"We Musalmans in general and youngmen in particular do not know the value of money. A paisa saved today is two paisa tomorrow, four paisa after that and so on and so forth. Because of our addiction to living beyond means and borrowing money we lost our sovereignty over this Sub-continent."

—Quaid-e-Azam Mohammad Ali Jinnah (in Ziarat, Balochistan, 1948)

BUSINESS
RECORDER

Wednesday 19 June 2019, 15 Shawwal 1440

The real RLNG controversy

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Electricity is a unique commodity which cannot be stored, at an economical cost, and must be consumed as it is generated. It is important to recognise that in the short run, the installed generation capacity in a system cannot be increased or decreased. An important consequence of this assumption is that fixed costs do not play any role in the production decision of power plants. Since a given power plant has already been constructed it should be willing to produce and supply electricity even if the market price is minutely higher than its variable cost of generation as this would contribute towards its fixed costs and profit. Though these are features of a market-based system, the principles and economics apply equally to a regulated system prevalent in Pakistan.

As an analogy, if you rent a car there could be a daily rental charge and a usage charge. The rental charge is a function of the capital and fixed costs and would be paid whether the car is used or not but is available for your use; while the usage charge is the fuel cost and variable cost paid in addition to the rental charge whenever the car is driven. Mind you the daily rental is still payable even if the car stands unused in your porch!

The power system works exactly in the same way; the thermal generators get paid on the basis of (a) capacity payment for making the contracted capacity available; and (b) energy payment based on the power purchasers demand and actual energy generated and delivered. Due to a lack of understanding of this system, one often hears of uninformed comments; that why are payments for electricity being made even if none is generated and supplied?

The electricity generation plant should be "available" for it to be eligible for capacity charge and if the full capacity is found not to be available then only the "available" proportion of the capacity charge would be paid. The "available" plant is put in the control of the power purchaser who manages the whole grid and power system and orders plants to come on and off, and generate power, when required to meet the demand in the system. In the power system the thermal generators get a capacity payment to cover their capital and fixed costs (CPP); while the fuel and variable cost (EPP) is only incurred and paid when the plant generates and delivers electricity on the order of the power purchaser.

This is the basis of the economic despatch or merit order, whereby the power despatcher will allocate the generating plants on the basis of cheapest marginal/variable cost first; and most expensive last to fulfil the demand at any point in time. If the cheapest generation source hits its capacity constraint before all the demand is met, the second-cheapest generation source is turned on, and increases power until either it reaches its capacity constraint, or all the demand is met.

The process continues by successively turning on more expensive generation sources until the entire load is served. This is the economic despatch order and is termed "merit order" which minimizes the total cost of delivered electricity. Generating plants in NTDC grid system, ranked on economic despatch, Merit Order basis, with a marginal cost (fuel + variable O&M) between Rs 2 and Rs 30 per kWh were despatched in May 2019 to meet demand http://www.ntdc.com.pk/meritorder/May%202019/M.O%2022.05.2019.pdf.

The "must run" power plants are those where natural resource cannot be stored or controlled, and energy is generated as and when resources remain available. If the electricity is not despatched, the resources go waste; these include solar, wind and run-of-the hydropower; however, nuclear is also by convention, included in this category not only due to its very low marginal cost but also because it has to remain at a fixed generation level due to technology constraints. In case of bagasse, it is must run during the crushing season. Renewables solar, wind and hydropower have very low variable cost close to zero and so they would always take priority, subject to transmission and operational constraints, in any economic order despatch list and would always be despatched first to satisfy the demand.

In Punjab, there are currently three high efficiency (over 62% thermal efficiency) combined cycle gas turbine plants (CCGT), with a combined capacity of 3633MW, using re-gasified LNG. These are the 1180MW Bhikki, 1230MW Haveli Bahadur Shah and 1223MW Baloki CCGT power plants. Due to the LNG purchase arrangements which were contracted on a "take or pay" basis, the power purchaser allowed these plants on a "take or pay" basis; effectively designating them as "must run" even with their high fuel cost compared to renewables the traditional "must run" category. Therefore, instead of cheap renewables displacing expensive thermal generation a situation was created where expensive thermal power could replace cheaper power including renewables!

The average fuel cost of these power generating plants, as shown in the May 2019 NTDC Merit Order, operating on RLNG is Rs 8.55/kWh. Under the "take or pay" contractual arrangement, up to the year 2032, if the plants are not despatched and do not generate any electricity, for example, if cheaper generation was available; then in addition to the capacity charge, the fuel cost of Rs 163 billion for 21 billion kWh per annum, at 66% plant factor, would have to be paid for. Thus, an additional financial burden of over Rs 2 trillion has been undertaken by the government of Pakistan till 2032, forcing them to operate these plants as "must run", even if cheaper generation was available.

In February 2019, NTDC prepared the "Indicative Generation Capacity Expansion Plan 2018-2040" which stated that up to the year 2032, the power purchaser is obliged to utilise 66% of the RLNG fuelled plants under contractual obligations. The report states that in order to develop an effective least cost generation capacity expansion plan that will meet the power needs of the country, both strategic considerations and constraints faced by Pakistan's power sector are somewhat considered.

These constraints include the take or pay energy constraints on RLNG. For the RLNG projects, 66% energy is on take or pay basis; and due to this constraint, the Thar coal-based projects are dispatched at lower capacity factor. As these constraints are released in 2032, the capacity factors of the RLNG plants, being a costly option, reduce and those of Thar coal-based projects increase substantially which means that Thar coal is a cheaper option in the future.

Due to the contractual commitments to take power from the RLNG plants, the despatch of cheaper Thar coal would have to be reduced till 2032, after which despatch of Thar coal increased and RLNG would be reduced. Thus, no cheaper generation including renewables, even if available, could be substituted for the RLNG generation and to that extent, the country would be forced to bear expensive generation till 2032.