

Consumers' Dilemma and the gas sector crisis in Pakistan

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Pakistan's energy crisis resulting from expensive fuel sources, chronic natural gas and electricity shortages, highly inefficient distribution system, culture of non-payment of bills, theft, circular debt, and inadequate and aged transmission and distribution systems – has played a role in the country's laggard economic growth. But while the country's power sector woes are much talked about, far less is debated about the natural gas sector despite it mirroring all the ills of power sector. For example, distribution losses in the Power Sector are approximately 18% (equivalent to Rs. 45 Billion per annum, over NEPRA allowance) which are twice that of international norm, whereas UFG equivalent of direct losses is 14% (Rs. 105 billion per annum, over and above OGRA allowance), which is 7 times that of international norm. Natural gas resources, which currently contribute 50% to Pakistan's total energy supply, are declining rapidly with no sizeable gas discoveries in sight in tandem with inefficient use of indigenous natural gas. As per Council of Common Interest (CCI), severe shortages of gas have been predicted in the coming years. A shortage of roughly 500 MMcfd is expected during the winters of 2020-2022, virtually shutting down the industry for 2 – 3 months and severely contracting economic output. The Asian Development Bank's (ADB) prediction of a contraction of Pakistan's GDP by 0.40% in 2020 comes as no surprise. If economic growth is to become a national priority, the direct and indirect effects of the natural gas crisis must be assessed while simultaneously formulating a timely and efficient long-term action plan. This article is aimed at highlighting some of the sector's key challenges which would come to lie at the heart of such a reform agenda.

Let us begin by analyzing demand and supply trends over the past few years as well as projections for the same. On the supply side, gas reserves have been on the decline in Pakistan (see Figure1)

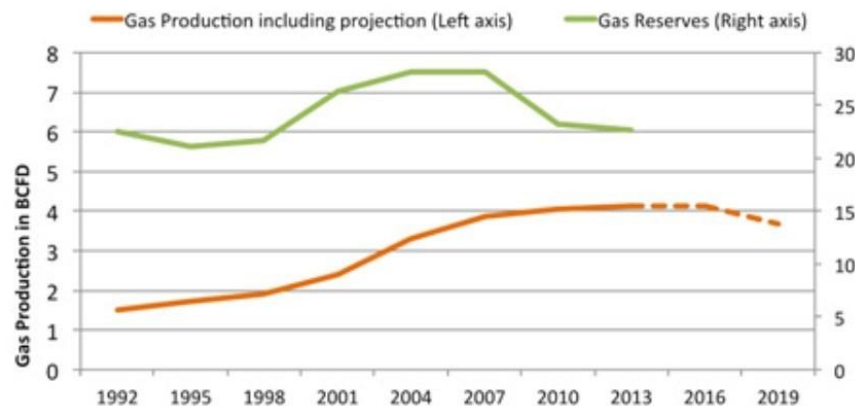


Figure 1: Pakistan's Gas Production vs. Reserves

Source: World Bank

and very little exploration activities are taking place and are not likely reap benefits before at least 5 years. And while several natural gas fields have been discovered since mid-2015 and are being further examined for viability, no production timeline is scheduled yet. On the demand side both consumers and production sectors have contributed to a continuing and rapid rise. For instance, the addition of 0.5 million new consumers in 2018-19 will increase the gap in demand and supply, especially in winter, further aggravating gas load shedding and disputes over allocation. As evident, in the face of rising needs by consumers and businesses and declining reserves, supply is not sufficient to meet demand. Resultantly, severe shortages have emerged since 2007 and while they were initially confined to

winters when there is a spike in gas use for heating purposes, the shortfall now extends all year round. As per World Bank (WB) estimates, gas shortages of nearly 1,800 MMcfd were witnessed in FY2015 (see Figure 2).

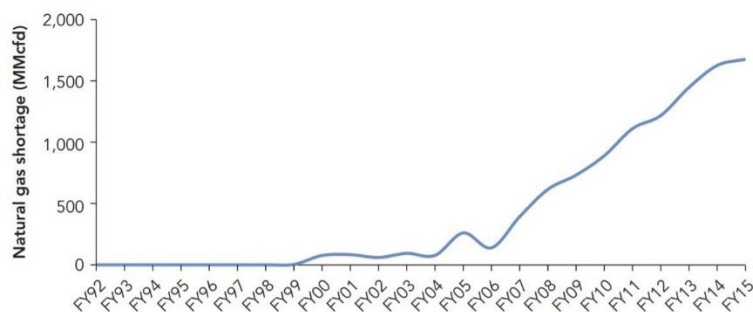


Figure 2: Shortage of Natural Gas becoming Severe in Pakistan
Source: World Bank

Given these grim circumstances, future outlook is no better as shortages are expected to rise to 3,684 MMcfd in the next five years (FY 2024-25) and to 5,389 MMCFD in the course of the next decade (FY 2029-30), as is evidenced in the projections provided in Table 1. To put things in perspective, the shortage is nearly three times the country’s existing gas shortfall and at least a 100% additional required over current domestic production.

| Year | 2019-20 | 2020-21 | 2021-22 | 2022-23 | 2023-24 | 2024-25 | 2025-26 | 2026-27 | 2027-28 |
|--------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <i>SSGC</i> | | | | | | | | | |
| Demand | 1,260 | 1,292 | 1,324 | 1,358 | 1,392 | 1,427 | 1,464 | 1,501 | 1,539 |
| Dom Supply-Current | 1,102 | 1,047 | 995 | 945 | 898 | 853 | 810 | 770 | 731 |
| Dom Supply-New | 40 | 78 | 114 | 148 | 181 | 212 | 241 | 269 | 296 |
| LNG Requirement | 118 | 167 | 215 | 265 | 313 | 362 | 413 | 462 | 512 |
| <i>SNGPL</i> | | | | | | | | | |
| Demand | 2,262 | 2,340 | 2,418 | 2,503 | 2,592 | 2,688 | 2,792 | 2,909 | 3,029 |
| Current Supply | 925 | 830 | 699 | 586 | 468 | 364 | 276 | 247 | 202 |
| LNG Requirement | 1,337 | 1,510 | 1,719 | 1,917 | 2,124 | 2,324 | 2,516 | 2,662 | 2,827 |
| Total LNG Needed | 1,455 | 1,677 | 1,934 | 2,182 | 2,437 | 2,686 | 2,929 | 3,124 | 3,339 |
| Current Import | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 | 1,200 |
| Required LNG | 255 | 477 | 734 | 982 | 1,237 | 1,486 | 1,729 | 1,924 | 2,139 |

Table 1: Demand & Supply Forecast – SSGC and SNGPL

A natural enquiry at this point then is the concoction of factors that have fueled gas shortages in recent years. **First and foremost**, the government’s chronic inability to accurately assess demand as well as contain it over the years serves as a primary reason for shortages. This exponential rise over the last 3 decades in gas consumption can be attributed to at least two factors: (i) the government’s shortsighted policies, planning and operations: a decade ago, when industries and automobiles shifted from oil to gas, policymakers failed to estimate the demand-supply gas arising from the shift, and (ii) the government’s gas allocation and consumer gas pricing policy. These policies are (largely) discretionary and provide significant power to the decision-makers, creating avenues for vested interests and pressure groups to advocate and achieve their own goals. The current government is burdened with financial burden of Circular Debt amounting Rs. 350 billion contributed by SNGPL and SSGC by keeping low gas tariffs for maximum political gain – not passing the OGRA determined pricing (Under 2012 Petroleum Policy) to people – resulting in increased demand and consumption, or rather misuse of gas, and providing RLNG to domestic users. However, OGRA has taken some steps in rationalizing the tariffs including increasing of tariffs and lowering of unaccounted for gas (UFG) benchmarks. Although the heightened tariffs must look out for vulnerable and lifeline consumers that cannot afford the gas even at low pricing. A two-pronged solution to this lower tariff for lifeline and lower category users is that i) tariff must be set on a cost-of-service basis for an efficient and reliable gas sector, and ii) direct subsidy like BISP – an effective instrument – must be embedded to protect

the poor household consumers. Gas prices in Pakistan are low and supplies inefficiently allocated, encouraging higher demands - the weighted-average purchase cost for wellhead gas was estimated at \$3.50 per million British thermal units (MMBtu) for FY 2017, 10% higher than those in India and almost double than those in Bangladesh. This results in economic waste in terms of welfare loss where consumers are willing to pay more for steady supply of gas, and reduced profits for producers where they can charge higher prices. Moreover, the government implements a uniform gas price for each consumer category across the country regardless of the distance, volume, or cost of supply, further highlighting its inefficiency. Another area where the inefficiencies curtailing the resourceful development of gas sector is the overall revenue structure of both Sui companies where the sector is highly regulated with all aspects have been under one control and creating monopolies. The operations – pipeline, marketing, gas supply – are managed by SNGPL and SSGC, whereas deregulation of structure in separating the pipeline business from the sale business will eventually uplift the efficiency of complete supply chain. Since, the departments are highly politicized, all gas supply schemes are politically motivated including the gas exploration initiatives only a decade ago. There were roughly 22 foreign companies with vested interest for new avenues in upstream activities of Pakistan, are now left with only 3 - The management of upstream gas concessions have remained a bottleneck to increased gas supplies. Politically induced allocations and monopolistic business operations are all administrative bottlenecks that have handicapped foreign companies to reap the benefits of our resourceful land.

A lot of basin studies have pitched Pakistan gas potential at roughly 10 times the reserves currently discovered. Realization of the yet to be discovered reserves depends upon concerted efforts, openness, a market-based pricing system and Progressive Petroleum Exploration Policy. We are confident that with modern techniques and a strong will, gas discoveries can boost availability of domestic gas in the medium term ~ 5 years by about 50% of current production. For this to happen, the monolithic OGDC and the lethargic PPL need to be shaken, and exploration needs to be reorganized on modern managerial and effective structures.

The wellhead prices are not the only factor for low exploration in Pakistan, there are other countries where the prices are even low but exploration are still taking place. Moreover, as stated earlier, the Division controls the entire structure, for example, one needs a permission for even well-commencement. This approach of holding all operations in one control is bound to create inadequacies costing welfare and economic loss. Without a strong effort to overcome this weakening of incentives, it is unlikely that exploration activity or gas production in Pakistan will recoup the trend observed up to 2005, i.e. 6 to 8 per cent increase in production per annum.

Secondly, government irregularities in regulatory frameworks and policy formulation have also aggravated shortages. In the early 2000s, while facing acute gas shortages, the government put a rather poorly thought-out and counterproductive policy in place, prioritizing allocation to the commercial and residential sectors (paying below current average cost of supply) while putting fertilizer and power in second place. According to USAID estimates, however, the same gas would have provided great economic benefits had it been used for power generation. This realization came late for the government which later revised its gas allocation policy, only to ignore the merit order and supply gas to an inefficient, aging fleet of public plants resulting in gas wastages while more efficient plants continued to suspend production owing to acute shortages. The gas sector is laden with continuous implementation of poorly thought reforms and policies. A recent instance of the same is when OGRA decided to charge different tariff for RLNG and gas indicating both as separate products. Although, both RLNG and local gas are supplied mostly through the same network and metered through the same system but the latter is charged with lower UFG than the former despite the fact that RLNG is generally expensive and has lower actual loss. RLNG inducted into the system is mixed with indigenous gas coming from different sources is indistinguishable from other gas already in the system. Hence, there is no point in treating the same product as two and adding complexities in the already jumbled sector. Furthermore, the tariff for gas and electricity must be in sync and both sources

must be treated as a commodity. Difference in pricing will eventually result in misallocation of resources and induce arbitrage opportunities. Variability in tariff creates disparity and hence must be kept in tandem by the regulator – and that too, should be same for both sources of energy.

Furthermore, Pakistan’s cost of power production is 26% higher for the industrial sector compared to other regional countries like Vietnam, Sri Lanka, Malaysia, Bangladesh, South Korea, Thailand and India, and it is 28% costlier for residential areas than the regional countries. To add to consumers’ and investors’ woes, inconsistent regulation between NEPRA and OGRA sends confused signals to consumers and investors, and creates disharmony in pricing strategies between gas and electricity. Additionally, since both are sources of energy, the variability in tariff on gas and electricity is \$6.5/MMBTU (power generation at 40% costs approx. Rs. 10.5/Kwh) and ₨9.0/kwh (Rs. 15/Kwh), creates opportunities for arbitrage in the system. Hence, the prices must be set in equilibrium at \$6.5/MMBTU for gas and ₨7.5/kwh for electricity as one of the measures in establishing an efficient system design.

Thirdly, gas losses are a major drain in the system, causing acute shortages. It is estimated that Pakistan loses more than an eighth of gas during delivery and while many factors contribute to these high losses, the main ones can be traced to the ways in which SSGC and SNGPL are regulated, the institutions that manage most of the gas transmission and distribution in Pakistan. No regulatory mechanism links their financial returns to their operational efficiency and tariff setting disproportionately rewards capital investment, encouraging firms to favour network expansion over pipeline maintenance. Both SSGCL and SNGPL have under-performed in managing distribution networks, leading to high levels of unaccounted for gas (UFG). UFG is typically 1–2 percent in OECD countries owing to better management and the larger share of bulk consumption in the consumer mix, whereas Pakistan’s UFG (for July 2020) is 17.83% and 11.45% as estimated by SSGCL and SNGPL respectively. Moreover, underground leakage from aging pipelines and poor maintenance have contributed significantly to UFG in Pakistan. According to World Bank estimates, the average leakage rate is 4.9 leaks per KM for SSGC and 2.2 for SNGPL. By contrast, the same average is 0.22 in Germany and 0.36 in few states of the U.S. Needless to mention, another major area contributing to gas shortages is theft which accounted for 16.5% of total UFG in 2015, including 14% by unregistered users illegally drawing gas from pipelines and 3% by registered users tampering with meters. Moreover, SNGPL and SSGCL’s ‘saving technique’ to conserve or reduce consumption by lowering pressure of natural gas during night hours is not only ineffective but also dangerous, extinguishing space heater and geysers resulting in fatal accidents.

Fourthly, and relatedly, the government’s strategy to import LNG to address shortages is not a viable option and rather allows the problem to persist due to one simple reason: **injecting more gas in a leaking distribution system cannot yield positive results**. Lacking realization of this simple phenomenon, Pakistan’s LNG imports continue to rise (see Table 2) e.g. they rose to 901 MMcf during FY 2018-19 from 754 MMcf in FY 2017-18, and their share in overall natural gas supplies increased to 27% in FY 2018-19 from 24% the previous year.

| Unit | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | ACGR |
|-------------------------------|------------|-------------|-------------|-------------|-------------|------|
| MMBTu | 19,795,505 | 100,720,923 | 186,672,977 | 313,902,345 | 373,410,403 | |
| TOE | 472,503 | 2,404,128 | 4,455,734 | 7,492,597 | 8,913,006 | |
| Import value (Million US\$) | (151) | (642) | (1,278) | (2,452) | (3,392) | |
| Annual growth rate of imports | | 408.81% | 85.34% | 68.16% | 18.96% | |

Source: Directorate General of Liquefied Gases, MoE (Petroleum Division)

Table 2: Pakistan’s Imports of LNG

Fifthly, natural gas is used very inefficiently in Pakistan. This is partly because large quantities of appliances are produced by small-scale manufacturers that do not meet national or international standards of safety. Utilities that operate on commercial principles have to achieve acceptable standards of performance and management and/or their staff face actions when minimum performance standards are not met. Sadly, this is not the case in our country. Enforceability of standards on appliances for sale in the market can be ensured if regulation was brought about that any appliance that was to be connected to the system, must be approved for use by OGRA or any other body who may be assigned this task.

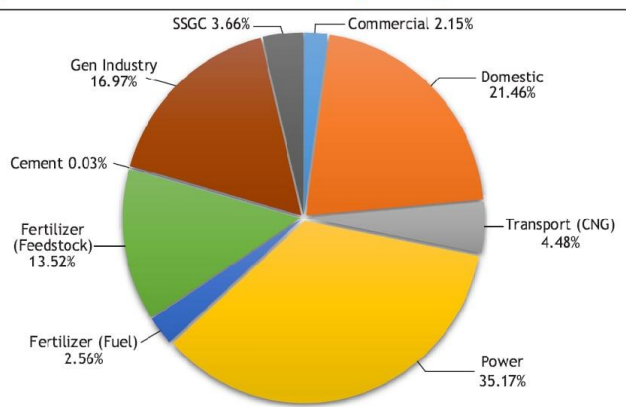
So, with these perennial problems and chronic shortages plaguing the country's gas sector, what kind of future can we envision for ourselves? The Oil and Gas Development Company Limited (OGDCL) predicts that Pakistan's indigenous oil reserves will be exhausted by 2025 and that the country will run out of domestic sources of natural gas by 2030. The sector-wise consumption of gas is provided in Figure 3 and Table 3. Given that more than half of existing gas reserves have already been exhausted while no noteworthy addition has been made to gas reserves in the last 17 years, and that the country now only has sufficient reserves to last just over 15 years in the best-case scenario where consumption is capped at present-day levels, the question is: what will become of all the consumers and businesses in this consumption mix? Does the government have any short- or long- term plans up its sleeve to save them from impending doom or all is bleak?

Table 3: Sectoral and Provincial Consumption of Gas (%) (2019-20)

| Gas Consumed as a Percentage of Sectors (%): | |
|--|----|
| Power | 38 |
| Domestic | 22 |
| Fertilizer | 16 |
| General Industry | 09 |
| Captive Power | 08 |
| Province-wise Gas Consumption (%): | |
| Punjab | 51 |
| Sindh | 38 |
| KPK | 09 |
| Balochistan | 02 |

Source: Pakistan's Energy Year Book 2019-20

Figure 3: Sector-wise share of the consumption of gas



Achieving the economic potential of energy efficiency is complex but Pakistan needs to start somewhere. According to ADB, being a developing economy means Pakistan still possesses high energy saving potential. It is currently 15% more energy intensive than India and 25% more intensive than Philippines in the Asian region, but reducing energy intensity can become a key priority to curb gas consumption and save it for peak hours to meet demand. An EY study concludes that Pakistan can benefit from measures with high potential energy saving such as (i) metering, (ii) thermal insulation of steam lines and valves (iii) tuning of boiler burners and improvement of the air-to-fuel ratio (iv) installation of heat recovery from exhaust flue gases (v) control of compressed air leakage, (vi) condensate recovery and (vii) heat recovery from wastewater, in energy intensive industries such as textile, sugar, paper and leather. The study also found that by adopting the aforesaid energy efficient practices, energy consumption in these industries in Pakistan could be reduced by a total of more than 3.7 million MWh annually. At the same time, increasing the energy efficiency of products can also provide a good starting point. Other South Asian countries like Bangladesh are already promoting efficient use of existing resources, both on the supply and demand side. Pakistan can learn much from their example and endeavour to maintain energy efficiency benchmarks at international standards to save gas and tackle shortages in short term. Under the existing circumstances, this seems to be the only way forward for Pakistan if it aims to resolve the perils and problems that have long plagued its gas sector.