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Despite the current ongoing energy shortages and loadshedding, Pakistan has energy wealth that could be unlocked just by thinking differently about electricity distribution.

Electricity supply is capital-intensive engineering. Pakistan built the existing electricity supply network with the help of large loans on favourable terms from the World Bank and other international institutions. In addition, Pakistan has benefited from the generosity of Saudi Arabia in providing low-cost fuel. It has also had the benefit of large hydroelectric generating plants at Mangla, Tarbela and other dams: they generate electricity with no ongoing fuel costs.

As fuel and capital costs rose and the proportion of cheap hydro-power was reduced, Pakistan decided to shield its people from the real cost of electricity generation with generous subsidies. The country benefited from the temporary growth that resulted from these policies. But it could not last.

Fast forward to 2012, with a population addicted to cheap energy. Like Australia, much of Pakistan's power-generation and distribution infrastructure was built in the 1960s and 1970s. It is now reaching the end of its operating life and needs to be replaced. The large dams have filled with river silt, reducing their water capacity for electricity and irrigation.

Now the government faces some hard choices. Unable to collect enough money even to pay for fuel, government-owned distributors have deferred maintenance and infrastructure investment needed to meet demand. Overloaded power lines burn up to 20 percent of the electricity that is generated. Influential consumers and cash-strapped government organisations refuse to pay their bills and others steal electricity, further reducing revenue. As more people connect air-conditioners, loadshedding is now endemic, and energy subsidies at around 10 percent of government spending help drive inflation.

Power prices seem to be rising fast. However, after allowing for inflation and currency devaluation, real electricity prices have fallen for most people. Even for the wealthy, real prices have remained static, discouraging efficiency. Pakistan uses twice as much electricity per unit of GDP as Australia.

The country is also running out of domestic gas supplies, further compounding electricity problems, and necessitating gas loadshedding in winter. Like electricity, gas has been priced well below international norms, encouraging wasteful consumption.

There is no easy way out. The government will have to double electricity prices, perhaps more, to cover the cost of fuel and rebuild infrastructure. Faced with similar decisions, even pro-business conservative state governments in Australia have chosen to continue subsidies. With only a slim majority, the PML-N government will be reluctant to raise power prices and put voters off-side.

Yet, there are solutions without having to raise prices. Pakistan is rich in energy but it is not where many people think. The coal reserves under the Thar desert lie deep under highly permeable aquifers, almost completely inaccessible with today's technology, and are destined to remain there for the foreseeable future.

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style="text-align: justify;">Pakistan's greatest energy wealth comes from the sun, much of it absorbed by agricultural crops on some of the most fertile soil in the world. It also has large land areas suitable for solar generation. It has hydro-electric infrastructure that could be used for pumped energy storage, enabling daytime solar-generated electricity to be stored for night-time consumption. Strong and reliable winds along the Arabian Sea coast and over the Himalayas could be used for power generation. How can this vast renewable energy potential be unlocked?

</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">The cost of photovoltaic solar panels has fallen dramatically in the last few years and solar generated electricity has now reached grid parity in many countries. That means the cost of solar electricity is around the same as their grid power prices, but not in Pakistan where current subsidies keep grid power (when it's on) far below the cost of solar electricity. Grid power prices would need to rise to Rs25 per unit to make solar and wind power feasible. With government institutions paralysed, that's not going to happen soon.</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">In reality, electricity costs in Pakistan have already exceeded this level, but few people realise that. Loadshedding forces up the cost of electricity for everyone. The real cost of a running an efficient diesel generator, the cheapest 24 hour alternative power source, is about Rs50 per unit after allowing for fuel, maintenance, labour, loan markup and depreciation. Most generators are running at low efficiency. For anyone using a generator, therefore, the average cost of power in Lahore with 12 or more hours of loadshedding is already well above Rs30 per unit.</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">However, the real cost is even higher because of indirect costs from loadshedding. With the power predictably off for many hours a day, illegal connections can be made in darkness with little chance of electrocution or detection, reducing revenue and imposing extra costs on everybody. The cost of lost production makes it more difficult for businesses to pay their bills. Workers earn less because their employers cannot make effective use of their labour without continuous electricity. Loadshedding increases the temptation to ignore electricity bills, particularly when you need a backup generator in any case.</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">Pakistan grows around three times more food than it eats, far more than an industrialised country. Much of the excess is lost due to power interruptions that cause food to deteriorate in storage and processing. Unlike in Australia, families need to buy fresh food every day and cannot keep leftovers without a reliable electric fridge. Power interruptions also damage appliances, further increasing costs for consumers. These costs are shared by everyone and, as a result, Pakistanis are actually paying much more for electricity than they think.</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">How can we move from the current loadshedding chaos to reliable and continuous electricity supplies? Here is one way it could be done:</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">The government could legislate to provide licences for qualified private power wholesaler companies to provide a guaranteed 24-hour electricity service in special zones at a negotiated price, around Rs25-30 per unit. This would be less than the current real electricity cost that includes running a generator and other opportunity costs.</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">Initially, most customers would be businesses because they better understand the real cost of intermittent electricity supplies. As an incentive in the early stages, it might even be worth offering fair market value to purchase private generators that would no longer be needed. Wholesalers would sign up customers for a fixed time, after which customers could switch to another supplier if they can get a better deal.</p> <p style="text-align: justify;"></p> <p style="text-align: justify;">Initially

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this would be implemented with local, parallel, high quality electricity networks, using separate cables, properly engineered connections, and electronic meters with theft prevention measures designed into the network. The power wholesalers would buy their electricity from Wapda at around, say, Rs15 a unit, providing a large increase in its revenue for the power supplied. Wapda would not incur the cost of collecting revenue, nor would it suffer revenue losses. Of course, it would have to guarantee supply continuity with compensation for interruptions.

Now, here's the exciting part. At Rs25-30 per unit, solar electricity from roof top panels becomes economically attractive. The solar panels also shade roofs, reducing the need for air-conditioning. Solar-powered chillers could refrigerate stored water, which could be used to provide night cooling with minimal electricity. The wholesalers could add to their revenue by hiring out solar panels to their customers.

Gradually the scheme could be extended to shopping centres and larger commercial districts and eventually to residential areas as consumers realise the benefits of 24-hour uninterrupted power. By being exposed to higher meter prices, consumers would be more careful with power consumption, reducing waste. Food could be stored safely, reducing processing and storage losses.

In the meantime, the government can avoid unpopular decisions to raise energy prices on the existing supply network. Savings and efficiencies would gradually allow loadshedding to be reduced. The government would be gradually freed from crippling subsidy payments, and the people would emerge from their current nightmare of wasteful underemployment caused by loadshedding.

As the savings work their way through the economy, Pakistan could be re-energised, awakening the nation to a bright and far more prosperous future based on efficient use of limitless renewable energy, backed up with responsible use of fossil fuel energy.

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