

# BUSINESS RECORDER

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## The power of solar

The world is adding solar power as fast as it can.

The installed solar PV capacity in Germany is around 45,000MW and even though India started late, it has around 25,000MW of installed solar capacity; Pakistan only has 388MW! Even though solar irradiation, a measure of the potential to generate electricity from the sun, in Germany is less than half of Pakistan's; Germany is continuously adding solar capacity, with a goal of 66,000MW by 2030; India has targeted 100,000MW solar PV by 2022, including 40,000MW of rooftop solar panels on residential, commercial and industrial buildings backed by a 30% government subsidy for residential buildings. What do these countries know that is escaping us? None of these countries is bound by a fixed mindset regarding supply/demand balance like Pakistan - they are just building solar and renewables capacity at a furious pace, to create a pool of cheap power to reduce dependence on fossil fuels with their high cost, price volatility and negative environmental impact. The logic is simple: don't you want USC 5-8/kWh renewable energy to replace USC 12-15/kWh thermal power?

Solar panels are made from polysilicon which itself is made from highly purified silica sand (abundant in Pakistan); about 5,000 Kg polysilicon is required to produce 1 MW solar panels. The price of polysilicon is US\$ 19 per Kg (dropping from US\$ 400/kg in 2008) giving a solar PV material cost of US C. 10 per watt and finished panel price of US C 40 per watt. In sync, with PV panel the cost of balance of electrical plant is also rapidly falling; leading to utility scale fully installed fixed tilt systems currently priced at USC 90-100 per watt which is expected to further fall to USC 70 per watt and lower by 2022.

Lower material usage, higher efficiencies, higher plant factors, new technology and massive increase in manufacturing capacity all mean a falling cost per kWh which is expected to approach US C 2-3 per kWh by 2022.  
<https://www.pv-magazine.com/2018/05/25/the-path-to-us0-015-kwh-solar->

power-and-lower/. A word of caution, however, tariff depend a great deal on financing cost, land cost, loan tenor, equity return (highly influenced by investor risk perception) and O&M costs.

The good news for Pakistan, however, is that the price of solar has fallen to all-time lows and it is the right time to add capacity. International auctions in Chile, Mexico, Morocco and the Middle East all achieved prices well below USC 5/kWh; even breaking the USC 3/kWh barrier, in some cases. [http://www.irena.org/documentdownloads/publications/irena\\_reactions\\_summary\\_2017.pdf](http://www.irena.org/documentdownloads/publications/irena_reactions_summary_2017.pdf). It is unlikely that Pakistan will achieve rock bot-

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tom prices, due to issues that plague our power sector, including, hugely delayed payments for electricity purchased by Government under its payment guarantee; but USC 4-5/kWh may still be attainable. Renewables in Pakistan get the hard end of the stick as thermal generators at least get paid for their tariff fuel component to keep them running, but renewables without a fuel cost get pushed to the back of the queue. It is important to fix these issues to attract continued investment in the power sector at a decent cost.

The generation from power plants is measured by the time that the plant is or can be operated. No power generation plants can be operated 100% of the time. Thermal plants can

its peak generation closely mirrors peak power demand (midday).

With 10,000MW installed solar capacity, the total annual generation, at a plant factor of around 20%, would be some 18 billion kWh of which more than 50% would be generated in peak midday summer hours. 10,000MW of solar generation would result in a straight saving of fuel in thermal plants, giving an annual saving of around Rs 200 billion, all in foreign exchange, recovering the full capital cost of the solar installations in under eight years. When fully installed by 2030 the 40,000 MW would result in a fuel saving in excess of Rs 700 billion per annum based on current trend of fuel prices. We would ignore these facts at our own peril.

Land, interconnection and transmission would be facilitated by government. Floating solar panels could be installed on our large water reservoirs; domestic solar (with grid interconnection or off-grid) should be vociferously promoted and supported as it would provide direct power to the user without any losses compared with centralized grid generation which loses 30% (5% in transmission and 25% in distribution) by the time it reaches the home; with a consequential 30% increase in cost!

Wind complements solar as they generate in different time spectrums, while hydropower has the longest life, cheapest lifecycle cost and ability to provide ancillary services, including frequency control, which wind and solar cannot provide. Thus, each generation technology has a place in the system, but the basic truth is that Pakistan cannot rely on or afford thermal generation based on expensive imported fossil fuels.

Focus on solar should by no means result in neglect of wind and hydropower as it is vital to develop the full potential of all renewables to promote energy independence & security, maximum grid utility, environmental protection, foreign exchange saving, reduction in fossil fuel import bill and achieving greater mix of fixed power cost.

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We would suggest that the power gurus, who transcend political governments, change their mindset, overcome their obsession with supply/demand which is dynamic and not a static phenomenon. A target of 10,000MW of solar capacity

by 2022 should be set with 40,000MW by 2030. This is fully achievable as has been shown worldwide; off course subject to investor interest and sentiment as US\$ 40 billion will have to be funded over 12 years. The mode of development could be changed and contact directly made with large factories in China with final award on condition that the last tranche of 2,500 MW should be made in Pakistan through transfer of technology and setting up manufacturing facilities here.

But the beauty of solar is that