

Are electricity markets “markets”?

Hi, welcome to this USAEE podcast, titled “are electricity markets markets?” My name is Gürcan Gülen. I am an energy economist with more than 25 years of international experience and a USAEE Senior Fellow. I have researched the restructuring of electricity sectors and performance of competitive markets across the world since the late 1990s. Working in Texas for 22 years, I paid close attention to the ERCOT market. This talk consists of excerpts from a report I published last year (titled [Net Social Cost of Electricity](#)). The text of this podcast enhanced with one graphic and links to numerous references will be available to listeners from the USAEE web site.

I’ll start by answering the question I posed in the title of this podcast. No, today’s electricity markets are not the competitive markets envisioned in the early days of industry restructuring. Many still call the dynamic mishmash of policies, regulations, and design changes with constant battles at regulatory agencies and courts “a market”. But, I cannot. When a growing share of investments and operational decisions are driven by out-of-market compensation rather than price signals, it is no longer possible to talk about a competitive market. Let me try to support this answer and offer an alternative to pseudo-markets of today.

Those who monitor the developments in the US electricity sector closely already know that organized electricity markets as well as traditional utilities face a policy-driven energy transition that threatens the financial sustainability of many businesses across the electric power value chain while helping others. This transition also causes concern about system reliability and stranded assets. There are many efforts to adapt the markets to out-of-market policies and to reform regulatory frameworks. Many of the solutions, however, start with a prescription on a preferred mix of available technologies rather than ultimate goals, such as lower emissions, affordable electricity and reliable service. Notably, solutions undervalue the role of consumers in reducing system costs and fueling true technology innovation.

The current environment of an uncoordinated, blunderbuss approach to energy policy across numerous jurisdictions has turned into a political competition of “leveling the playing field” for favorite technologies via subsidies and mandates. Many of these policies or associated market design changes lead to litigation. Recent threats by several states to leave the PJM market after FERC’s MOPR ruling is the latest example of the growing divergence between state policies and FERC’s defense of competitive market designs. Even the states in the same region do not always agree with each other. Unfortunately, this situation raises the cost of electricity to customers, increases uncertainty for market participants, and encourages further rent-seeking.

Let’s get into some details.

❖ First, let’s admit that market designs have been imperfect from day one. By definition, these are political failures, not failures of economic principles. Those defects especially relevant to current discussions in the electricity sector include the following:

1. Price caps undermined the price signals to market participants. Most regions established capacity markets while ERCOT eventually increased price caps and instituted ORDC to create additional incentives to generators.

2. Most consumers have not been allowed to respond to intraday dynamic price signals. Only recently, with the increasing popularity of DER and prosumer concepts, [dynamic pricing](#) regained some space in the policy debate.
 3. Externalities have not been incorporated into market prices. This policy failure turned out to be a fundamental reason for hundreds of diverse support programs that ended up disrupting the markets the most. On the other hand, it is not certain that pricing externalities would have prevented all of these programs as many are driven by local politics.
 4. Since the transmission and distribution (T&D) grid remains a regulated monopoly in restructured markets, investment in T&D is decoupled from generation investment decisions. This decoupling introduces inefficiencies into grid optimization and system cost management, especially with the rising penetration of remote intermittent and variable resources as well as demand-side resources. Notably, T&D utilities are incented to pursue unnecessary investments under cost-of-service ratemaking.
- ❖ Motivating these design handicaps is the long history of electricity as a public service. That mindset never allowed for electricity to be seen as another commodity by the public at large and, hence, by the policymakers. Vertically integrated, regulated utilities continue to generate, transmit, and distribute electricity in many jurisdictions that never restructured their electricity industry. Although most utilities are investor owned, public power still serves about one-third of electricity consumers in the US, including within the territories of organized markets.
 - ❖ Many states had (and continue to have) priorities other than market efficiency: local jobs and environmental improvements. Markets were not trusted to achieve these objectives because pricing environmental externalities, for example, would have increased the cost of electricity visibly. However, according to EIA-861 data, the retail cost of electricity, especially for residential and commercial customers, has been increasing in recent years (or, at best, remained stable) in most regions despite historically low wholesale electricity prices. What are the drivers of higher retail costs?
 - A plethora of uncoordinated, often conflicting or duplicative policies across jurisdictions increase overall costs but they also distort markets, and encourage rent-seeking. There are over 2,000 incentive programs of one kind or another across the country. Most listeners are probably familiar with federal production and investment tax credits, renewable portfolio standards (RPS), energy efficiency programs, feed-in-tariffs, net energy metering, and storage mandates but they come in many different flavors across states. And there are others. Many appear in customer bills as separate charges. Others increase the cost of wholesale electricity. For example, an [LBNL study](#) estimate the incremental cost of the RPS programs up to 4%. Not much but these costs would have been higher in the absence of federal tax credits which allows for [lower-priced PPAs and low-cost financing](#), which distort the wholesale markets. The Clean Energy Technology Center at the North Carolina State University tracks these programs. New ones are added constantly, such as the requirement of solar panels on new homes in California starting in 2020. New policies, regulations, or market design changes are needed to fix the problems created by the previous set of policies. There is no holistic benefit–cost analysis of these policies. Benefit–cost analyses of individual programs are insufficient to capture all dimensions and ripple effects across industry segments and over time.
 - Also, alternative technologies do not eliminate the need for conventional infrastructure although they change how they are utilized. In fact, [increasing penetration of wind and solar is dependent on the availability of a well-connected grid and sufficient dispatchable generation \(or storage\)](#). Since 2010, about \$200 billion dollars have been invested in the T&D infrastructure, [partially to facilitate integration of more renewable energy capacity](#). Some of these investments

- are certainly larger than needed, driven by the bias towards capital investments created by cost-of-service ratemaking for utilities. These costs find their way into electricity bills as T&D charges.
- And, intermittency and variability of wind and solar increase other system costs such as balancing, adequacy, “full-load hour reduction” and “overproduction”. For examples, encourage you to research negative prices due to wind in ERCOT, and CA paying neighboring states to buy its excess solar generation. As penetration of renewable energy increases, system costs also rise, and the market value of these technologies decline. There is a growing literature on system costs and on the related concept of market value of renewables. For examples see wind technology reports of LBNL and studies by [Hirth, Taming the Sun](#) by Varun Sivaram, and value-adjusted LCOE by the [IEA](#).
 - These are all important improvements on the misleading generic LCOE estimates. For example, why do renewables still need subsidies if they are already cheaper than conventional technologies according to LCOE estimates? In another podcast, I will talk about why today’s generic LCOE estimates are misleading and improvements on LCOE that capture regional variations, system costs, externalities and subsidies.
 - As the former president of the CPUC, Michael Picker, put it: “We have a renewables standard, and everybody is talking about 100 percent renewables, but that doesn't necessarily translate into GHG reductions....Should we go to a GHG reduction standard?...What does California really want from customer choice? Is it bright and shiny technology? Is it decarbonization? We need clarity on those questions to avoid the mistakes of 2000–2001.” These comments were made around the release of a [CPUC report in 2018](#), which highlighted the concerns of the regulator about reliability as a result of “dozens of different decisions and legislative actions” that are being implemented without a plan. Among others, two UC Berkeley economist, [Borenstein](#) and [Bushnell](#) have criticized California’s “try everything” approach repeatedly.
 - ❖ Coming back to today’s state of affairs, the fact is that an increasing amount of resources is supported by out-of-market compensation. Some receive multiple forms of such compensation. Nuclear plants are saved by state subsidies such as ZECs and even some coal plants are kept alive artificially. The main reasons are subsidized renewables that eat into their market shares and cheap natural gas, which lowers the price of electricity. This “leveling the playing field” actions require further market design changes. And the feedback loop continues.
 - For example, price formation and capacity market reforms have kept the FERC and stakeholders in several organized markets busy since the early 2010s. The ongoing saga of PJM reforms of its capacity and energy markets provides a good example of a cycle of confusion, litigation, and uncertainty. Now, three states consider leaving the PJM market.
 - ❖ An economic truism seen in many sectors across the world is that, once put in place, subsidies persist because they create interest groups and low-risk rent opportunities. They persistently undermine market price signals. Financial interests seeking short-term growth and secure returns in an otherwise uncertain policy and market environment pursue risk-mitigating incentives and perpetuate this policy volatility.
 - ❖ As such, I see no hope in saving competitive markets. But I must re-state that properly designed markets would have delivered more cost-effective and innovative solutions to both economic and environmental goals. But some of the current developments are ironic since they basically ask for fixing market design deficiencies I mentioned earlier, but, unfortunately, only in a piecemeal fashion.
 - For example, an increasing number of stakeholders and experts argue for allowing demand-side participation and dynamic pricing in order to promote a portfolio of technologies, such as smart appliances, energy management software, rooftop solar, battery storage, and the like.

- Energy markets without price caps (or, at least, with caps that represented the value of lost load) and widespread demand response based on dynamic prices would have encouraged technology developers to serve customer needs for managing energy consumption or self-generation with innovative technologies. Many pointed out that real-time pricing would have dampened the negative impacts of the California crisis in the early 2000s.
 - Behavioral adjustments by consumers would have eliminated unnecessary investment in peaking capacity as well as T&D infrastructure.
 - The building industry could have responded to customer demand for more efficient and energy-smart accommodations, providing an opportunity for large-scale change that would have attracted capital and talent into energy efficiency and conservation technologies and building designs.
- Another example is the resurgence of the call for a carbon tax. Economists are nearly unanimous in their support of pricing externalities as the most cost-effective and impactful solution to environmental problems. For example, the sulfur dioxide cap-and-trade market is commonly accepted as successful in reducing acid rain. Similarly, a tax on greenhouse gas (GHG) emissions is economists' preferred solution to tackle climate change. But it is politically unlikely because:
- First, the tax needs to be economy-wide since emissions from electricity generation accounts for only about 30 percent of total GHG emissions in the United States.
 - Second, the tax has to be global because emissions are global. This is highly unlikely to happen given the deterioration of global relations and failed record of past climate agreements. A border carbon adjustment tax can be used to prevent international free riders but that is yet another tax.
 - And it is too late to yield economic benefits and technological innovation because a GHG tax today will only add to the cost of existing programs unless those are eliminated.
 - It is useful to remember that the national RPS proposals failed in Congress. A well-designed national RPS would certainly have been more cost-effective than a multitude of state RPS programs because it would have encouraged the development of renewable facilities in best locations using cost-competitive technologies and the trading of RECs. For example, see The [Future of Solar Energy by MIT, Oliver and Khanna \(2018\)](#). But, states pursue local economic benefits such as job creation when they pursue RPS programs or other mandates. New England states cannot agree on a GHG tax or tightening the cap in the existing RGGI market. Politics is local after all.

In short, the de facto trend is away from competitive markets toward integrated resource planning (or IRP), but many market participants are feeling in limbo. Annual surveys of the electric utility industry by Black & Veatch and Utility Dive, among others, track the changing market, policy, and technology environment and register the growing concerns of utilities as well as their solutions for accommodating new technologies and customer expectations. Also, the realization of the higher cost of uncoordinated policies across states rather than regional grids may be spreading. ***Hence, there is an opportunity to marry best practices in regulated IRP with competitive market principles to achieve society's goals at least cost and faster. The new construct should minimize time-wasting and costly regulatory and legal clashes, and influence of rent-seekers.***

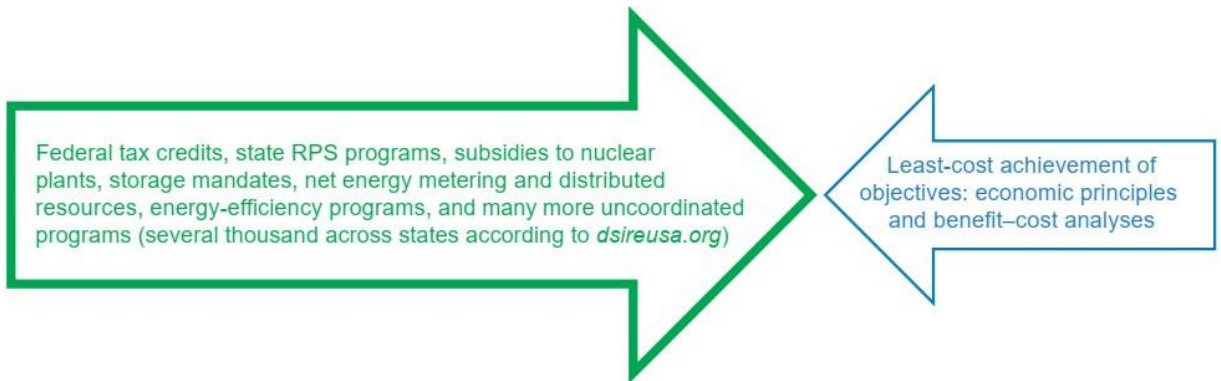
- A hybrid approach should mimic the efficiency of a proper market. Let's call it market-IRP, or a planned market (I provided a graphic on the last page of this document that compares the principles of the market-IRP to those of the traditional IRP and several competitive market designs). A holistic look at the overall electricity system is necessary to capture the value offered

by the T&D grid and demand-side participation. The least-cost option for achieving the objectives will differ across systems and can come from generation, T&D, demand response, or, most likely, a mix. I cannot emphasize enough the importance of making consumers an integral part of the electricity system.

- Time is opportune to take advantage of a large and growing portfolio of smart technologies and a growing demographic that is more comfortable with them. Many analysts and businesses advocate for customer choice and talk about the emergence of prosumers. But customer choice is a hollow concept unless consumers make decisions based on accurate price signals.
- Once system operators, regulators and other key stakeholders agree on the least-cost option, competitive procurement and performance-based ratemaking (rather than traditional cost-of-service ratemaking) should be pursued as appropriate. We should remember that the inefficiencies of cost-of-service regulation was a major driver of industry restructuring in the 1990s. There are already some experiments around the US with competitive procurement and performance regulation. The US is trailing some international advances in regulation by decades. So, there are lessons to be learned from them.
- However, there are several major obstacles, all political.
 - Policies have to be coordinated across states. The reliable and efficient flow of electricity across the transmission grid does not recognize state boundaries. Nor do the climate change or many other environmental problems.
 - An agreement on objectives is a must: lower emissions, affordability, and reliability come to my mind first but there may be others. And, as usual, the devil is in the details.
 - Technology-specific subsidies and mandates as well as antiquated policies such as PURPA must be eliminated.
- Unless these issues are resolved, the market-IRP would only add to the total cost of electricity in the US.

I hate to finish on a pessimistic note but I am afraid we will continue to muddle through combatively and continue to deliver electricity more expensively than it needs to be and even risk reliability at times. Fixing the competitive markets is unfortunately a political non-starter. And, there is too many vested interests to agree on a wholesale transition to an alternative such as the market-IRP. But hopefully I have been able to at least nudge some listeners to question the cost of the current confused state of affairs.

Thanks for listening.



Hypothetical competitive markets	ERCOT—most competitive market	Most common competitive markets	Market-IRP	Traditional regulated IRP
Energy-only	Energy-only	Energy plus capacity markets	IRP targets for generation mix, T&D, DER based on benefit-cost analysis; met via competitive bidding	Rate-based generation, T&D, DER, DSM, etc.
No out-of-market generation	Large out-of-market generation (federal tax credits, CREZ, state and local tax incentives, PPAs by munis and co-ops)	Extensive out-of-market generation (federal tax credits, state RPS, ZECs, PPAs, other state and local incentives)	No technology-specific subsidies	
Full demand-side participation via dynamic pricing	Large demand-side participation with limited TOU pricing	Limited demand-side participation with limited TOU pricing	Full demand-side participation via dynamic pricing	
Externalities priced into the market	No pricing of externalities	Some markets price some externalities (e.g., RGGI in the Northeast)	Externalities priced into the market	

Source: Gülen, G. (2019), *Net Social Cost of Electricity: Policy Smog and Waning Competitive Markets, Lack of Consumer Participation, Importance of the Grid and Scalability Challenge*, Bureau of Economic Geology Udden Series No.7, 86 p., 21 figs, 5 tables, doi.org/10.23867/US0007D.