Decision Making Framework for Implementing Section 18 of Senate Bill 3

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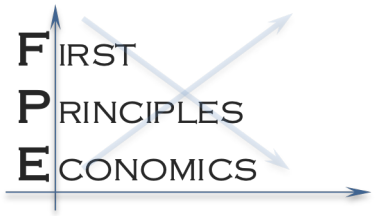

From the Latin *Ab initio*, First Principles cannot be deduced from any other propositions – they are the only reliable foundation for discovery.

Executive Summary

With respect to the requirements of Section 18 in SB3 mandating the PUCT to devise a structure that leads to an increase in investment in dispatchable generation, the first question is *not* what mechanism should be adopted, but rather what is the appropriate investment paradigm that should underly the ultimate structure.

The final structure – the rules, requirements, cost allocation, etc. – will all be based on the underlying investment model. Not only should the structure be consistent with the underlying model, but importantly the model itself should reflect the beliefs of the Commission regarding the investment and market environment as well as the investment process.

In designing the structure, it is the nature of the investment environment that is fundamentally important. Specifically, with respect to electricity, the future – or more precisely the expectation of various future states of the world – and not the past that is of fundamental importance. While the Commission will not actually invest, SB3 gives them the responsibility for designing, implementing, and overseeing a significant component of the investment process in ERCOT. This puts the Commission in a unique position – they must design the "game", but they do not participate. And yet they alone, and not the participants, will be held responsible for the outcomes produced.

The objective of this analysis is to make a recommendation about the appropriate investment paradigm and not about any single proposal. Once the appropriate investment paradigm is adopted it is a rather simple matter to evaluate the various proposals.

To date most of the discussion has been on each of the various proposals, with virtually no attention paid to the underlying investment paradigm represented by the separate recommendations. This is a mistake. Especially as it pertains to the future of the electricity sector. The underlying technology in the electricity sector is changing rapidly. Moreover, this change will increase in the future. Similarly, the mix of generation technologies has and will continue to change in the future. Finally, electrification is just beginning. These three forces – changing technology, the changing generation mix, and electrification – will dramatically alter the ways in which we produce, transport, and consume electricity. Accordingly, they will significantly change the way we define and operationalize reliability as well as the manner in which we manage volume and price risk. In short, the electricity sector will look substantially different in three years, let alone ten or fifteen, than it does today. Accordingly, it makes little sense to put in place a structure for investment that does not account for this reality. In particular, the Commission should adopt an investment construct that recognizes the dynamic environment of the electricity sector, one in which change is the norm and not the exception.

As stated above, the objective of this analysis was not to advocate for one proposal over another. But rather to frame the decision in terms of investment within the electricity sector environment. The intention of the analysis is neither to be controversial nor deliver an opinion. However, given the issues raised in the analysis – issues that cannot be avoided – the proposal brought forth by Commissioner McAdams in his memo of November 17, 2021, provides an attractive starting point. The DPC/DEC proposal maintains optionality, has minimal effect on the operation of the market, is designed such that it is self-eliminating, can be implemented inexpensively and quickly, can be reversed in favor of more traditional approaches if it is not delivering the necessary results, does not preclude new technology, and is a least cost solution for consumers

Introduction

In response to the requirements mandated in recently passed legislation – specifically Section 18 of Texas Senate Bill 3[1] - the Public Utility Commission of Texas ("PUCT" or "Commission") has been working to address the issue of how to ensure that there is adequate capacity available in the future to ensure reliable operation of the grid.

To date, the Commission has received several ideas/proposals for consideration as the "answer". Stated differently, the Commission has received several responses to the question of "what should be done."

The purpose of this analysis is to complement the discussion of "what should be done" by adding a second question to the discussion – "how should the decision be made" or more correctly, "what criteria should be used to make the decision" on what should be done. Other than to simply state the requirements of SB3, none of the proposals have provided any guidance to the PUCT in terms of how a decision from amongst the various proposals should be made.

The effect of this omission has been to largely Balkanize the discussion with the only unifying thread being the requirements of SB3. As will be discussed in the next section, there is in fact a unifying thread that has its roots in the requirements of SB3 and should form the basis for how to choose among various alternatives. This thread leads to a logical framework from which the decision should be made. SB3 mandates that a decision be made – it does not allow for inaction. If there was only a single alternative there would be no need to consider a decision-making framework. However, the existence of alternatives, of choices – necessarily implies there is an opportunity cost to any decision – creates an opportunity for an appropriate decision-making framework to be beneficial to the selection process.

The Fundamental Question at Hand

With respect to what the Texas State Legislature expects, the language contained in Section 18 of SB3 provides definitive guidance:

> Section 39.159
>
> (b) The commission shall ensure that the independent organization certified under Section 39.151 for the ERCOT power region:
>
> (1) establishes requirements to meet the reliability needs of the power region;
>
> (2) periodically, but at least annually, determines the quantity and characteristics of ancillary or reliability services necessary to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region;
>
> (3) procures ancillary or reliability services on a competitive basis to ensure appropriate reliability during extreme heat and extreme cold weather conditions and during times of low non-dispatchable power production in the power region;
>
> (4) develops appropriate qualification and performance requirements for providing services under Subdivision (3), including appropriate penalties for failure to provide the services; and

[1] See: https://capitol.texas.gov/tlodocs/87R/billtext/html/SB00003F.htm

(5) sizes the services procured under Subdivision (3) to prevent prolonged rotating outages due to net load variability in high demand and low supply scenarios.

The general – and correct – interpretation of the primary objective underlying this section of SB3 is for physical investment to take place in ERCOT to ensure reliable operation of the grid, especially considering the existing and forecasted amount of non-dispatchable generation in the current and future generation stack. There is no disagreement on this interpretation. The Commission must, therefore, (1) act, i.e., make a choice, and (2) make a choice that results in an increase in the amount of dispatchable physical assets on the system.

The question, therefore, is not first one about either electricity as a commodity or the electricity market defined by the Protocols and administered by ERCOT. Rather the primary question is about general investment. To re-iterate, Section 18 of SB3 is an explicit instruction made by the Texas Legislature to specifically increase physical investment in dispatchable[2] resources to improve the reliability of the grid.

The starting point for the discussion is, therefore, not electricity or the electricity market but rather investment. While this may seem obvious, the question has largely been ignored by many/most of the proposals, i.e., there has been little attention given to the actual investment process as it related to the mandate in SB3.

In effect, the PUCT, while not being required to make actual investment decisions, has been given the responsibility to devise, implement, and oversee a structure through which physical investment in electricity will take place. And not just any investment, but rather investment that will improve the reliability of the electricity system. This is a difficult task even ignoring the fact that they retain all their other existing mandated legislative obligations. Thus, for example, the Commission is still required to ensure non-discriminatory open access to the electricity system as well as a market that is reliable and efficient.

Accordingly, every proposal submitted to the Commission for consideration represents – by definition – a specific articulation of a generalized "theory" of investment. While the underlying theoretical investment model is almost always implicit, it is important to make it transparent and explicit. This is especially true in the current context, where the Commission is responsible for designing a significant portion of the structure by which investment will take place in the aggregate, i.e., the investment process for all participants. That is, the investment decision-making process for each firm will necessarily take place within the context of the structure approved by the Commission

Relationship Between Investment and Market Performance

It is no surprise that the performance of the ERCOT administered electricity market, both in terms of reliability but also the locational marginal prices, is a direct function of the capital infrastructure. This will always be true. That being said, the infrastructure will age, depreciate, and eventually be retired – some more quickly than others. The longer lived the physical infrastructure the longer it will potentially affect the outcomes of the market.

Furthermore, the greater the extent of "out-of-market" products or actions that need to be used/taken in order to maintain the reliability of the grid, the less meaningful – as a simple percentage – the energy price. So, for example, the existence and prevalence of "adders" such as the ORDC, the less meaningful the actual

[2] Defined in SB3 as output from a generation facility that can be controlled.

LMP. This is not to imply that these adders are neither beneficial or don't result in "better" outcomes, only that the adder usurps the direct and more predictable price mechanism in directing participant behavior.

It is, therefore, vitally important that every candidate proposal be evaluated not only from the perspective of meeting the objectives of SB3 but also through the lens of how it is likely to effect market outcomes – most importantly, reliability, price, and the ability for participants to efficiently manage risk.

Thus, for example, a proposal that meets the requirements of SB3 but causes the market to be significantly less competitive or efficient may not be a desirable outcome. It is doubtful that there exists a single potential proposal that dominates all others on all metrics. If there is, it has not been presented to the Commission. It is far more likely that tradeoffs will exist between the various candidate proposals, and this will require "weighting" the outcomes according to the desirability of the expected outcomes.

Investment

"Economics defines investment as the act of incurring an immediate cost in the expectation of future rewards…viewed from this perspective investment decisions are ubiquitous."[3]

The simplest, or orthodox, theory of investment by a firm begins, and largely ends, with the process of calculating the Net Present Value ("NPV") of the profits (revenues less costs) of all the candidate investment opportunities and then allocating available funds according to the ranking.

Typically, it is understood that the revenue and cost streams are expected rather than actual, and in this way, uncertainty is captured. The actual concept of uncertainty can be narrowly defined, i.e., applied strictly to the values of revenues or costs, or more broadly defined, i.e., market uncertainty.

What is fundamentally lacking from this simplistic approach is the concept of "optionality." In particular, the option value of waiting. As explained by Dixit and Pindyck,

> …the ability to delay an irreversible investment expenditure can profoundly affect the decision to invest. It also undermines the simple net present value rule, and hence the theoretical foundation of standard neoclassical investment models. The reason is that a firm with an opportunity to invest is holding an "option" analogous to a financial call option – it has the right but not the obligation to buy an asset at some future time of its choosing. When a firm makes an irreversible investment expenditure, it exercises, or "kills," its option to invest. It gives up the possibility of waiting for new information to arrive that might affect the desirability or timing of the expenditure; it cannot disinvest should market conditions change adversely. This lost option value is an opportunity cost that must be included as part of the cost of investment.[4]

This is precisely relevant to the decision the Commission must make. Within SB3 waiting is not an option. However, proposals that meet the requirements of Section 18 of SB3 while simultaneously providing for optionality warrant strong consideration. Why? Because, as previously stated, the technological base of the electricity sector is expected to change rapidly and dramatically in the both the short- and long-run and because the growth of electrification will have immediate and unforeseen impacts.[5] But for technological change, the changing generation mix and the effects of electrification there would be little value to optionality.

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[3] Dixit, Avinash K., and Robert S. Pindyck, *Investment Under Uncertainty*. Princeton University Press. 1994. p. 3.

[4] Ibid, p 6.

[5] This point cannot be emphasized strongly enough. There is no reason to believe that electrification will proceed in a linear fashion, i.e., growing along a straight trend line. Rather electrification is more like to proceed according to a geometric/exponential path, in which case the effects and the need to accommodate will be felt suddenly and without adequate warning.

Discussion

Of the proposals that have been provided most do not recognize the value of optionality. As such, most are rooted in the simple NPV investment model in which there are three ways to incentivize new investment – increase expected revenues, decrease expected costs, and/or reduce uncertainty. This poses several important and direct questions/issues for the Commission:

- What is value of optionality with respect to the information needed to have the "right" investment in the electricity sector in ERCOT? If, the Commission believes that the electricity environment is, and will continue to be, dynamic then their choice of a structure should reflect this belief.
- A related concept is the extent to which a given proposal is "final" in that it results in investment that is irreversible. Thus, for example, once assets are built and contracts written it is (nearly) impossible to reverse course.
- If the Commission believes that future changes have the potential to be "revolutionary" as compared to "evolutionary" with respect to the existing state of the world, then locking in, i.e., incentivizing, investment that reflects the current state of the world will not only result in sub-optimal outcomes in the future but may actually be negative.
- Given the relationship between market outcomes and the characteristics of the underlying physical infrastructure (including the operational lifetime), the benefits and costs of each proposal should be made explicit and well understood.
- To the extent that competing proposals are mutually exclusive how will the Commission weight the various attributes to arrive at a decision?

Concluding Remarks

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[6] Assuming the market "works" the sunset clause will be unnecessary.

* Ron McNamara is an economist with over 30 years of experience in electricity and energy markets. A former academic economist at the University of Auckland (New Zealand), he was responsible for co-designing and then implementing, operating, and monitoring the New Zealand wholesale electricity market, which was the first nodal-based competitive wholesale electricity market in the world. The New Zealand nodal-based market design is the foundation for all the electricity markets in the United States as well as the markets in Alberta, Central America, Singapore, and the Philippines. Subsequently as the Vice President of Market Management and Chief Economist with the Midcontinent ISO (MISO) market he was responsible for all aspects of designing and then operating the market. He served as a state regulator in Queensland, Australia with responsibilities over the electricity, natural gas, and ports sectors. In addition to his work in the United States, New Zealand and Australia, he has been involved in projects in Georgia (the country) the Philippines, Ghana, Nigeria, Pakistan, East Africa (East Africa Power Pool), and Central America (CRIE/CDMER) and has advised government and industry officials from Italy, Georgia, Canada, China, Japan, Singapore, Malaysia, Indonesia, Viet Nam, Thailand, Lao PDR, Cambodia, the Philippines, Guatemala, Honduras, El Salvador, Costa Rica, and South Africa on open access and electricity market design, implementation, operation, regulation and monitoring.