 1.0 million BPD to 2.8 Million BPD. This latter pipeline (which previously operated as a natural gas pipeline) provided KSA with spare oil capacity that bypasses the Strait of Hormuz.

In 2016, Saudi Aramco announced plans to expand the capacity of the Petroline to 7

Million BPD. This was targeting end of 2018, but the fate of the expansion is not known.

The 1.6 Million BPD 48-inch Iraqi Pipeline in Saudi Arabia (IPSA), runs parallel to the Petroline from pump station #3 (11 pumping stations run along the Petroline) to the port of Muajjiz, just south of Yanbu. The pipeline was built in 1989 to carry Iraqi crude oil to the Red Sea. The pipeline closed indefinitely following the August 1990 Iraqi invasion of Kuwait. In June 2001, however, KSA seized ownership of IPSA as compensation for debts Iraq owed and converted it to transport natural gas to power plants. Saudi Arabia pumped test volumes of crude oil through the pipeline in response to Iranian threats to close the Strait of Hormuz in 2012.

The IPSA Line is the one that Pakistan needs to discuss and have as a fallback for crude supplies in case of the blockade of the Strait of Hormuz. Please refer to the red line in the map below. The next map shows the onward route from UAE to Karachi.



Please also refer to both reproduced on one map.



3.2 Refining

The present Refining capacity is given in the Table 1 below:

| Refineries:- | BP/D | Million Metric Tons Per Annum |
|-----------------------------------|------------------|-------------------------------|
| Attock Refinery Limited (ARL) | 55,400 | 3.45 |
| Pakistan Refinery Limited (PRL) | 48,000 | 2.10 |
| National Refinery Limited (NRL) | 54,000 | 3.80 |
| Pak-Arab Refinery Limited (PARCO) | 600,000 | 4.30 |
| WPCO Oil & Refs. | 175,000 | 7.15 |
| EPRI | 7,500 | 0.30 |
| Total | 1,339,900 | 10.99 |

The refining capacity of Pakistan falls considerably short in comparison to the national needs. We have

traditionally preferred depending on imported product rather than enhancing our own capabilities. The future lies in planning new refineries which will give Pakistan the energy security it needs. The forthcoming Parco Coastal Refinery (PCR) of 300,000 BPD capacity is a step in the right direction. It is of Deep-Conversion configuration with Euro IV/V specification target for Gasoline and HSD. It is expected to be on-stream in 2023-24 as per reports.

In the short-term, conditions must be ensured to allow the existing refineries to operate at 100% capacity. Moreover, there should be fuller utilization of the locally produced Furnace Oil and the refiners may be given a minimum 3 years to upgrade their facilities to deep-conversion, yielding more transportation fuels.

For the medium term, it is recommended to plan and implement another Deep-Conversion 300,000 BPD refinery with Euro IV/V transportation fuels (Gasoline and HSD), with commissioning targeted in 2026-27.

For the long-term, planning another refinery of the same size, configuration and specification target is recommended for 2029-30.

Each refinery must have its own Single Point Mooring (SPM) to allow large tankers to bring in the crude raw material, thereby reducing crude landed cost.

This planned addition of refineries will also help considerably reduce or even eliminate by the year 2029-30 the product deficit and remove the choke-hold that current imports have on our ports infrastructure.

The foregoing steps will be a big stride in ensuring energy security for the Country.

3.2 Pipelines

Pipelines are the safest, most secure and environment-friendly mode for POL transportation. Ensuring their optimum utilization not only ensures safe and secure supplies of transportation fuels, it also replaces transportation by road tankers, whose devastating accident potential was

witnessed at Bahawalpur few years ago.

The White Oil Pipeline (WOPP) is part of the supply backbone for ensuring timely POL supplies to the country. However, it is not fully utilized relative to its potential. Moreover, it is incomplete: the Mach hike to the North portion is missing

FWO has recently been given permission to complete the remaining section all the way to Taru Jabba (Peshawar). This is a step towards completing the backbone.

Further recommendations are:

Short-Term

- Ensure better utilization of Byco's SPM in order to transfer some of the load at the existing two ports to the SPM.
- Address outstanding issues hindering the OMCs from its utilization (approach roads, storages, customs related matters) on a fast-track basis.
- Explore also the possibility to reverse the flow of APL pipeline by transporting imported diesel from Byco's SPM to Zulfiqarabad Oil Terminal (ZOT) for onward transfer to WOPP. The Furnace

Oil requirement of Hubco Power Plant can be met from Furnace Oil Imports by PSO utilizing Byco's SPM or Byco Refinery.

Medium-Term

- Expedite the Keamari-PQA connectivity Project.
- Complete the conversion of WOPP to dual fuel use i.e. HSD and PMG.

Long-Term

- Urgently complete the pipeline project from Faisalabad to Peshawar, thereby completing the supply backbone.
- While it needs to be done in a phased manner, it is recommended that, given the strategic link to national energy security, the OMCs be given a maximum of one year to move from 20 to 30 and another one year to move from 30 to 45 days' cover, respectively.

3.3 Strategic Storages

Strategic Storages are permanent petroleum reserves held for non-commercial reasons. These safeguard against:

- External blockades (e.g. in times of war)

- Internal impediments to product movement (e.g. floods, other disasters)
- Oil industry disruptions (e.g. refinery outages, pipeline break down)

Strategic reserves are separate from commercial stocks, but these can be utilized by oil industry in times of need. Owing to the vulnerability of our sea lines, sufficient stocks of crude and imported refined product must be maintained. Strategic reserves vary as per government policy:

- EU requirement for net importing countries is 90 days.
- Germany Maintains 90 days through a federal body with refineries, OMCs, government as members.
- Netherlands 90 Days through an independent non-profit body.
- UK 67.5 Days (net exporter of crude) where the OMCs manage strategic storage.
- In every case, the responsibility and ownership for maintaining strategic stocks resides with the governments, with the Industry cooperating in the implementation of the policy.

In all the above international models, the cost of strategic storage is recovered as a

charge/levy passed on to the end-consumer on all inland sales.

Based on a Pakistan Study conducted some years back, 45 days strategic stock requirement for the country had been proposed by the authorities. It was also proposed that these storages should be built across the country. Locations to be determined from strategic and defense point of view with proximity to demand centers.

However, development will entail:

- Infrastructure development costs
- Additional bi-annual costs of logistics will be incurred to recycle reserves (Product quality of stocks is susceptible after 6 months)

The same study had recommended that a policy in this regard may be prepared. The fact remains that there is still no defined national policy on strategic storages for the country. Optimum utilization of existing resources of the Oil Industry needs to be ensured. Guaranteed availability to the Armed Forces at specified places must be ensured. We, therefore, recommend as follows:

- The earlier study needs to be revisited and policy defined in consultation with the Downstream Industry to meet the future

e

needs on the basis of the evaluation of the strategic storages/stocks requirements, requirement of reserves for the armed forces, and review of the number of depots

- It is proposed that a Working Group be constituted at the earliest with Ministry of Defense (MOD) and Ministry Of Energy Petroleum Division (MOEPD) as members to evaluate detailed options for strategic storage for Pakistan, which may develop future course of action, with all stakeholders (Industry, Defense, Ports & Shipping) participating. MOD to take the lead role and MOEPD could provide the technical support.

3.4 Revised Downstream Petroleum Policy

Most of the shortcomings highlighted in the previous sections of this paper can be traced to the lack of a clear Downstream Policy. This must be rectified. The Policy regarding the downstream sector has the following history:

- After the 1991 and 1993 petroleum policies, the first comprehensive petroleum policy was announced in 1994. Thereafter, the petroleum policy 1997 also addressed this sector but only perfunctorily.

- After 1997 all revised petroleum policies have addressed the Upstream Sector (Exploration & Production) only, totally ignoring the midstream/downstream sector.

In the meantime, the dynamics of the Sector have undergone a sea change. There is, therefore, a very urgent need for a revised Petroleum Policy 2018 which not only affects changes to address the present but also the foreseeable future. A successful policy in must achieve the following objectives:

1. Attract private sector investment. The international investment climate is highly competitive and this sector's projects are all very capital-intensive
2. Be practical, viable and sustainable.
3. Address the short, medium and long-term actions needed to overcome the challenges i.e. A Road Map for the actions with timelines.
4. 'Sweat' existing assets to their fullest.
5. Strengthen the regulatory framework to ensure the emergence of a truly competitive market structure while providing investors with greater legal certainty and more regulatory oversight and arbitration.
6. Ensure consistency: consistency of policy is the single most important ingredient to attract investment.

7. Have a road map to deregulation with clear timelines.
8. Have a clear road map with timelines for product specification improvements. Improve Fuel specifications in a phased approach as done globally, allowing a minimum needed time to the refineries and the OMCs to calibrate their systems to move to the next level from the current one. Learn from the experience of developed countries with regard to reasonable timelines.
9. Policy guidelines and framework to be in place for the energy mix on a long-term horizon to enable strategic capital investment for the appropriate energy sourcing in line with the business model of the respective OMC/Refinery.
10. Till deregulation, revision of OMC margins should be done annually and automatically based on CPI/inflation.
11. There should be no ban on retail outlet development and a level playing field must be available for all players. Established players should not be penalized with different yardsticks for retail/storage development parameters.
12. Revise criteria for new and existing OMCs to ensure genuine players to enter the market: discourage 'fly-by-nights' and 'briefcase companies'.
13. Introduce anti-adulteration law for strict quality control and enforcement.
14. Product Pricing for New and Existing Refineries should be no less favorable than the prevailing mechanism.
15. Incentives/facilitations to new refinery projects be also made available to existing refineries which upgrade and meet the country's target product specifications.
16. There should be consistency in present and future petroleum policy including tariffs and incentives given which should be ratified by the parliament for a period of 15 years.

The MOE-PD should finalize all the paperwork related to Petroleum Policy 2018 based on the document already prepared and to take it to the relevant authority for implementation. The Downstream Oil Sector has been clamoring for a revised petroleum Policy since 2013 and after considerable effort we have arrived at the last goal post.

Meeting the challenge of sustained energy supplies is of critical importance to Pakistan's growth. GOP must facilitate the huge investments involved by providing government land at concessionary rates, providing the needed Utilities (Electricity, Gas, Water), waiver of customs duties and withholding tax as well as other charges and levies, and offering other fiscal incentives

e

including tax holidays. The Petroleum Policy 2018 should align with this Road Map.

3.5 June 2020 Petrol Crisis

The Petrol Crisis of June 2020, which was the second major one in a little over five years, not only underscored the fragility of the country's oil supply chain but more importantly highlighted lapses in managing the situation, on the part of all stakeholders who have been entrusted with the task of ensuring uninterrupted supplies of petroleum product to the consumers in the country.

The expectations from the Inquiry Commission's Report, which was issued in December 2020, were to look at the various dimensions of the crisis objectively, neutrally, and dispassionately so that the right conclusions could be reached and course correction could be taken. However, that unfortunately did not happen. It has unleashed a blame-game which was not the purpose.

The Inquiry Commission Report has discussed the role of each stakeholder in the responsibility matrix (the Ministry of Energy – Petroleum Division, OGRA, OMCs, Oil Refineries, OCAC, and Department of Explosives); however, pipelines that play a very crucial role in the supply chain could

hardly find a mention in the report. The delay in conversion of the White Oil Pipeline (WOP) between Karachi and Machhike merited special mention as transporting petrol through WOP could have precluded the crisis.

A close reading of the Report re-establishes certain main contributors to what happened during June 2020: the price movements in the international market (remember, the country imports 70% of its Petrol requirement), the impact of Covid-19 on global and domestic consumption, the lockdowns and shutdown of tanker transport between Karachi and up-country, and the widening demand-supply gap due to declining local availability, to name a few.

The shortcomings in the capacity to move the product out of Karachi import storages to upcountry depots and the role of the transporters did not either find a mention. The non-lifting of Furnace Oil from the local refineries was the major factor contributing to very low throughput/closure of some of them leading to low availability of locally produced/refined Petrol. This fact has also been missed.

Whilst the price movements in the international market did have an impact, as they always do on the local consumer prices, it needs to be remembered that the prices had

been drastically reduced on May 1, 2020 by Rs 15 per liter. Therefore, another drastic reduction of prices on June 1, 2020 was an ill-advised action.

What impact did that particular decision have on market behavior? In our opinion this factor needs to be examined also to see if the crisis could have been averted by not changing the price on June 1, 2020. This aspect merits consideration also.

Some of the conclusions of the Report do merit consideration. However, in our opinion, the recommendations regarding taking drastic actions against individuals as well as organizations (OGRA, OCAC, MoEPD) are, to say the least, very harsh, uncalled for and unrealistic. These, if implemented, tantamount to impacting the domestic industry very adversely. Not only the Downstream Petroleum Sector, but all other sectors involving investors would be hard put to accept such actions if taken.

To reiterate, the purpose of the Report was to identify the main causes of the Petrol Crisis of June 2020, which involved knee-jerk actions/reactions to begin with, namely the embargo on import of petroleum product and crude taken by the MoEPD on March 25, 2020, which was the trigger for the crisis.

The Investigation Report has identified a number of areas for the future. Let us, however, not compound the mistakes already made by implementing the drastic punitive actions proposed by the Commission. Let us plan ahead and have the right (and better) supply chain monitoring in place, address any anomalies that need to be rectified and bring the required changes to address the dynamics of today's Downstream Sector which continues to rely on an outdated Petroleum Policy that is more than two-decade old.

Without an updated policy matching today's dynamics, firing shots-in-the-dark will continue to be our modus operandi!

Going forward, it is suggested as follows:

1. Hire/place the right people in positions of authority within the government agencies, who understand the dynamics of the downstream oil sector.
2. Plan ahead for a minimum of 3 months and then strictly adhere to it.
3. Develop a Planning Model which meets the requirements of the underlying intricacies (not an Excel based spreadsheet that does not and cannot account for covering all expected impact scenarios for smooth supply of petroleum products).
4. Address any anomalies in the Rules dictating the performance of the

e

Downstream Oil Sector. You cannot have multiple Rules and expect it to work.

5. The most sensible solution for addressing such hiccups, in our humble opinion, is Deregulation. It has been under discussion for many years, but without any progress because of paralysis through analysis. All importing OMCs obtain product through varied sources and it is to their advantage to always keep import cost as low as possible. Vagaries of the international market notwithstanding, linking the pricing to a single importer (government-controlled) is questionable and downright uncompetitive behavior. OGRA can still play a watchdog role in a deregulated environment! Fear of the unknown' is no excuse for not taking the only right course of action to protect the Pakistani consumer.

3.6 The Way Forward to tackle the Gas Crisis

Natural gas is predominantly the major energy source in Pakistan contributing for about 38 percent of the total primary energy supply mix of the country, according to Pakistan Economic Survey 2019-20.

Natural Gas is used in a wide range of sectors and by the end of FY2018-19 there were 9.8

million gas consumers in the country. The number of gas consumers has been growing by about 0.3 million per annum for the past five years.

In 2018-19, 4,319 MMCFD of gas was supplied to consumers against a total demand of 5,759 MMCFD. Therefore, there was a deficit of 1,440 MMCFD.

The natural gas shortage has been growing for several years now. The situation happened because we have been consuming more natural gas than we could have used. It has been the preferred fuel because of its low cost, and clean-burning quality. However, as the consumption increased rapidly, warnings that supplies were diminishing, at a rate of 9 percent per annum and were soon likely to be outrun by demand, were conveniently ignored.

This represents a serious situation and there are no signs of it improving any time soon.

Reasons for Gas shortage:

1. High usage of gas, but more importantly the resource is being inefficiently utilized.
2. High losses and poor operational efficiency of SSGC and SNGPL. UFG for the two utilities was 17.83% and 11.45% respectively in July 2020.

3. There has been a greater focus on network expansion, because of political reasons, than maintenance of the existing infrastructure. Therefore, little has been done to plug UFG and losses continue unabated.
4. No new gas fields have been found or developed for nearly two decades. The gas reserves are believed to be much more than what has been tapped so far.
5. Poor government policies especially the promotion of CNG in the past.
6. Highly monopolized sector.
7. Poor regulation of the sector.

In view of the prevailing situation, it is necessary for the Government of Pakistan to determine the right Energy Mix for the Country and to maximize the rational use of its indigenous resources, with only the balance being imported fuel.

Suggestions are:

1. Put an Embargo on CNG Stations: It is a no-brainer that CNG has been consuming a resource that is limited. CNG-driven vehicles have reached their saturation point. The NG thus saved can find better use in the industry and domestic sectors.
2. Lift the embargo on the use of Furnace Oil: The Country is importing higher and higher volumes of LNG at prohibitive

costs due to non-utilization of locally produced Furnace Oil by the local refineries. Historical Sales of Furnace Oil have been as follows (M.Tons):

| | |
|---------|-----------|
| 2014-15 | 9,262,531 |
| 2015-16 | 8,999,823 |
| 2016-17 | 9,599,254 |
| 2017-18 | 7,393,917 |
| 2018-19 | 3,536,119 |

Notice the very sharp decline in 2018-19, which was almost equal to the local refineries' FO production (however, at an average 72% of Refinery capacity utilization). The below-par capacity utilization was caused primarily by non-use of FO. When a Refinery operates, it must also produce FO, the volume produced being dependent upon the crude processed and the refinery's configuration. Imports of FO are net of local production and are shown below:

| Local Production | Imports Total* |
|------------------|----------------|
| 2014-15 | 2,928,140 |
| 6,243,226 | 9,171,366 |
| 2015-16 | 2,859,110 |
| 6,228,427 | 9,087,537 |

| | |
|-----------|-----------|
| 2016-17 | 3,014,330 |
| 6,593,614 | 9,607,944 |
| 2017-18 | 3,262,800 |
| 4,358,322 | 7,621,122 |
| 2018-19 | 2,873,745 |
| 552,239 | 3,425,984 |

* includes HSFO as well as LSFO

From 30+% share of FO in the Energy Mix for Power Generation, 2018-19 saw the share decline drastically to 8%. To reiterate, this was the primary cause of low refinery throughput and consequently lower production of PMG and HSD, and higher imports of these transportation fuels at an increasing cost to the national exchequer.

During the same period, the Import of LNG grew from 472,503 TOE in 2014-15 to 7,492,597 TOE. Import cost of LNG in USD was 2,452 Million USD (2.5 Billion USD) in 2017-18.

With LNG, a number of problems are persisting, compromising its availability at a reasonable cost due to various factors including but not limited to the Qatar Gas Deal factor.

In the past, too, whenever the Government faced gas availability issues, it has always been

Furnace Oil that came to the rescue. It is a locally available resource that the refineries must produce when they operate. Its full disposal also helps the refineries to maximize the full range of refined product, especially PMG, HSD and Jet Fuel (JP-1 for Commercial Airlines and JP-8 for the Air Force), thereby acting also to protect our National Energy Security.

In light of the above facts, the Government should ask the local refineries to operate at maximum capacity, produce maximum Furnace Oil. Maximum production of transport fuels PMG and HSD will also be an obvious outcome.

The generation capacity of all RFO based plants is ~ 3,500 MW. This would require ~ 20,000 MTD of FO. The refineries can cumulatively produce ~ 3 Million Tons of RFO per year, or ~ 8,300 MTD.

Power plants based on RFO must be directed to operate so that maximum RFO based generation equivalent to the local FO production takes place to start with. We may set aside the merit order and environmental concerns for the time being. We are fighting for our survival here. If environmental concerns were such a big issue, then why has coal been promoted, which is an even dirtier

fuel and a larger contributor to particulate matter than Furnace Oil.

This will tide us over the immediate shortage, saving ~ 41 M cft of gas per ton of FO consumed per day. The gas savings would total around 115 BCF and could be used for supplies to the domestic consumer for heating and cooking.

The use of Furnace Oil in the manner proposed must continue even beyond the winter season so that the local refineries continue to operate at full capacity and produce additional volumes of transportation fuels PMG and HSD, thereby saving precious foreign exchange.

Based on 2018 average prices,

- Each MTon of locally produced PMG saves USD 622
- Each MTon of locally produced HSD saves USD 553
- Each Ton of Imported Crude Oil costs USD 475

Therefore, net of Crude Import cost, each Ton of local PMG would save USD 223 and each Ton of local HSD would save USD 259.

3. The government should prioritize gas exploration to discover new reserves.

4. Urgently cut down UFG to bring it to acceptable limits.

5. Improve the supply chain by separating the pipelines from supplying to consumers.

6. Improve the regulatory framework.

Conclusion

To summarize, the following urgent steps are recommended for ensuring national energy security:

1. Ports:

A Dedicate two of the Oil Piers at Keamari to oil only.

B Debottlenecking of the existing jetties.

The present Byco SPM also needs to be utilized to shift some of the volume from Keamari to the SPM and reduce the load on KPT. Due to the drastic fall /ban in Furnace Oil imports, a second jetty at Port Qasim may not be required.

B Ensure and fast-track Keamari-Port Qasim Connectivity Project.

The implementation of this connectivity has been pending since over a decade and must be fast-

tracked in order to fully utilize the KPT's Keamari Port.

2. In case of Blockade of the Strait of Hormuz:

Discuss with the Saudi Arabian authorities the possibility of using the Iraqi Pipeline in Saudi Arabia (IPSA), which is owned by the Kingdom of Saudi Arabia (KSA) and is the potential rescuer for Pakistan as a fallback for crude supplies in case of the blockade of the Strait of Hormuz.

3. Refining

In the short-term, i.e. immediately, conditions must be ensured to allow the existing refineries to operate at 100% capacity.

For the medium term, the Parco Coastal Refinery (PCR) may be fast tracked, followed by planning and construction of another Deep-Conversion 300,000 BPD refinery with Euro IV/V transportation fuels (Gasoline and HSD), with commissioning targeted in 2026-27.

For the Long-term, another refinery of the same size, configuration and specification target is recommended for 2029-30.

4. Strategic Storages

A National Policy on Strategic Storages should be urgently developed.

Ministry of Energy Petroleum Division (MOEPD) and Ministry of Defense (MOD) should urgently constitute a Working Group to evaluate detailed options for strategic storages for

Pakistan and develop future course of action, with all stakeholders (Industry, Defense, Ports & Shipping) participating. MOD may take the lead role, including budgeting, with MOEPD providing the technical support and inputs.

Pipelines

Short-Term: Ensure better utilization of Byco's SPM in order to transfer some of the load at the existing two Ports to the SPM.

Medium-Term: Expedite the Keamari-PQA connectivity Project and expedite the conversion of WOPP to dual fuel use i.e. HSD and PMG.

Long-Term: Expedite the completion of the Pipeline Project from Faisalabad to Peshawar, thereby completing the supply backbone.

5. Petroleum Policy

In order to facilitate national energy security plans, the Downstream Petroleum Policy 2019 should align with this Road Map and be urgently notified.

6. Gas

Use all locally-produced Furnace Oil to keep the local refineries at 100% capacity thereby freeing gas from power production to be utilized for the industrial and the domestic sector.

ACKNOWLEDGEMENTS

- OCAC's Pakistan Oil Report 2017-18
- Oil Industry Master Plan, OCAC
- HDIP's Energy Yearbook 2018
- National Transmission & Despatch Company Ltd
- Development of Natural Gas as a Vehicular Fuel in Pakistan: Issues and Prospects, Muhammad Imran Khan, Tabassum Yasmine; Journal of Natural Gas Science and Engineering- March 2014
- USA Energy Information Administration (EIA) Document October 20, 2017

Dr. Ilyas Fazil is currently a distinguished fellow with Islamabad Policy Institute. He has previously served as Member (Oil) OGRA and CEO Oil Companies Advisory Council (OCAC).