
Pakistan's Gas Shortage - Is a Moratorium on Gas Supply to Captive Power Plants (CPPs) the Solution?

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Pakistan is faced with an acute gas shortage. Natural gas resources, which comprise 50% of the country's total energy supply, are declining rapidly with no sizeable gas discoveries in sight, in tandem with inefficient use of gas. In an endeavor to manage the country's acute gas shortage, the Cabinet Committee on Energy (COO) has recently proposed a moratorium on gas supply to Captive Power Plants (CPPs) with effect from February. The underlying strategy is to encourage grid electricity consumption while reducing demand for gas. This article explains why, under the current circumstances, such a policy measure is short-sighted and a focus instead on practicing energy efficient protocols can help alleviate the situation much better.

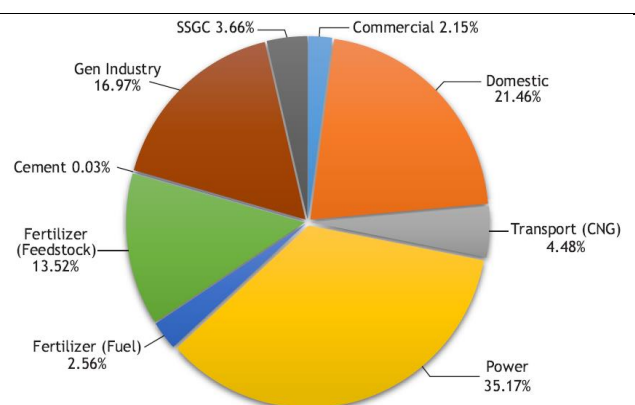
To begin with, the captive share of gas consumption is merely 8% of the total gas consumed (see Table 1). Moreover, captive's gas usage is not consumptive but economic, that is, it leads to sustained production, with benefits of employment generation and enhanced exports. CPPs are not necessarily inefficient when compared to Bulk Power Generation. The efficiency of the IPPs (*Engro Power, Orient Power, Saif Power, Sapphire Power, Foundation Power, Halmore Power*) is 50% at generation level but once the line losses and commercial inefficiencies of the DISCOs are accounted for the efficiency at the point of consumption is hardly 42%. The higher efficiency of the new RLNG based power plants (*Qaid-i-Azam thermal plant, Punjab thermal plant, Balloki plant and Haveli Bahadur Shah plant*) is net 60% at the generation but reduces to 48% at the consumption level because of the reasons stated above falling far short of the efficiency achieved by Co-Gen units.

*Table 1: 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
Baluchistan	02

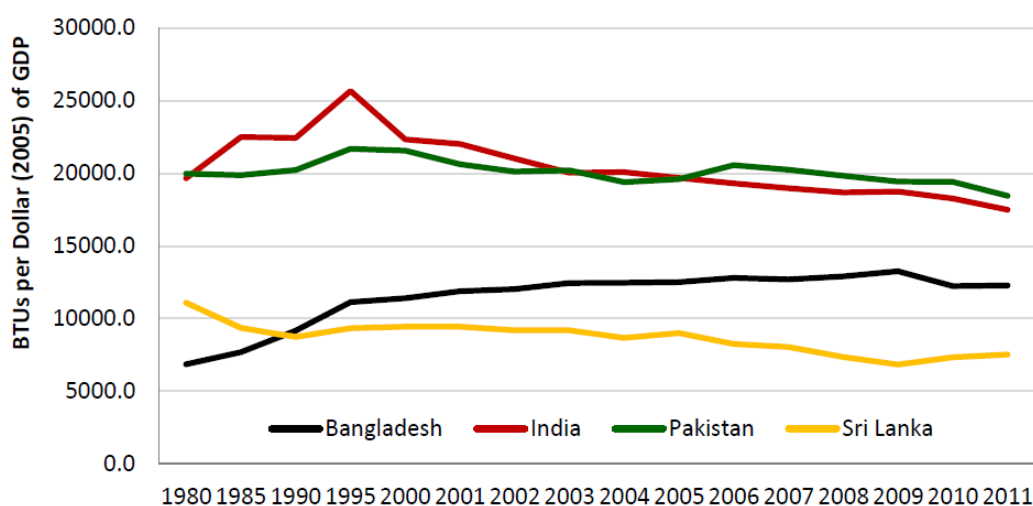
Source: Pakistan's Energy Yearbook 2019-20

Figure 1: Sector-wise share of the consumption of gas



Secondly, the government's policy to encourage grid electricity does not come with a plan to address fundamental issues of competitiveness and affordability. The existing infrastructure is not able to support 3,000 MW of additional electricity to be supplied to the industry resulting in fluctuation and irregular supply that not only result in production losses but also damage expensive equipment. Textile, the single largest contributor to Pakistan's exports with existing sizeable investments in state-of-the-art machinery and high efficiency generation and have over USD \$2 billion worth of investments for expansion and modernization in the pipeline. The potential losses thus accruing to such policy measure are phenomenal. On the contrary, the industry can bring substantial economic benefit from enhanced exports if the gas supply is continued. In other words, even if the approach to shift industry to grid electricity reaps long run benefits, a pre-requisite to implement the same is a meticulous plan to substantially improve grid electricity for a stable, sustained, continuous supply of electricity at regionally competitive tariffs.

Figure 2: Energy Intensity in Selected South Asian Countries



There is no doubt that achieving the economic potential of energy efficiency is complex, but Pakistan needs to start somewhere. Acknowledging that the use of natural gas in Pakistan is highly inefficient is the first step. The inefficiencies are in part attributed to large quantities of appliances being produced by small-scale manufacturers that do not meet national or international standards of safety. According to The World Bank, inefficient appliances in the residential sector are estimated to cause gas waste to the magnitude of 30,000 – 40,000 MMCF per year. Industries and utilities that operate on commercial principles must achieve acceptable standards of performance and management – if not, their staff must face the consequences of missing minimum performance standards. Sadly, this is not the case in our country. In 2010-11, the Pakistan Standards and Quality Control Authority (PSQCA) set up a certification program for appliance manufacturers. Improvements in appliance certification, energy efficiency labelling, and enforcement of standards were deemed necessary. However, while regulations are in place, the enforceability of standards on appliances for sale in the market is weak. If conservation of natural gas is to become a priority, enforceability must be strong.

However, inefficient appliances are only part of the problem. Inefficient use by customers does rest of the damage. Pakistan has the potential to save up to 10-15% (10-12 MTOE) of primary energy supply through energy efficiency, but residential gas consumers have limited incentive to shift to more efficient appliances because of low gas prices the lowest slab at Rs. 120/MMBTU. Reducing the consumption of gas at consumer level by improving efficiency can lead to significant savings on bills as well as decrease the pressure on the government for making the scarce resource available. If considered, there is room for exponential savings e.g., 12% efficiency of gas stoves used in households can be enhanced to 36% with a handful of simple measures such as finetuning stoves, replacing their nozzles, switching to high-efficiency cookware like pressure cookers and thermal bags etc. Similarly, gas geysers can be made highly efficient through mandatory use of cone baffles, saving 30% gas. Likewise, a typical solar water heater will save about 7,500 cubic feet of natural gas per year. If all 2 million gas water heaters of SNGPL customers were converted to solar, 15 billion cubic feet of natural gas would be saved. Considering the 173 billion cubic feet of domestic gas consumption in Punjab, this translates to a saving of about 9% annually. Dynamometer tests have measured that CNG-fueled vehicles have 10-15% lower power output than petrol engines, and there is a high cost of conversion (vehicle conversion, natural gas conversion to CNG). Moreover, increased exhaust-valve wear and tear in CNG-operated vehicles are anticipated due to the drying effect of the gaseous fuel.

But if energy efficiency is the outcome, what is the process? In other words, how can the government develop and implement measures to bring it about? In order to develop appropriate policies, strategies, laws and regulatory frameworks to enhance energy efficiency, a multitude of approaches will be required. There will be no “cookie cutter” approaches. Monthly or quarterly audits by SNGPL/SSGC will be necessary to verify approved quality equipment is installed and in use. Penalties in case of violations and inefficiency will have to be encouraged via price signals and incentives. All along, our public will need to be educated on how to reap benefits of efficient usage. Government departments can additionally provide free services to upgrade existing inefficient equipment like servicing or replacing worn-out/damaged parts that can save up to 600 MMCFD of gas. The fact that SNGPL has already undertaken a few successful but limited measures such as cone baffles and smart thermostats for geysers is an encouraging start.

Another silver lining is that policy and research circles are increasingly paying attention to the challenges and opportunities associated with Pakistan’s energy crises. A recent report by the Consortium for Development Policy Research (CDPR) and RAFTAAR, Research and Advocacy for The Advancement of Allied Reforms, for instance, makes recommendations for energy conservation based on their potential scale of positive impact (see Table 2). The gains to gas conservation therein are clear.

Table 2: Energy Conversation Measures								
		Potential Impact						
Sr	Energy Efficiency Measures	High Medium Low	Scale of Impact	Quantitative Energy Saving Estimate	High Medium Low	Barriers	Possible Solutions	Time Required
Gas Conversation Measures								
1	Tuning Domestic Gas Cooking burners	Very H	Domestic gas demand	400-600 MMCFD	H	Currently not mandated to any organization, but a national requirement.	SNGPL/SSGC to take the lead and outsource	1 - year
2a	Conversion of domestic gas water-heaters to solar	H	Domestic gas demand	360 MMCFD	H	Funding	Concessional Finance by SBP for installation and recover cost on instalments	2 - years
2b	Insertion of cone baffles and tuning	H	Domestic gas demand	200 MMCFD	H	Funding		1 - year
3	Efficient space heaters	M	SNGPL gas demand	100 MMCFD	M	Funding	SNGPL to provide efficient heaters on instalments	1 - year
Electricity Conversation Measures of High Impact								
4	Conversion to Energy Efficient Lighting	H	Pakistan's Electricity Consumption	9.30%	H	Upfront cost	Financing	1 - year
5	Conversion to Energy Efficient Fans	H	Pakistan's Electricity Consumption	7.70%	M	1 -Technology improvement 2-Fan manufacturers support 3-Buy back of old fans	Work with the fan manufacturers association	1 - year
6	Conversion of 350,000 low-water table (30ft) irrigation pumps to solar	H	Total irrigation pumps in Pakistan	Fuel Savings for 30% of all pumps in Pakistan	M	1 -Technology standard 2-High upfront cost 3-Specialised maintenance	Rural outreach, skills enhancement, farmer finance solutions	2 - year
Sources: CDPR, The World Bank, Asian Development Bank, NEECA, etc.								

In summary, the government's proposal to suspend gas supply to captive is misinformed and may do more harm than good, at least in the notable future. There are numerous benefits of utilizing gas in captive, including (i) high efficiency, (ii) reliability, unlike grid electricity (iii) no theft, (iv) less burden on national exchequer (there are no financial subsidies) and (v) no drain on foreign reserves. At the same time, prioritizing energy efficiency and directing more efforts towards the same can help reap significant gains. 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 endeavor to maintain energy efficiency benchmarks at international standards to save gas and tackle shortages in the short term. Under the existing circumstances, this seems to be the only viable option if Pakistan aims to resolve the perils and problems plaguing the gas sector without compromising the interests and economic contribution of industrial sectors.