

Policy Brief Series

# OVERCOMING PAKISTAN'S ENERGY CRISIS



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## A SIX-POINT PLAN OF ACTION

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### Policy Recommendations

- Embrace, in the immediate term, hydel, wind, and solar power—all readily available in Pakistan—and aim to have them comprise 50 percent of electricity generation within 10 years.
- Privatize public sector thermal power plants in rapid fashion to boost efficiency, and privatize distribution companies to enhance accountability and to reduce theft.
- Facilitate the rapid development and production of Pakistan's ample tight and shale gas resources by transferring 26 percent of equity, along with managerial control, of the public sector company Pakistan Petroleum Limited to an overseas exploration and production company.

Recommendations continued on next page

This policy brief series seeks to share with a wider audience the proceedings of a July conference at the Woodrow Wilson Center that explored Pakistan's energy crisis. The Wilson Center's Asia Program takes great pleasure in acknowledging support provided by the Fellowship Fund for Pakistan for the conference, this policy brief series, and the longer volume of essays to be published in the coming months.

- Begin construction on an Iran-Pakistan pipeline—a project that could potentially boost gas supply by 25 percent, and at lower prices than Pakistan's current liquefied natural gas imports.
- Raise residential natural gas prices to promote more conservation and more use of renewable energy sources (such as solar-powered water heaters) in households.
- Build on existing legislation outlawing natural gas and electricity theft by introducing stricter penalties, such as not allowing bail, and by encouraging key stakeholders—government, media, religious leaders, and academia—to highlight consumers' social responsibility not to commit theft.

This six-point action plan offers a series of novel recommendations for the government of Pakistan as it struggles to overcome a crippling energy crisis. These recommendations focus on how to better support energy resource development in Pakistan, how to expedite foreign cooperation in energy development and production, and how to improve energy governance. They also encourage the development of renewable energy (particularly hydel and solar power) and the rapid increase of indigenous tight and shale gas production.

### **RENEWABLE POWER GENERATION POLICY**

Pakistan is fortunate to have renewable energy resources (hydel, wind, and solar) capable of producing maximum power during its summer months, when power demand increases due to the use of air conditioning in homes and commercial establishments. Water availability is high during the summer due to glacier melt and monsoon rains; strong winds prevail during summer monsoon season; and longer sunny periods during the summer result in higher power generation from photovoltaic solar power. Thus, these renewable sources of power enable higher generation when demand is at its peak.

More, however, is needed—and the supply is clearly available. Consider that in the northern areas of Pakistan, there is potential for 40,000 megawatts (MW) of hydel. The government should introduce and implement a policy for the

continuous development of large hydel projects in the public sector over the next 20 to 30 years. Adequate funds should be earmarked in the budget toward consummating hydel power projects, and they should be stewarded annually.

Meanwhile, wind availability in the Sindh wind corridor is excellent, with wind turbines enjoying the ability to produce, on an annual basis, an average of over 30 percent of their rated capacity (generally, 25 percent is considered the threshold for economically viable wind power generation). The Pakistani government should consider encouraging industries impacted by power shortages to develop wind power projects in Sindh, in return for a continuous power supply at their industrial sites. This could result in industries making a return on their wind power projects, along with their industrial units enjoying improved profitability thanks to more reliable supplies of power. Such innovative policies could result in the accelerated development of wind power in the country, and also enhance the profitability of important industries such as the textile sector in Punjab.

Solar photovoltaic power projects can be executed very rapidly (often within a year), and large projects such as the Quaid-e-Azam solar park are already being developed. Solar photovoltaic power should be encouraged in residential homes to take the burden off of power distribution companies, which suffer from capacity constraints (particularly during the summer) due to being undersized and faced

with aged transformers.

For their part, distribution companies should “accept” surplus solar photovoltaic power from homes during the day through net metering. This is an arrangement in which utility companies take back surplus electricity from a residential solar power unit via the normal electricity-metering system of a house. It is common practice in some parts of North America and in Europe.

Currently, photovoltaic solar systems with storage batteries are being marketed in Pakistan with a payback of five to six years. If net metering is introduced in the country, storage battery costs can be curtailed and the economic viability of solar power in homes can be further improved. The government should encourage solar power in homes through duty-free imports, and also encourage distribution companies to introduce net metering technology in large cities.

### **PRIVATIZATION OF PUBLIC SECTOR THERMAL POWER UNITS**

The privatization of the Karachi Electricity Supply Corporation (KESC) has been quite successful. Since being turned over to Abraaj Capital, KESC has seen significant improvements in reliability and efficiency. Within the last five years, the efficiency of KESC power generation units has increased from 30.6 to 36.7 percent. Power transmission and distribution losses have been reduced from 36 percent to 28 percent.

Meanwhile, within this same five-year time frame, the public-sector thermal power generation and distribution companies of the Water and Power Development Authority (WAPDA) have not shown improvements in performance. Thus, there is an urgent need to replicate the successful transformation of KESC (now called K-Electric) through the privatization of public sector power companies

to professional private groups with experience in the power sector.

The quickest way to show impact in privatizing WAPDA companies is to initially divest thermal power generation companies. Professional management with technical experts can improve the reliability and efficiency of thermal power plants within one to two years. The first thermal power generation company of WAPDA that should be privatized is the one called Genco 2. It is located at Guddu, a gas-rich town in Sindh province where capacity has recently increased from 1350 to 2100 MW. This site mostly has combined cycle gas turbine units, which have been poorly managed and on average operate at half capacity due to frequent breakdowns. In comparison, combined cycle gas turbine units in private sector power plants (IPPs) deliver over 90 percent of their capacity. Privatizing public sector generation companies is the quick way to increase power generation capacity in Pakistan and to produce efficiency and reliability improvements. Privatization also allows for modernization and expansion, which can be fast-tracked at existing power generation sites.

The best way to improve the capacity and efficacy of distribution companies is also through privatization. This would admittedly be a daunting task, as these companies are spread over thousands of localities, and there are also issues related to theft, security, and access. To this end, the government should start the privatization process of distribution companies by targeting smaller distribution companies in Punjab, which can be attractive to the private sector.

### **ACCELERATION OF HYDROCARBON EXPLORATION AND PRODUCTION IN PAKISTAN**

Pakistan has recently updated its policies for indigenous exploration and production of hydrocarbon resources, but there has been no

growth in the overall production of natural gas in the country. A key reason why is that half of the natural gas production in Pakistan is undertaken by the two large public sector corporations, OGDCL (Oil & Gas Development Corporation Limited) and PPL (Pakistan Petroleum Limited). These two companies also hold the majority of the exploration leases. Unfortunately, neither OGDCL nor PPL has the project management and technology expertise to rapidly exploit and develop its leases.

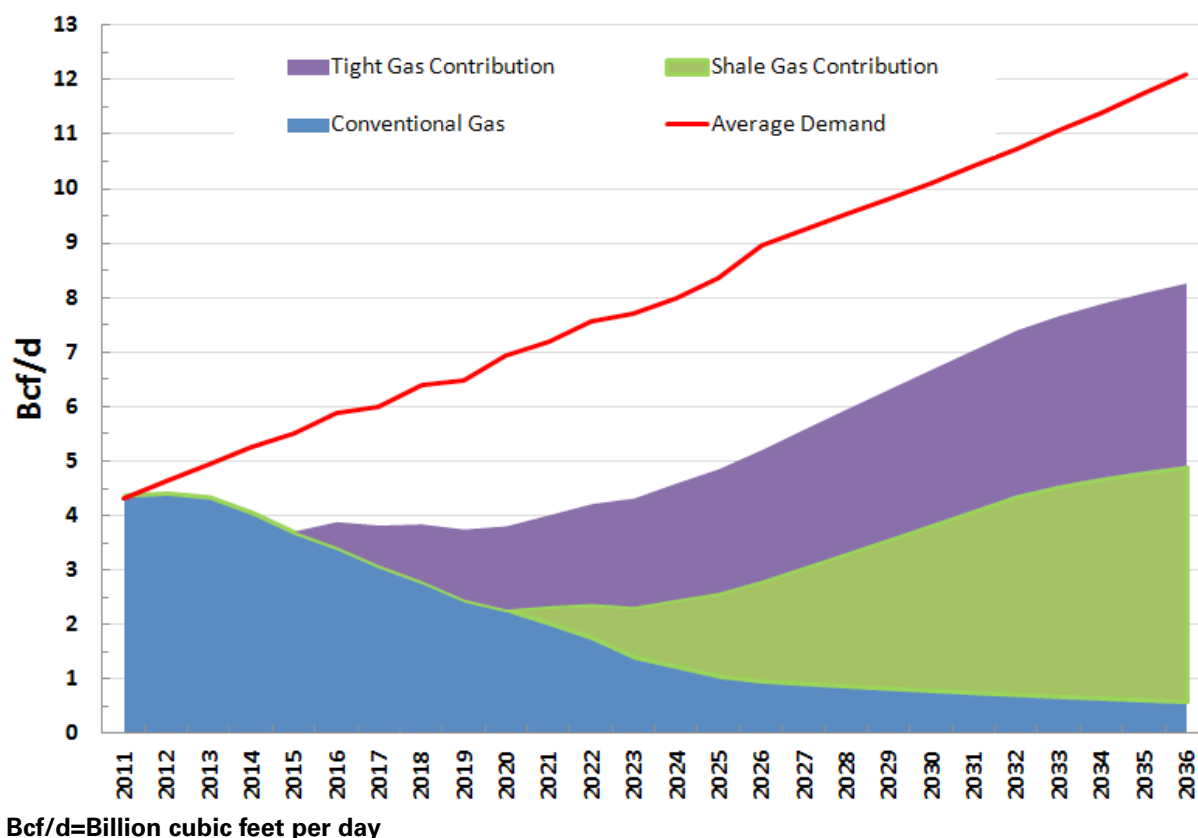
In this regard, the government should advertise the sale of 26 percent of PPL's equity to an overseas company boasting the management expertise and technological know-how to explore and rapidly develop Pakistan's tight and shale gas and oil resources. A strategic investor with 26 percent shareholding in, and management control over, PPL would have the incentive to rapidly increase PPL's hydrocarbon production.

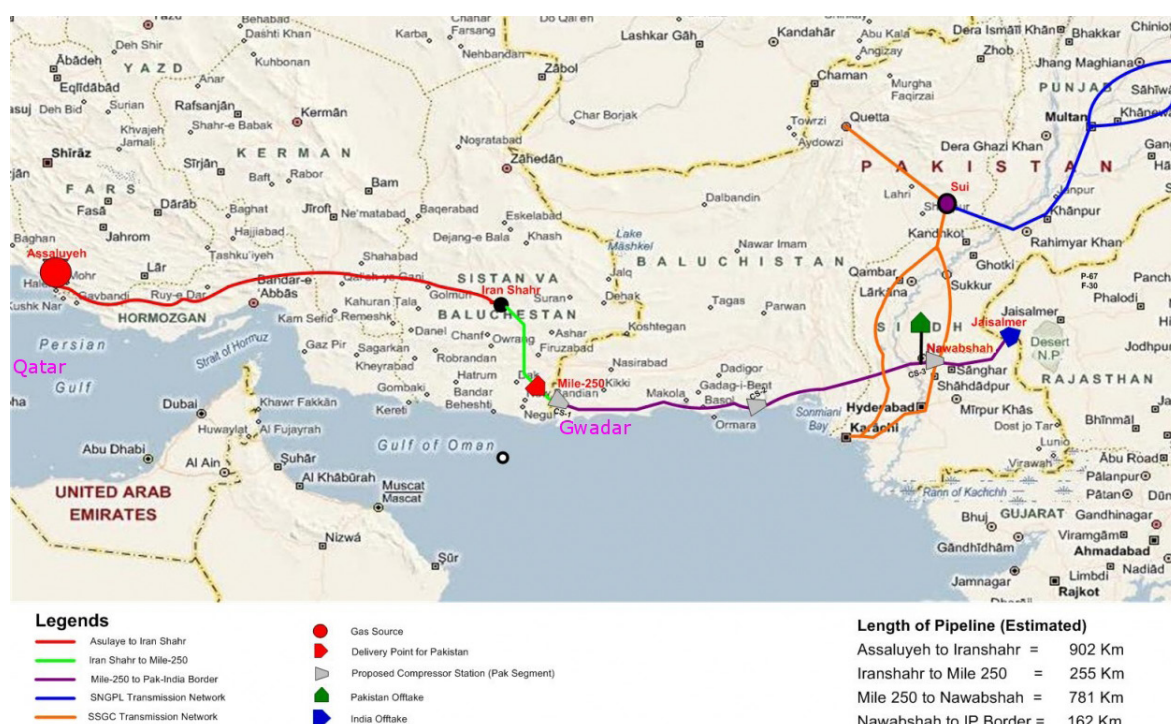
PPL is a "compact" company originally owned by the multinational Burmah group of the United Kingdom, and for this reason it is easier to take over in a privatization move. If the divestment experience of PPL is successful, then the government should consider a similar strategic divestment of the larger public sector company, OGDCL, within three to five years.

## STAGED DEVELOPMENT OF IRAN-PAKISTAN PIPELINE PROJECT

The Iran-Pakistan gas pipeline is on hold due to international sanctions on Iran. This gas project is very significant for Pakistan, because it can potentially add 25 percent to Pakistan's gas supply at much lower prices than liquefied natural gas (LNG) imports. Pakistan's government should therefore initiate work on this pipeline project by starting construction of 750 kilometers of the pipeline up to the port

## Projection of Pakistan's tight gas and shale gas production





of Gwadar (located in southwestern Pakistan, near the Iran border), to be used for the import of LNG. Subsequently, if and when sanctions on Iran are lifted, the short distance of pipeline from Gwadar can be extended to Iran for the importation of cheaper Iranian gas. Since the government is already collecting taxes to finance natural gas development (this is known in Pakistan as the Gas Infrastructure Development Cess), staged development of the Iran-Pakistan pipeline should be started immediately—and especially because it will take two years to construct the Pakistan portion of the pipeline to Gwadar.

## PRICE ADJUSTMENTS TO RESIDENTIAL NATURAL GAS FOR EQUITY AND CONSERVATION

Urban homes generally have access to natural gas, and they account for a quarter of the gas consumed in Pakistan. By contrast, small towns and rural areas (where the majority of Pakistanis reside) must burn wood or dung, or use fuel such as liquefied petroleum gas

(LPG) or kerosene, which are 10 times more expensive than subsidized natural gas provided for residential use. The price differential between natural gas and petroleum-based fuels is exacerbating socioeconomic disparities between the urban middle class and the rural poor.

Gas utility companies charge progressively higher prices through “slab rates” in cases where gas is consumed in greater quantities (the price of gas consumption up to 100 cubic meters per month has an 80 percent subsidy, while consumption up to 300 cubic meters per month has a 60 percent subsidy—and consumption above 300 cubic meters per month has no subsidy). However, the pricing mechanism and slab rates are generous. Consequently, a typical gas bill for a middle-class household is about 500 rupees (Rs.), or \$5 per month, for cooking and water heating, whereas LPG users spend over Rs. 2000 (\$20) per month for cooking purposes alone. If the gas price for residential use is progressively increased, there is an opportunity to save about a quarter of the natural gas consumed in

homes. This opportunity could be seized through the installation of solar water heaters, which cost only Rs. 30,000 (\$300). However, these are currently neither viable nor desirable for residential consumers, given the low natural gas prices they enjoy. In essence, home consumers have little incentive to install solar heaters when they receive gas at such low rates.

The government should increase gas prices and revise “slab volumes” to promote gas conservation in homes, and also to reduce the disparity with the population that does not have access to natural gas. It should be noted that gas consumption in the residential sector is also growing fast because of the installation of small gas generators, which have only a third of the efficiency of large power plants in Pakistan.

### GOVERNANCE ON THEFT OF ELECTRICITY AND NATURAL GAS

Electricity theft is rampant throughout Pakistan. Reportedly, over 20 percent of the country's total electricity is stolen. In poor localities, electricity has been stolen for decades through simple wire connections to overhead power lines; this practice has become the norm in these communities. Local politicians do not support disconnection—a position they espouse in order to prevent communal disturbances in their constituencies. Some utility companies are slowly regularizing electricity connections through the installation of meters. However, this leads to meter bypassing and tampering. After all, the price of electricity is high for poor people. It should be said as well that theft is also prevalent in middle-class and affluent areas, mostly with the connivance of electricity meter readers.

Theft of natural gas is reported to be below 10 percent. There is limited theft in the residential sector because gas bills are relatively affordable. Gas theft in houses normally takes place before gas supply connections and meters are installed in new dwellings. However, gas theft does occur

significantly when compressed natural gas (CNG) and small industrial establishments are involved. Recently, due to severe gas shortages, the government has emphasized that it would undertake investigations of losses. Additionally, numerous gas theft cases are being identified and addressed. This improvement in governance is a positive development for the future, when imported gas (which in Pakistan is three to four times more expensive than natural gas) is expected to increase in the short term—thereby making the average price of gas substantially more expensive in the country.

Although legislation on the theft of natural gas and electricity exists, there is a need for strict implementation with tougher measures, such as not allowing bail. Additionally, the government, media, religious leaders, and academia should play an active role in educating people about their social responsibility not to commit energy theft.

### CONCLUSION

By implementing these policy recommendations, Pakistan has the potential to increase the availability of energy—both gas and electricity—for industry and homes (albeit at a higher price). This improved energy scenario will enable industry to operate at greater capacity, and it will improve the quality of life for common Pakistanis by reducing black outs. It will also incentivize energy conservation projects in industry, and improve energy-related governance in the country on the whole.

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*This policy brief marks the last in a series of three on Pakistan's energy crisis. Other briefs in the series can be accessed from the Asia Program webpage at <http://www.wilsoncenter.org/publication-series/overcoming-pakistans-energy-crisis>.*

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