IT'S TIME TO RECONSIDER SINGLE-CLEARING PRICE MECHANISMS IN U.S. ENERGY MARKETS

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I. INTRODUCTION

For more than two decades, American power markets[1] operated by regional transmission organizations (RTOs)[2] have used "single-clearing price" (SCP)

* Commissioner, Federal Energy Regulatory Commission (FERC or Commission). Commissioner, Virginia State Corporation Commission (2004-2021). This article benefitted from a plethora of good suggestions, valuable criticism, historical recollections and technical assistance from many, including the author's former colleagues at the Virginia State Corporation Commission, Judith Williams Jagdmann and James C. Dimitri, and members of the Christie office team at FERC, including Neil G. Yallabandi and Regine Baus. The views expressed herein, however, are solely those of the author and do not necessarily represent the views of commenters, nor do they represent the official position of the Commission. The author does not express any opinion herein on any specific formal matter currently pending before the Commission or that may come before the Commission in the future, and nothing herein should be so interpreted.

1. Kathryne Cleary & Karen Palmer, *U.S. Electricity Markets 101*, RES. FOR THE FUTURE (Mar. 17, 2022), https://www.rff.org/publications/explainers/us-electricity-markets-101/. This article focuses on three major types of U.S. power markets. Described in more detail below, they include (i) real-time energy markets, in which physical electrical power is traded in real time, (ii) day-ahead markets, in which prices and commitments for next-day delivery of electrical power are traded, and (iii) capacity markets, in which promises to deliver power resources in the future, are sold, bought and priced.

2. "RTOs" are the regional transmission organizations that meet the criteria set forth in Final Rule, *Regional Transmission* Organizations, 65 Fed. Reg. 810 (1999) (to be codified at 18 C.F.R. pt. 35), Order No. 2000, FERC Stats. & Regs. ¶ 31,089 (1999) (cross-referenced at 89 FERC ¶ 61,285), *order on reh'g*, Order No. 2000-A, FERC Stats. & Regs. ¶ 31,092 (2000) (cross-referenced at 90 FERC ¶ 61,201), *aff'd sub nom.* Pub. Util. Dist. No. 1 of Snohomish Cty. v. FERC, 272 F.3d 607 (D.C. Cir. 2001); *see also* Morgan Stanley Cap. Grp. Inc. v. Pub. Util. Dist. No. 1, 554 U.S. 527 (2008) [hereinafter Order No. 2000]. Herein the term "RTO" also includes the single and multi-state Independent System Operators (ISOs) that qualify under Order No. 2000.

mechanisms. Such mechanisms are also used in power markets in the United Kingdom, Europe, Asia and other parts of the world.[3]

A single-clearing price mechanism broadly means that all sellers offering power or a power-related service receive the same clearing price. This clearing price is the *highest* price that it takes to meet full demand. As a result, sellers that have offered to sell at prices lower than the clearing price, including those offering at zero or even below zero due to out-of-market subsidies, still receive the highest clearing price. As consumers' power bills continue to rise, however, both the EU and UK are reconsidering whether the continued use of SCP mechanisms is in the best interests of hard-pressed consumers and whether changes to pricing structures need to be made to give consumers the full potential cost savings available from low to zero marginal cost resources.[4] Some experts experienced in RTO markets in the United States have recently begun questioning the continued use of single-clearing price mechanisms in American power markets as well.[5]

This article makes several arguments:

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3. *Action and measures on energy prices*, EUROPEAN COMM'N, https://energy.ec.europa.eu/topics/markets-and-consumers/action-and-measures-energy-prices_en ("The wholesale market in the EU is a system of marginal pricing, also known as pay-as-clear market, where all electricity generators get the same price for the power they are selling at a given moment. . . . The bidding goes from the cheapest to the most expensive energy source. The cheapest electricity is bought first, next offers in line follow. Once the full demand is satisfied, everybody obtains the price of the last producer from which electricity was bought."). On February 8, 2023, the author discussed with members and staff of the Central Electricity Regulatory Commission of India the use of SCP mechanisms in Indian power markets.

4. *See* Alice Hancock & Richard Milne, *Brussels plans energy market overhaul to curb cost of renewables*, FIN. TIMES (Jan. 1, 2023), https://www.ft.com/content/9c92f25d-26ee-40ae-b043-eb6cd7a22211 ("Brussels plans to overhaul the bloc's electricity market to prioritise cheaper renewable power . . . the commission suggests making renewable power more reflective of its 'true production costs', given that once the infrastructure is built, the energy source for a wind farm or solar array is essentially free."). *See also* Natalie Thomas, *UK looks to break link between soaring gas and power prices*, FIN. TIMES (Oct. 1, 2022), https://www.ft.com/content/b47e542c-de63-4f49-8ec6-9a459d28fe97 ("Pricing in Britain's wholesale electricity market, like on the continent, is based on 'short-run marginal costs.' Every electricity generator puts a bid in but the daily market price is set at the level that ensures there will be sufficient supply to meet demand. In other words, the price is always set by the most expensive plant . . . ."); John Norris & Rich Heidorn Jr., *EU Retreat from Competition, Ukraine Conflict Seen Impacting US Energy Markets*, RTO INSIDER (Sep. 19, 2022), https://www.rtoinsider.com/articles/30796-eu-retreat-competition-ukraine-conflict-impacting-us-energy-markets ("Europe appears to be retreating from electric competition and single-price clearing auctions, trends that could spread to the U.S., MIT professor Michael Mehling told the Independent Power Producers of New York. . . ."); Kate Abnett, *EU sets sights on energy market reform as prices soar*, REUTERS (Aug. 30, 2022), https://www.reuters.com/business/energy/eu-sets-sights-energy-market-reform-prices-soar-2022-08-30/ ("In the current system the EU wholesale electricity price is set by the last power plant needed to meet overall demand. Gas plants often set that price, which countries including Spain have said is unfair because it means cheap renewable energy is sold at the same price as costlier fossil fuel-based power.").

5. Tony Clark & Vincent Duane, STRETCHED TO THE BREAKING POINT RTOS AND THE CLEAN ENERGY TRANSITION, WILKINSON BARKER KNAUER, LLP (2021), https://wbklaw.wpenginepowered.com/wp-content/uploads/2021/07/Wholesale-Electricity-Markets-White-Paper-07.08.21.pdf (Clark is a former FERC commissioner and Duane was senior vice president of law, compliance and external affairs at PJM for many years); *see also* Bernard L. McNamee, *Time to Update Wholesale Electric Markets – But Don't Forget the Benefits of Traditional Utility Regulation*, REAL CLEAR ENERGY (Apr. 8, 2021), https://www.realclearenergy.org/articles/2021/04/08/time_to_update_wholesale_electric_markets__but_dont_forget_the_benefits_of_traditional_utility_regulation_771956.html. McNamee is also a former FERC commissioner.

First, that it is timely for the United States to join the UK and EU in a comprehensive reconsideration of the pricing mechanisms used in our power markets and to ask whether those pricing mechanisms can or will, in the future, deliver the best combination of cost savings and reliable power supply to consumers. It is especially timely to ask, as the EU is asking, whether single-clearing price mechanisms are best suited to deliver to consumers all of the potential cost savings from the increasing deployment of heavily subsidized, very low to below-zero marginal-cost resources such as wind and solar.[6]

Second, that the need for this reconsideration of pricing mechanisms should focus immediately on capacity markets. These constructs are critically important not only because of their impact on the costs consumers pay for power resources, but on the reliability of the power grid itself. Indeed, it is past time to reconsider whether such constructs, certainly those in the large, multi-state RTOs, are still capable of performing the important duties expected of them.

Third, that the reconsideration of SCP mechanisms in our power markets should not be limited to capacity markets. Unlike capacity markets, real-time energy and day-ahead markets use a different single-clearing price mechanism, the very granular SCP mechanism called Locational Marginal Pricing (LMP). While acknowledging that there are serious arguments in favor of continued use of the LMP mechanism in certain markets,[7] the article asserts that such arguments should not prevent an open-minded consideration of equally serious arguments made against continued use of single-clearing price mechanisms in U.S. power markets, including the practical question whether LMP itself, which may be effective in some scenarios, can continue to deliver what it promises under today's conditions.[8] Because of the vital role played by the real-time and day-ahead markets in balancing supply and demand, a rigorous reconsideration of SCP mechanisms such as LMP must proceed with care and caution, but it should proceed and it should not come with preconditions as to what can be reconsidered and what cannot be.

Fourth, the article emphasizes that any serious reconsideration of power market pricing mechanisms must include examining the broader historical context in

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6. Norris & Heidorn, *supra* note 4 ("[MIT professor Mehling] said [e]conomists and policymakers must determine whether single-price clearing markets still make sense as the fuel mix shifts to one dominated by low variable cost renewables that often produce negative prices.").

7. William W. Hogan, *Electricity Market Design and Zero-Marginal Cost Generation*, SPRINGER (Feb. 24, 2022), https://link.springer.com/article/10.1007/s40518-021-00200-9; Scott Harvey & William Hogan, *Locational Marginal Prices and Electricity Markets*, LMP MKT. DESIGN (Oct. 17, 2022), https://lmpmarketdesign.com/papers/locational_marginal_prices_and_electricity_markets_hogan_and_harvey_paper_101722.pdf. Hogan is the Raymond Plank Research Professor of Global Energy Policy, John F. Kennedy School of Government, Harvard University. *Id*. He is one of the world's leading experts on power market design and in whose Kennedy School seminars the author has frequently enjoyed participating and learning. *Id.* Harvey is a consultant with FTI Consulting and a member of the California ISO/Western EIM Market Surveillance Committee. *Id.*

8. Clark & Duane, *supra* note 5.

which they were adopted, as they were key features of the power industry "deregulation"[9] movement of the late 1990s and early 2000s. Reconsidering these pricing mechanisms thus requires a candid reassessment of the assumptions that drove deregulation and whether those assumptions still apply to present reality. The use of single-clearing price mechanisms was integral to deregulation with its establishment of RTOs and RTO power markets. These "markets," however -- despite the label -- have never have been true markets, but rather administrative constructs with some market characteristics.[10] The questions about SCP mechanisms raised in this article cannot be divorced from the question whether these markets were based on deregulation assumptions that may no longer be valid, if they ever were.

Fifth, the article also emphasizes that, for those defending current single-clearing price mechanisms, it is not enough to argue purely from economic "textbook" theory and ignore the present realities driving market operations and results, especially in the large, politically diverse, multi-state RTOs.[11] Even the most ardent advocates of RTO markets admit that certain public policies, especially subsidies, that have been widely adopted since the advent of those markets, are antithetical to their efficient operation.[12] So any serious reconsideration of single-clearing price mechanisms cannot be confined to textbook economic theory, but must take into account how public policies have distorted the pricing mechanisms in RTO power markets that use marginal costs to determine outcomes and how these policies are likely to continue to do so. For if prices are the "keys to the RTO kingdom . . . what happens when price is no longer an effective tool for fulfilling the tasks that RTOs were created to complete?"[13]

So a serious reconsideration will evaluate how the messy real world of conflicting policies and politics, especially in the large, multi-state RTOs, affects their abilities to operate markets that deliver just and reasonable rates to consumers[14] and promote reliability.

Similarly, and especially with regard to capacity markets, a consideration of alternatives should ask whether accountability to the public in a democratic system is best served when it is elected state policy-makers and state regulatory authorities

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9. A note about terminology: What took place during this period was not the "deregulation" of a previously regulated electric power industry, similar to what took place with airlines, trucking and railroads in the 1970s, but a replacement of one heavily regulated construct with different ones. "Restructuring" is a more accurate term and came to replace the term "deregulation" as this fact became obvious. Nevertheless, for consistency, this article uses the term "deregulation" throughout. *See infra*, note 10.

10. Another note about terminology: This article uses the short-hand term "markets" for these administrative constructs known as RTO power markets, but the use of the term "markets" does not change the assertion herein that these are administrative constructs with some market characteristics, not true markets. As with the term "deregulation," the use of the term "markets" has always been more of a branding exercise by advocates than an accurate description, an exercise that George Orwell would recognize. *See supra*, note 9.

11. "[LMP] is the . . . *textbook* ideal that *should* be the target for policy makers." Hogan, *supra* note 7, at 17 (emphasis added).

12. *Id.* at 20 ("Subsidies produce unintended consequences and undermine the incentives provided by markets. . . . 'Subsidies are contagious. Competition in the markets could be replaced by competition to receive subsidies.'") (internal citation omitted).

13. Clark & Duane, *supra* note 5, at 1.

14. Federal Power Act, 16 U.S.C. § 824d (2018); *see also* 16 U.S.C. § 824e (2005).

who have the clear and acknowledged responsibility to ensure their load-serving utilities have sufficient power resources to meet demand at prices consumers can afford, not RTO managers, RTO market participants and RTO member interest groups.[15]

Finally, as in any debate on a major issue of public policy, the most important question always evokes the Henny Youngman punch line "compared to what?" That is because choosing public policies *always* involves tradeoffs and any criticism of one policy must consider criticisms of alternative policies. So any serious reconsideration of single-clearing price mechanisms in U.S. power markets must evaluate just as critically the alternatives and their advantages and disadvantages. Without providing specific answers to the questions raised herein, the article asserts that the need to consider them is timely and compelling.

II. WHAT IS A SINGLE-CLEARING PRICE MECHANISM?

One of the most succinct and understandable descriptions of single-clearing price mechanisms and how they work in power markets is found in a U.S. Supreme Court opinion written by Justice Elena Kagan. It is worth quoting liberally herein. Referring to RTO power markets, Justice Kagan wrote:

> These wholesale auctions serve to balance supply and demand on a continuous basis, producing prices for electricity that reflect its value at given locations and times throughout each day. Such a real-time mechanism is needed because, unlike most products, electricity cannot be stored effectively. Suppliers must generate— every day, hour, and minute—the exact amount of power necessary to meet demand from the utilities and other "load-serving entities" (LSEs) that buy power at wholesale for resale to users. To ensure that happens, wholesale market operators obtain (1) orders from LSEs indicating how much electricity they need at various times and (2) bids from generators specifying how much electricity they can produce at those times and how much they will charge for it. *Operators accept the generators' bids in order of cost (least expensive first) until they satisfy the LSEs' total demand. The price of the last unit of electricity purchased is then paid to every supplier whose bid was accepted, regardless of its actual offer* . . . .[16] So, for example, suppose that at 9 a.m. on August 15 four plants serving Washington, D. C. can each produce some amount of electricity for, respectively, $10/unit, $20/unit, $30/unit, and $40/unit. And suppose that LSEs' demand at that time and place is met after the operator accepts the three cheapest bids. *The first three generators would then all receive $30/unit.* That amount is (think back to Econ 101) the marginal cost—i.e., the added cost of meeting

15. FERC regulates RTOs and RTO markets to ensure just and reasonable rates to consumers, but FERC has no authority to order a load-serving public utility to build a specific generation facility, only states can. 16 U.S.C. § 824; *see also* Hughes v. Talen Energy Mktg., 578 U.S. 150, 154 (2016) ("The States' reserved authority includes control over in-state 'facilities used for the generation of electric energy.'" (quoting 16 U.S.C. § 824(b)(1)); 16 U.S.C. § 824o(a)(3) ("The term 'reliability standard' means a requirement, approved by the Commission under this section, to provide for reliable operation of the bulk-power system. The term includes requirements for the operation of *existing bulk-power system facilities*, including cybersecurity protection, and the design of planned additions or modifications to such facilities to the extent necessary to provide for reliable operation of the bulk-power system, but the term does *not* include any requirement to enlarge such facilities *or to construct new transmission capacity or generation capacity*.") (emphasis added).

16. FERC v. Elec. Power Supply Ass'n, 577 U.S. 260, 268 (2016) (emphasis added).

> another unit of demand—which is the price an efficient market would produce.[17] FERC calls that cost (in jargon that will soon become oddly familiar) the locational marginal price, or LMP.[18]

This is as good a basic description for non-lawyers and non-economists as one will find as to how a single-clearing price mechanism works. Justice Kagan is describing a specific SCP mechanism, LMP, which is used in American real-time and day-ahead power markets. RTO capacity markets, it should be noted, use single-clearing price mechanisms but do not use LMP, as we will discuss below.

The Harvey-Hogan paper, which strongly advocates for the continued use of the single-clearing price mechanism of LMP in real-time and day-ahead markets, offers additional detail about how this mechanism specifically works:

> [LMP] has two important characteristics. First, the prices are calculated from the system operator's actual operational security constrained economic dispatch solution for balancing load and generation. LMP prices support balanced supply and demand at each location and account for market participants bids and offers, the physical constraints of the transmission system and physical constraints on resource operation such as upper operating limits, and ramp rates. Second, LMPs settlements are based on market clearing prices, as opposed to pay-as-bid pricing designs used to determine . . . payments in non-LMP pricing systems. . . . A crucial element of LMP pricing is that it settles all resource injections and withdrawals at the same location at the same point in time at the same market clearing spot price. . . .
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> In LMP markets, prices can vary by location at each interconnection point (node) on the transmission system and by time in five-minute increments.[19]

The single-clearing price mechanism of LMP has three elements: an energy charge, a congestion charge and a charge for transmission system energy losses. Consequently, LMP can and usually does vary substantially across the RTO based on the presence of transmission constraints that prevent lower-cost generation from being dispatched.[20] These transmission elements in LMP can be valuable metrics in assisting RTO transmission planners: "[w]hen there are transmission constraints, the highest variable cost unit that must be dispatched to meet load within transmission-constrained boundaries will set the LMP in that area. All sellers receive the LMP for their location and all buyers pay the price for their location."[21]

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17. *Id.* (citing Alfred E. Kahn, The Economics Of Regulation: Principles And Institutions 65-67 (John Wiley & Sons, Inc., 1971).

18. *Id.* (emphasis added). While giving appropriate kudos to Justice Kagan, in her more extensive explanation of RTO markets she also relied upon FERC's own Energy Primer as a key source for her explanation. *Id*. at 267-68 (citing FERC, ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS 58–59 (2015), https://www.ourenergypolicy.org/wp-content/uploads/2016/01/energy-primer.pdf). If it's good enough for Justice Kagan, it's good enough for the author, who will rely on the latest version of the ENERGY PRIMER, published in April 2020, herein. FERC, ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS (2020), https://www.ferc.gov/sites/default/files/2020-06/energy-primer-2020_0.pdf.

19. Harvey & Hogan, *supra* note 7.

20. ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS, *supra* note 18, at 64.

21. *Id*. at 65. See also Scott Miller, *Not 'sick or dying or dead': The great benefit of RTOs,* UTILITY DIVE (Mar. 23, 2023), https://www.utilitydive.com/news/rto-iso-benefits-regional-transmission-west/645776/

III. SCP'S CRITICAL ROLE IN THE DEREGULATION OF THE POWER INDUSTRY

Reconsideration of the use of single-clearing price mechanisms cannot be separated from an examination of what was called the deregulation[22] of the power industry during the 1990s and early 2000s,[23] because the use of such price mechanisms was a vital feature of the economic theory that underpinned deregulation and the RTO power markets created to implement it.

Deregulation was considered the textbook solution to the cost overruns of rate-based generation assets in the 1970s and 1980s, especially nuclear units.[24] During the movement's heyday in the late 1990s and early 2000s, deregulating states ordered their vertically integrated electric utilities to divest generation assets completely or at least "functionally separate" those assets into a separate generating company (a/k/a "genco") within a holding company structure.

The economic theory driving restructuring was that the wires network, which includes transmission and distribution components, was a natural monopoly and

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("The grid that is dispatched as a network based on a Security Constrained Economic Dispatch (SCED) is very different from a grid based on the limitations of the contract path . . . . Thus, the RTO dispatch reveals transmission upgrades based on a fully utilized grid revealing areas of congestion on a larger view."); *Cf.* Clark & Duane, *supra* note 5, at 8-10 (discussion of the use of LMP in transmission planning).

22. *See supra* notes 9-10 (re terminology).

23. There were, of course, some antecedents to the deregulation movement of the 1990s. FERC's actions during that era were rooted, at least in part, in earlier legislative and regulatory efforts intended to use competition to protect consumers from exercises of market power by monopoly utilities. The literature recounting the history is voluminous and to recount it all here would be the fish that swallowed the whale. Among the most informative and well-written accounts are: Hon. Joseph T. Kelliher, *Market Manipulation, Market Power, and the Authority of the Federal Energy Regulatory Commission*, 26 ENERGY L.J., 1, 5-11 (2005) (Kelliher is a former member and chairman of FERC); Harvey Reiter, *The Contrasting Policies of the FCC and FERC Regarding the Importance of Open Transmission Networks in Downstream Competitive Markets*, 57 FED. COMM. L.J. 243, 255-61 (2005) (detailing the history of efforts to open up access to transmission assets prior to Order No. 888); Harvey Reiter, *Competition and Access to the Bottleneck: The Scope of Contract Carrier Regulation under the Federal Power and Natural Gas Acts*, 18 LAND AND WATER L. REV. 1, 3-10 (1983) (which was prescient in forecasting and advocating for the type of open access to monopoly-owned transmission networks that was enacted in FERC Order No. 888 over a decade later - both Kelliher and Reiter 2005 highlight the important role of the Public Utility Regulatory Policy Act (PURPA), Pub. L. 95-617, 92 Stat. 3117 (Nov. 9, 1978) in laying the groundwork for the deregulation of the 1990s, because PURPA required monopoly utilities to purchase power, under certain circumstances, from a new class of generators which were not owned by the utility). For a well-written and persuasively critical view of deregulation's early phase, including FERC's role, *see* Tyson Slocum, *The Failure of Electricity Deregulation: History, Status and Needed Reforms,* FED. TRADE COMM'N (Mar. 2007), https://www.ftc.gov/sites/default/files/documents/public_events/Energy%20Markets%20in%20the%2021st%20Century:%20Competition%20Policy%20in%20Perspective/slocum_dereg.pdf.

24. *The Contrasting Policies of the FCC and FERC Regarding the Importance of Open Transmission Networks in Downstream Competitive Markets*, *supra* note 23, at 251; *see* Mark C. Christie, *Economic Regulation in the United States: The Constitutional Framework*, 40 U. RICH. L. REV. 3, 949, 968-69 (2006) (providing a discussion of the famous (at least among utility lawyers) U.S. Supreme Court opinion in *Duquesne Light Co. v. Barasch*, 488 U.S. 299 (1989) which arose out of this era and involved denial of cost recovery through rate base of the pre-construction costs for proposed but never completed nuclear power plants in Pennsylvania). *Duquesne Light* is probably the most recent time the Supreme Court evaluated those ubiquitous terms "just and reasonable" rates in the context of a Takings Clause claim under the Fifth Amendment. *See generally* 488 U.S. 299.

should remain regulated under the long-used cost-of-service model.[25] By the 1990s, for a variety of reasons, including the development of highly efficient combined-cycle gas turbine generators, there was general agreement that generation was no longer a natural monopoly.[26] So deregulation advocates argued that generators should be subjected to a competitive marketplace and seek their revenues through efficient operation and economic dispatch, not from the guaranteed revenue stream provided in rate base.[27] In response, states passing deregulation laws generally required the incumbent utility's generation resources to give up the guaranteed revenues that came from including generation assets in rate base. Instead, generation assets were required to seek revenues in newly-established RTO power markets, where they would compete with independent power producers (a/k/a "merchant generators"). According to the theorists, the most efficient generators would be winners in this competition for revenues, whether utility-owned or independent. The inefficient generators, denied guaranteed funding from rate basing, would be the losers and be forced to retire. All risk would be shifted from consumers to investors, or so the theory went.

FERC was no passive bystander in the deregulation movement; on the contrary, arguably FERC launched it with Order No. 888,[28] which required all jurisdictional public utilities to make their transmission assets available for interconnection and use by generators without regard to whether generators were utility-owned or independent. While Order No. 888 was within FERC's jurisdiction and consistent with a history of promoting competition,[29] there were undeniable tradeoffs. It created enormous pressure on states to deregulate. Generators in one state, both merchant and utility-owned, could now use their access to interstate transmission to undercut another state's regulated utilities which owned rate-based units *that customers had to pay for whether they dispatched or not*. This new reality created by Order No. 888 undermined both state regulators' authority over

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25. *Competition and Access to the Bottleneck: The Scope of Contract Carrier Regulation under the Federal Power and Natural Gas Acts*, *supra* note 23, at 8 ("the transmission of electric power is generally acknowledged to possess natural monopoly characteristics") (citing James Meek, *Concentration in the Electric Power Industry: The Impact of Antitrust Policy*, 72 COLUM. L. REV. 64 (1972)). There remains debate to the present day whether transmission, which includes both regional and local elements, is a natural monopoly. This article takes no position on that issue.

26. Kelliher, *supra* note 23, at 5-6.

27. "Rate base" is a term from cost-of-service regulation. Load-serving utilities are allowed to put assets (distribution, transmission and generation) into "rate base" and then recover in rates paid by customers depreciation costs over the lives of the assets, as well as a profit on the value of the assets in the form of return on equity, referred to in shorthand as "ROE." The setting of ROE is often the most important and contentious issue in a rate case.

28. Order No. 888, *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services. by Pub. Utils.; Recovery of Stranded Costs by Pub. Utils. & Transmitting Utils.*; 75 FERC ¶ 61,080 (1999) ; *order on reh'g*; 78 FERC ¶ 61,220 (Order No. 888-A);, *order on reh'g*; 81 FERC ¶ 61,248 (1997) (Order No. 888-B); , *order on reh'g*,; 82 FERC ¶ 61,046 (1998) (Order No. 888-C), *aff'd in relevant part sub nom.;* Transmission Access Pol'y Study Grp. v. FERC, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom.;* New York v. FERC, 535 U.S. 1 (2002).

29. *Competition and Access to the Bottleneck: The Scope of Contract Carrier Regulation under the Federal Power and Natural Gas Acts*, *supra* note 23, at 3*; see also* Kelliher, *supra* note 23, at 1.

their own state utilities' resource planning and their ability to seek the optimal balance between generation and transmission costs.[30]

FERC then pushed way beyond Order No. 888. In the much more intrusive Order No. 2000, issued in 1999,[31] FERC created modern RTOs and shifted the deregulation movement into overdrive. Order No. 2000 made it crystal clear that FERC wanted *all* state-regulated public utilities to join federally-regulated RTOs.[32] This new goal expanded from ensuring open access to transmission assets to transferring effective control over those assets to the RTOs.[33] Just as significantly, pushing all utilities into RTOs meant that the transmission *planning function* itself was removed from the state-regulated public utilities and thus simultaneously removed from oversight by state regulators.

Transferring responsibility for transmission planning to the RTOs, even in states in which utilities remained vertically integrated, made it far more difficult, if not impossible, for state regulators to oversee effectively and comprehensively their state utilities' planning and construction of transmission, distribution and generation facilities, known as integrated resource planning, or "IRP." Overseeing the IRP process had long been one of the states' most effective tools for ensuring just and reasonable *retail* rates and reliable service, the two chief goals of state utility regulation. The IRP process enabled state regulators to balance the need for one type of proposed resource, be it generation, transmission, distributed energy or demand-side, against other alternatives, potentially of lower cost.[34]

In addition to taking over the transmission planning function from the utilities and their state regulators, the RTOs created under Order No. 2000 were charged with operating the regional power markets that were integral to deregulation and which would use single-clearing price mechanisms.[35]

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30. Slocum, *supra* note 23 at 3-4 ("Reliable planning and operation of a bulk supply system requires full coordination between generation and transmission and this functional separation made coordination much more difficult . . ."). Another one of the legacies of Order No. 888 has received much less attention but may have affected consumer costs significantly. The unbundling of transmission assets from distribution and generation meant that most rate regulation of transmission costs was transferred from state regulatory authorities to FERC, which offered transmission owners the formula-rate recovery mechanism. Formula rates are procedurally much more attractive to the transmission owner, and often much more generous than most state rate recovery mechanisms, in which the utility bears the burden of proving that costs are reasonable and prudent. The consequences of this transfer of rate authority to FERC and its impact on transmission costs to consumers are not the subject of this article, but they deserve one.

31. Order No. 2000, *supra* note 2.

32. *Id.*

33. *Id.* Order No. 2000 said its goal was "for *all transmission-owning entities in the Nation*, including non-public utility entities, to place their transmission facilities *under the control of the appropriate RTOs*." *Id.*

34. McNamee, *supra* note 5 ("In traditionally regulated markets, investor-owned utilities submit detailed integrated-resource plans that explain how they will meet future electric needs through a mix of generation resources.").

35. *Wholesale Electricity Markets and Regional Transmission Organizations*, AM. PUB. POWER ASS'N, https://www.publicpower.org/policy/wholesale-electricity-markets-and-regional-transmission-organizations.

While Order No. 2000 clearly intended that all public utilities would join the new RTOs, its text was not explicitly mandatory.[36] Many state-regulated utilities in the Southeast and West resisted doing so. In response, just a few years after Order No. 2000, FERC proposed *mandatory* RTO membership for *all* state-regulated public utilities, in its misbegotten Standard Market Design proposal.[37] After sparking a firestorm of opposition in Congress and from state officials, this proposal crashed and burned.[38] It was perceived – accurately -- as a glaring and ill-considered example of federal hubris and encroachment on the states' core retail-rate regulatory authorities, which are essential to regulation in the public interest.

Standard Market Design was "the bridge too far" that reversed the momentum of deregulation. Most states that deregulated did so before 2005, with various forms being adopted. Some early adopters went as far as full retail choice in which retail customers could choose among different, allegedly competitive, retail power marketers, and load-serving utilities were required to divest their generating assets.[39] Other states retained the monopoly model for retail sales to end-user customers but required their incumbent load-serving utilities to obtain power and capacity in RTO markets.[40] Some others reversed course before full retail choice was implemented and returned to the vertically-integrated, cost-of-service model, albeit within an RTO, with utilities still owning generation assets.[41]

As both the history of Order No. 2000 and the Standard Market Design proposal demonstrate, participation by utilities in RTOs was an integral part of the deregulation agenda and serves as a rough proxy for whether a state deregulated, at least in some form or degree. Deregulation was always about much more than whether a state's load-serving utilities shopped for power supply in power markets, but in those markets the use of SCP mechanisms has always been a key feature.

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36. *Electricity Markets – 101*, NAT'L GOVERNORS ASS'N, https://www.nga.org/electricity-markets/#:~:text=FERC%20Order%202000%20encouraged%20utilities,is%20owned%20by%20non%2Dutilities.

37. Request for comments, *Remedying Undue Discrimination through Open Access Transmission Service and Standard Electricity Market Design*, Notice of Proposed Rulemaking, FERC Stats. & Regs. ¶ 32,563 (2002), 67 Fed. Reg. 76,122 (2002).

38. Order terminating proceeding, *Remedying Undue Discrimination through Open Access Transmission Service and Standard Electricity Market Design*, 112 FERC ¶ 61,073 (2005). Mandatory RTO membership was proposed by a Commission under a chairman appointed by President George W. Bush, so FERC's role in pushing its regulatory reach too far, from the ill-conceived federal overreach in Order No. 2000 during the Clinton administration into the even more sweeping Standard Market Design proposal during the second Bush administration, was certainly bipartisan.

39. FED. TRADE COMM'N, COMPETITION AND CONSUMER PROTECTION PERSPECTIVES ON ELECTRIC POWER REGULATORY REFORM: FOCUS ON RETAIL COMPETITION (2001), https://www.ftc.gov/sites/default/files/documents/reports/competition-and-consumer-protection-perspectives-electric-power-regulatory-reform-focus-retail/electricityreport.pdf; *see also* Slocum, *supra* note 23; *see also* Borenstein & Bushnell, *infra* note 56.

40. *Id.*

41. Virginia provides such an example. 2007 Va. Acts ch.. 933 (April 4, 2007).

IV. DEREGULATION AND CONSUMER COSTS

Whether the deregulated models overall have, in practice, been better for consumers than the state-regulated, cost-of-service constructs may still be a matter of debate,[42] but there is persuasive evidence that deregulation provided no real cost savings to consumers; indeed, the empirical data available suggests that it actually has made power more costly for consumers in deregulated states.[43] Data from the U.S. Energy Information Administration and other sources has consistently showed a general pattern of *higher* residential electricity rates in most RTO states than in non-RTO states.[44] Since RTO participation was integral to deregulation, comparing rates in RTO and non-RTO states provides relevant context to a reconsideration of the pricing mechanisms that are also part of deregulation's legacy.[45]

Further, the question whether deregulation itself has actually saved consumers money is obviously relevant to any reconsideration of SCP mechanisms, since deregulation was advocated as a way to reduce costs to consumers, as well as shifting risk to investors.[46]

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42. James Downing, *After a Quarter Century, Industry Experts Still Split on Restructuring*, RTO INSIDER, (Jan. 17, 2023), https://www.rtoinsider.com/articles/31446-after-quarter-century-industry-experts-split-restructuring.

43. Alexander McKay & Ignacia Mercadal, *Deregulation, Market Power, and Prices: Evidence from the Electricity Sector*, MIT CTR. FOR ENERGY AND ENV'T POL'Y RES. (Apr. 2022), https://ceepr.mit.edu/workingpaper/deregulation-market-power-and-prices-evidence-from-the-electricity-sector/ ("We find that the increase in markups dominates despite modest efficiency gains, leading to *higher consumer prices and lower consumer welfare* [from deregulation].") (emphasis added); *see* Penn, Ivan, *Why Are Energy Prices So High? Some Experts Blame Deregulation*, N.Y. TIMES, (Jan. 4, 2023), https://www.nytimes.com/2023/01/04/business/energy-environment/electricity-deregulation-energy-markets.html ("Average retail electricity costs in the 35 states that have partly or entirely broken apart the generation, transmission and retail distribution of energy into separate businesses *have risen faster than rates in the 15 states that have not deregulated*. . . . That difference has persisted for much of the last two decades or so. . . . On average, *residents living in a deregulated market pay $40 more per month for electricity* than those in the states that let individual utilities control most or all parts of the grid. *Deregulated areas have had higher prices as far back as 1998*." (emphases added)); *see also* Scott Patterson & Tom McGinty, *Deregulation Aimed to Lower Home-Power Bills - For Many, It Didn't*, WALL STREET J. (Mar. 8, 2021), https://www.wsj.com/articles/electricity-deregulation-utility-retail-energy-bills-11615213623 ("Retail energy companies compete with local utilities to give consumers more choice. *But in nearly every state where they operate, retailers have charged more than regulated incumbents, a Wall Street Journal analysis found*.") (emphasis added)); Slocum, *supra* note 23, at 5-6. While not the subject of this article, one reason deregulation may have provided no cost savings to consumers is because many states already had relatively low rates under their traditional cost-of-service models, so there was nothing for deregulation to "fix." And it may have increased costs for consumers in deregulated states because by removing authority over transmission planning from states to RTOs, state regulators could no longer conduct integrated resource planning that balanced the costs of generation, transmission and other resources and sought the most cost-effective mix.

44. *State Electricity Profiles, Data for 2021*, U.S. ENERGY INFO. ADMIN. (Nov. 10, 2022) https://www.eia.gov/electricity/state/unitedstates/.; *see* Robert Mullin & James Downing, *A 'Deregulation' Debate by the Numbers*, RTO INSIDER (Jan. 16, 2023), https://www.rtoinsider.com/articles/31452-a-deregulation-debate-by-the-numbers ("McCullough contends that prices in RTO areas can be more sensitive to [price spikes] because RTOs rely on the single market clearing price mechanism to set prices, as opposed to the 'price-as-bid' nature of the traditional utility model."). *See* Slocum, *supra* note 23, at 5-6.

45. Downing, *supra* note 42 ("RTOs were created to lower costs to end-use consumers but have failed to do so, said Public Citizen's Energy Program Director Tyson Slocum.").

46. The author was a fact witness to such claims, serving as the director of policy for the governor of Virginia in the mid-1990s when deregulation was being promoted in Virginia as a way to reduce power costs,

V. DEREGULATION AND RELIABILITY

Not only was deregulation supposed to save consumers money, it was supposed to promote reliability. So it is also pertinent to ask whether RTO markets, especially the multi-state capacity markets, have been successful in ensuring a sufficient supply of the power necessary to sustain reliability.

The experience of ERCOT[47] – the purest example of a market approach to reliability through use of SCP scarcity pricing -- during Winter Storm Uri[48] should disabuse anyone but the most committed theorist of the belief that a pure market approach will be effective in ensuring reliability during extreme weather and unanticipated demand spikes.[49] Winter Storm Uri triggered controlled outages affecting more than four million customers, leaving many customers in Texas without power for days as power supplies were inadequate despite scarcity pricing.[50] Nor should ERCOT's market design be seen as a problem unique to Texas. Similar problems with the threat of critical supply shortages are growing in all the FERC-regulated RTOs as well, including several with capacity markets.[51] In these FERC-regulated markets, market design and the use of single-clearing price mechanisms cannot be summarily excluded from the discussion about the growing threat of supply shortfalls.

Another facet of the reliability question that should be examined is the so-called "missing money" problem.[52] For one thing was certain about deregulation and the move to RTOs and RTO markets. All the states that did adopt some form of it, as well as the RTOs they joined, faced one unavoidable question when it

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especially for the large industrial customers who were among the most vocal advocates. He began his service a few years later as a member of the Virginia State Corporation Commission, the state utility regulator, shortly after Order No. 2000 had established RTOs. FERC's Standard Market Design, which mandated RTO participation, was still pending when he sat on his first major utility case, to decide whether to allow Virginia's largest utility, Dominion Virginia Power, to enter the regional RTO, PJM Interconnection. *In the matter concerning the application of Virginia Electric and Power Company d/b/a Dominion Virginia Power for approval of a plan to transfer functional and operational control of certain transmission facilities to a regional transmission entity*, COMMONWEALTH OF VA. STATE CORP. COMM'N: EX PARTE, Case No. PUE-2000-00551 (Nov. 10, 2004). On deregulation advocates' promises of reduced consumers costs and shifting of risks, see Slocum, *supra* note 23, *supra* note 45, and Borenstein & Bushnell, *infra* note 56.

47. *About ERCOT*, ERCOT, *https://www.ercot.com/about.* Electric Reliability Council of Texas (ERCOT) is the ISO for most of Texas in terms of both load (roughly 90%) and geographic footprint. *Id.*

48. *Winter Storm Uri Spread Snow, Damaging Ice from Coast to Cost, Including the Deep South*, WEATHER CHANNEL (Feb. 16, 2021), https://weather.com/safety/winter/news/2021-02-14-winter-storm-uri-south-midwest-northeast-snow-ice.

49. McNamee, *supra* note 5 ("[A] big disconnect in the electric markets is that no one has an obligation to serve customers.").

50. *Id.*

51. NERC, 2022 LONG-TERM RELIABILITY ASSESSMENT (2022), https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf [hereinafter NERC LTRA 2022].

52. Murty P. Bhavaraju et al., *PJM Reliability Pricing Model - A Summary and Dynamic Analysis*, IEEE XPLORE (June 2007), https://ieeexplore.ieee.org/document/4275491 ("[S]ince the peaking generation needed to meet the adequacy criterion will not receive enough revenue from the energy market to justify investments, other revenue streams are needed to ensure that they cover their fixed costs. *The gap between the net revenues and fixed cost of generation is referred to as 'Missing Money.'*" (emphasis added)).

came to reliability: *How do we make sure the lights stay on in this brave new world of competing generators with no guaranteed revenues?* That is, what about the "missing money?" With rate base revenues gone, there was an entirely justifiable fear that energy market revenues alone would not attract sufficient generation investment to keep the lights on at times of peak demand, a threat exacerbated by the adoption of price caps in energy markets in many deregulated states.

Only one deregulated state -- Texas with the ERCOT model -- decided to go the "full Monty" on deregulation, adopting retail choice and depending entirely on a real-time energy market with scarcity pricing to attract enough generation resources to keep the lights on.[53] Not being willing to gamble like Texas on an energy-only market construct, several other RTOs and deregulated states turned to something else.

VI. THE USE OF SCP MECHANISMS IN U.S. CAPACITY MARKETS

In the eastern RTOs – ISO New England Inc. (ISO-NE), New York Independent System Operator, Inc. (NYISO) and PJM Interconnection LLC (PJM) – several (though not all) states adopted a deregulated model in which their load-serving utilities got entirely out of the generation business and all generators were forced to compete in RTO markets.[54] In contrast to Texas, however, to deal with the "missing money" problem, administrative constructs called "capacity markets" were created.[55] If the unavoidable question of deregulation was *how do we keep the lights on when generators no longer have dependable revenues from rate basing,* it turned out the answer in these RTOs was: *We will continue to give them dependable revenues called "capacity payments."* The creation of these markets necessarily conceded that investors *must* have certainty as to future revenues – and specifically that RTO energy market revenues alone are not enough to encourage investment in capital-intensive generation. The creation of these markets also destroys any argument that deregulation was all about shifting investment risk for generation assets from consumers to investors.[56] It never was, certainly not where capacity markets were established to provide the "missing money" to investors.

PJM describes its own capacity market this way:

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53. After the crucible of Winter Storm Uri, Texas is considering a major redesign of its markets to attempt to improve their reliability performance through payments to generators outside of the energy market. Naureen S. Malik & Mark Chediak, *Texas Regulator Backs Plan to Pay Power Plants to Bolster Grid*, FINANCIAL POST, (Jan. 19, 2023), https://financialpost.com/pmn/business-pmn/texas-regulator-wants-to-pay-power-plants-to-help-avoid-deadly-blackouts ("Texas regulators are throwing their support behind a plan to pay electric plants to be on standby to provide backup electricity to the state's grid to help avoid a repeat of the deadly blackouts during a 2021 winter storm. . . . Previous attempts to start similar programs, called *capacity markets*, in Texas have been defeated in the last decade.") (emphasis added).

54. Slocum, *supra* note 23 at 2-5; *see also* Borenstein & Bushnell, *infra* note 56.

55. *PJM Interconnection, LLC*, 117 FERC ¶ 61,331 at PP 1-2 (2006) (approving PJM's capacity market construct).

56. Severin Borenstein & James Bushnell, *The U.S. Electricity Industry After 20 Years of Restructuring* (Nat'l Bureau of Econ. Rsch., Working Paper No. 21113, 2015) ("*We argue that the greatest political motivation for restructuring was rent shifting, not efficiency improvements*, and that this explanation is supported by observed waxing and waning of political enthusiasm for electricity reform.") (emphasis added).

"The essential elements of the capacity market are:

- Procurement of capacity three years before it is needed through a competitive auction
- Locational pricing for capacity that varies to reflect limitations on the transmission system
- A variable resource requirement curve, which is the demand formula used to set the price paid to market participants for capacity and the amount of capacity

Capacity market participants offer power supply resources into the market that provide supply or reduce demand. These resources include new and existing generators, upgrades for existing generators, demand response (consumers reducing electricity use in exchange for payment), energy efficiency and transmission upgrades. When a participant offers these resources into the market, *that participant is committed to increase supply or reduce demand on the PJM system by the amount they offered, three years in the future*."[57]

If there are insufficient offers on the supply side – in other words, if not enough capacity is offered to meet the administratively set demand curve -- then all sell offers theoretically could even reflect a price based on a constructed value (Cost of New Entry or CONE) inflated by a subjective multiplier.[58] The resulting price would purportedly represent the scarcity price that is supposed to bring new supply rapidly into the market. This method is the SCP mechanism on steroids, paying suppliers not just the highest clearing price but an administratively set price potentially higher even than the price of the highest offer.

While there is variation across the capacity market constructs used in RTOs, all capacity markets use a single-clearing price mechanism and all pay winning sell offers the *highest* clearing price, even those offered at prices far below their actual costs due to subsidies.[59] None of the RTOs use a nodal price (such as LMP) as an element of the single-clearing price mechanism in their capacity markets.[60] They use instead zonal pricing based roughly on load-serving entity territories and data on transmission constraints, including the use of sub-zones within those territories.[61] Zonal SCP mechanisms may provide more granular price signals than an RTO-wide price, but nowhere near the granularity of LMP. So the arguments for the value of LMP's highly granular, nodal price signals, offered to justify its

57. *Capacity Market (RPM)*, PJM, https://learn.pjm.com/three-priorities/buying-and-selling-energy/capacity-markets (emphasis added); ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS, *supra* note 18, at 88. NYISO conducts three capacity auctions: six-month, monthly and spot. *Id.* at 83. ISO-NE conducts a three-year forward auction. *Id*. at 78. MISO conducts an annual *voluntary* resource auction. *Resource Adequacy*, MISO, https://www.misoenergy.org/planning/resource-adequacy/#t=10&p=0&s=FileName&sd=desc%3B; *see* ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS, *supra* note 18, at 94.

58. PJM Open Access Transmission Tariff, Attachment DD, § 5.10(a)(i), https://pjm.com/directory/merged-tariffs/oatt.pdf.

59. *Wholesale Electricity Markets and Regional Transmission Organizations*, AM. PUB. POWER ASS'N, https://www.publicpower.org/policy/wholesale-electricity-markets-and-regional-transmission-organizations-0#:~:text=Energy%20prices%20paid%20in%20these,meet%20the%20demand%20for%20power.

60. U.S. GOV'T ACCOUNTABILITY OFF., ELECTRICITY MARKETS: FOUR REGIONS USE CAPACITY MARKETS TO HELP ENSURE ADEQUATE RESOURCES, BUT FERC HAS NOT FULLY ASSESSED THEIR PERFORMANCE (2017), https://www.gao.gov/assets/gao-18-131.pdf.

61. *Id.* at 15-22.

use in real-time and day-ahead markets, simply do not apply as a defense of capacity markets.

One justification for capacity payments, however, does make sense. Power markets, unlike real markets, cannot tolerate shortages while waiting for suppliers to respond to price signals and produce more supply to meet demand. *Contra* Texas, we cannot run the risk of waiting to see if scarcity pricing alone in energy markets is incentive enough to balance power demand with sufficient power supply during times of peak demand and tight supply.[62]

Not willing to take the chance of depending on either energy or capacity markets for resource adequacy, many states, even in RTOs, remain vertically-integrated and continue to allow their load-serving utilities to keep generation resources in rate base or procure power through bilateral contracts. In MISO, the capacity market is only residual and most MISO states remain vertically integrated with generation-owning utilities. SPP,[63] in which all states remain vertically integrated, does not operate a capacity market at all, nor does the California Independent System Operator (CAISO). And, of course, many states in the Southeast, Pacific Northwest and Rocky Mountain regions did not deregulate at all, nor join RTOs, much less depend on capacity markets for resource adequacy.

In practice, capacity markets do not procure physical electrical power, but rather a future *pledge* to deliver power when needed to meet a *predicted* demand peak at emergency times.[64] Both the resources the RTO deems available to deliver power at the future emergency point in time, as well as the predicted demand at that future point in time, are unavoidably speculative. If actual demand at the future point is significantly higher than the prediction, a supply shortfall and outages will occur, the worst outcome. If actual demand is significantly lower, customers could be said to have paid too much. Those operating the capacity markets are speculating on future supply and demand just as integrated resource planners in vertically-integrated utilities are speculating. *Both are engaging in an administrative planning exercise*.

So, let's not pretend capacity markets, with their administratively set demand curves and scarcity prices, are true markets that are more efficient at predicting the future because of the Hayekian collective intelligence of the marketplace. They are just another way to transfer money from consumers to generation investors to try to ensure sufficient power supply in the future. Not that there's anything wrong with that *in concept*. If Americans are not willing to live with regular power supply shortages – and we are not – then it is necessary to pay in advance for resources to make sure they are there whenever needed, just like buying an insurance policy

62. Naureen S. Malik & Mark Chediak, *Texas Regulator Wants to Pay Power Plants to Help Avoid Deadly Blackouts*, BLOOMBERG NEWS, (Jan. 19, 2023, 4:46 PM), https://www.bloomberg.com/news/articles/2023-01-19/texas-regulator-backs-plan-to-pay-power-plants-to-bolster-grid#xj4y7vzkg. Even Texas now appears to be moving away from that approach, although at this writing state elected leaders had not taken final action on such proposals.

63. *About Us*, SW. POWER POOL, INC., https://www.spp.org/about-us/.

64. *Capacity Market (RPM)*, *supra* note 57 ("Capacity represents a commitment of resources *to deliver when needed*, *particularly in case of a grid emergency*." (emphasis added)).

that may never be used. Just don't pretend, however, that what's at work in capacity markets is Adam Smith's invisible hand efficiently allocating capital through a single-clearing price mechanism.

And that raises the following question: How can this administrative pricing mechanism used in capacity markets -- with the complexities and subjectivity of an administratively set demand curve, administratively set local deliverability areas used to calculate zonal prices to load, administrative determination of CONE, administrative judgments about effective load carrying capabilities, offer caps, *etc*. -- possibly be described as the "market" alternative to the "regulated" construct of paying for needed generation through rate base, or purchasing needed power through bilateral contracts? To the honest observer RTO capacity markets and state IRP processes are *both* planning constructs, just in different forms. This article suggests that most state IRP processes may be far better suited to plan comprehensively, to manage the risks associated with different types of generation, to incorporate demand-side resources, and to balance state policies promoting renewables with the core goals of delivering reliability and controlling consumer costs than RTO capacity markets are.

VII. DO SINGLE-CLEARING PRICE THEORIES FIT THE PRESENT-DAY REALITIES OF RTO POWER MARKETS?

To consider whether the theories offered in support of SCP mechanisms still apply, return to Justice Kagan's elegant description in *FERC v. EPSA* of how SCP works in U.S. power markets:

> So, for example, suppose that at 9 a.m. on August 15 four plants serving Washington, D. C. can each produce some amount of electricity for, respectively, $10/unit, $20/unit, $30/unit, and $40/unit. And suppose that LSEs' demand at that time and place is met after the operator accepts the three cheapest bids. The first three generators would then all receive $30/unit. That amount is (think back to Econ 101) the *marginal* cost—i.e., the added cost of meeting another unit of demand—*which is the price an efficient market would produce*.[65]

As Justice Kagan remembered from her Econ 101 class, the *marginal cost would be the price an efficient market would produce.* That, then, is the very foundation of the theory for using a single-clearing price mechanism, that the *marginal* cost is the price an *efficient market* would produce. The entire edifice of the SCP mechanism is based on this textbook theory of efficient markets.

But what if RTO markets are *not* efficient markets? In fact, as discussed above, what if they are not even markets at all? If the theory justifying the use of single-clearing price mechanisms is contrary to reality, savvy bettors know that in the clash between theory and reality, bet on reality to win. So, let's explore the theories versus the realities of the RTO markets in which single-clearing price mechanisms are being used.

The first theory, as Justice Kagan posited, is that in RTO markets competition is taking place on a level playing field *at the margin*, with generators competing on their *marginal* costs of production.[66] This theory comes closest to reality in the

65. *Elec. Power Supply Ass'n*, 577 U.S. at 268 (emphases added).

66. *Id.*

real-time markets, which are supposed to be agnostic as to the source of the power and which use the granular LMP mechanism to set prices at a nodal level every five minutes. Yet even in real-time energy markets the efficient-market theory is flawed, since some resources are almost always going to clear both because they effectively have *no* marginal costs (although significant upfront capital costs)[67] as well as heavy federal and state subsidies that may allow them to offer at a price of zero or even below. Both these factors give renewables a significant advantage over competitors that have significant marginal costs (but may have lower capital costs).[68]

Typically, the marginal cost for dispatchable[69] generation consists largely of the cost of fuel. But because several common types of dispatchable "baseload" generation, such as combined-cycle gas, nuclear[70] and coal, run most efficiently on a continuous basis for long periods, these generators are more cost-effective and therefore more competitive when priced on an average-cost basis, not on marginal costs. By contrast, intermittent resources,[71] including wind and solar, have no fuel costs at all, an overwhelming advantage when RTO markets determine winners purely on the short-term marginal cost of production.

This reality means that when RTO markets clear based on marginal costs, generators with virtually no marginal costs and subsidies that enable offers at zero

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67. Michael Milligan et al., *Marginal Cost Pricing in a World without Perfect Competition: Implications for Electricity Markets with High Shares of Low Marginal Cost Resources*, NAT'L RENEWABLE ENERGY LAB'Y 27 (2017), https://www.nrel.gov/docs/fy18osti/69076.pdf ("[Wind and solar] generation resources have high capital costs with near-zero marginal costs because of the lack of fuel costs.").

68. Clark & Duane, *supra* note 5, at 3-6.

69. Dispatchable generation is on-demand generation that (i) is not weather-dependent, (ii) can be scheduled with reasonable certainty, and (iii) can run for extended periods. *Energy Education: Dispatchable Sources of Electricity*, UNIV. OF CALGARY, https://energyeducation.ca/encyclopedia/Dispatchable_source_of_electricity#:~:text=A%20dispatchable%20source%20of%20electricity,the%20electrical%20grid%20on%20demand. Dispatchable generators are not impervious to weather extremes – Arctic weather can impact natural gas supply and degrade the performance of gas generators, as happened during both Winter Storms Uri in 2021 and Elliott in 2022– but dispatchable generators are not literally dependent on certain weather conditions to produce power, as intermittent resources are. *Infra* note 71.

70. Nuclear units have extraordinarily high capital costs but are designed to run continuously for months and refuel on a schedule independent of each dispatch. *U.S. nuclear capacity outages were 35% higher in summer 2020 than 2019*, U.S. ENERGY INFO. ADMIN. (Sept. 18, 2020), https://www.eia.gov/todayinenergy/detail.php?id=45176. "A planned nuclear generation outage is usually scheduled to coincide with a plant's refueling cycle. U.S. nuclear power plants typically refuel every 18 to 24 months . . . ." *Id*.

71. Intermittent resources are dependent on specific weather conditions to produce power. *Intermittent Power Resources: Frequently Asked Questions*, NEW YORK ISO, https://www.nyiso.com/documents/20142/20259596/Intermittent-Power-Resources-FAQ.pdf/110f029a-2864-cf0d-9f64-54d2edc12913; *Energy Education: Dispatchable Sources of Electricity*, *supra* note 69. The wind must blow for wind generators to produce and the sun must shine for solar generators to produce, which means that intermittent power production rises and falls independently of, and without correlation to, the demand for power (a/k/a "load"). While weather can be *forecasted* with varying degrees of accuracy, weather cannot be *scheduled*, so weather-dependent generators cannot be scheduled with certainty beyond the period weather itself can be accurately forecasted – and, of course, even next-day weather forecasts can be wrong. Battery storage has the potential to change this engineering reality if or (hopefully) when long-duration batteries are developed that can store enough power to inject on demand hundreds of megawatts into the grid for several days at a time, not just a few hours, and at costs that are competitive with other resources.

or below start with a huge built-in advantage. The single-clearing price mechanism makes that advantage even more profitable, because these generators can offer in at zero or below with out-of-market subsidies, but then receive the highest clearing price anyway, set by the last generator that is necessary to meet the demand curve, often a high-cost gas combustion turbine "peaker." This dynamic leads to another serious problem with incentives in current RTO market design: Investment in dispatchable generation that can no longer compete against heavily-subsidized, no-marginal-cost competitors will dry up, because what investor wants to risk capital on a generation resource that will face a market pricing mechanism stacked against it? This means existing dispatchable units necessary to keep the lights on will retire early and few new ones will be planned, as the current interconnection queues in RTOs already reflect. These consequences threaten reliability, as the North American Electricity Reliability Corporation (NERC) and the RTOs themselves continue to warn us.[72]

A second theory offered to support the use of a single-clearing price mechanism is that it sends price signals that balance *both* supply and demand. Advocates describe the SCP mechanism of LMP as delivering efficiency *both* on the supply and the demand side and emphasize the importance of scarcity pricing as part of the utility specifically of LMP:

> The description of the real-time LMP model often simplifies to marginal-cost pricing, which then collapsed to the treatment of the marginal cost of generators. In part this derives from *assuming that demand was fixed*. But this descriptive convenience was never exactly correct, nor necessary. For example, when load reached the capacity of a given swath of generation, there would always be an additional price component that would reflect the scarcity of lower cost generation. That would include high load periods when *all the available generation capacity was in use*. *Then scarcity prices would be necessary to balance supply and demand.*[73]

This last passage is particularly revealing. The use of single-clearing price mechanisms – LMP in this reference -- in American power markets is not only about giving price signals to generators and rewarding those with the lowest marginal costs. SCP is also justified as essential on the *demand* side, by using scarcity pricing to signal to load to *reduce demand* when supply is extremely short, in order to avoid the catastrophic imbalances between supply and demand experienced, for example, in ERCOT during Uri.

So, this argument for the single-clearing price mechanism is its value as a price signal *both to supply and demand*. But that seems suspect on both ends.

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72. Robert Walton, *Most of US electric grid faces risk of resource shortfall through 2027, NERC finds*," UTILITY DIVE (Dec. 16, 2022), https://www.utilitydive.com/news/nerc-grid-resource-adequacy-shortfall-reliability-assessment/638949/ ("NERC has been warning about the speed of the energy transition in recent years. 'Just to say it for the fourth or fifth time: Managing the pace of our generation retirements and our resource changes to ensure we have enough energy and essential services is an absolute necessity,' [NERC spokesman John] Moura said."); *see also* PJM, ENERGY TRANSITION IN PJM: RESOURCE RETIREMENTS, REPLACEMENTS AND RISKS (2023), https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/energy-transition-in-pjm-resource-retirements-replacements-and-risks.ashx (showing almost 40 gigawatts of largely dispatchable coal and gas generation resources predicted to retire in the next few years and insufficient replacement capacity in the queue).

73. Hogan, *supra* note 7 (emphases added).

For what if out-of-market subsidies have utterly distorted the price signals to supply resources, even occasionally distorting price signals and producing unfair outcomes among zero-marginal cost renewable resources themselves, such as state subsidies that may favor offshore wind to the detriment of onshore wind or solar?

And, on the demand side, the price signals to load are, *and always have been*, submerged in a *retail* power bill consisting of numerous non-by-passable charges, including separate, large and rapidly growing charges for distribution and transmission services, not to mention an array of out-of-market payments that appear as bill riders for zero-emission credits (ZECs), renewable energy credits (RECs), reliability-must-run (RMR) payments to generators, percentage of income wealth transfers, or any of the myriad other bill riders that special interests have lobbied state legislatures to authorize?[74]

Indeed, retail electric bills, even in fully deregulated states, have never reflected the nodal, five-minute changes in LMPs, and thus the claim that scarcity pricing based on LMPs is essential to balance supply and demand, especially at times when there is no more generation to dispatch (as in ERCOT during Uri), appears utterly disconnected from the reality of retail regulation at the state level. For it is state-level retail rate regulation that establishes the actual price signals that load – residential, commercial and industrial consumers – are effectively receiving. While some large industrial customers have responded to wholesale price changes through curtailment programs that pay them to reduce load, the vast majority of retail customers are not responsive to continual changes in wholesale costs since retail rates are fixed. On its face, that means retail residential customers cannot respond to wholesale power price changes. It is obvious then that retail customers, especially residential, are simply not going to respond to any single-clearing price mechanism in wholesale power markets by reducing their demand in five-minute or any other increments. That means depending on LMP or any single-clearing price mechanism in RTO markets to balance supply and demand in times of emergency is disconnected from reality.[75]

A third theory for the use of single-clearing price mechanisms in RTO markets holds that electricity is a *commodity*, so sellers can only compete on price and efficiency of production, not on differential attributes. This theory assumes all electrons are identical, so the price should be the same for all offers necessary to clear the supply stack. Following Justice Kagan's efficient-market theory of marginal costs, that means the highest clearing price should go to *all* sellers, even those who offered at zero or lower.

This theory also breaks down in the real world. RTO markets are not a forum for selling and buying physical power only on an agnostic basis, but rather, for

74. Clark & Duane, *supra* note 5, at 6-8.

75. The author has long been an advocate of variable or dynamic retail rate designs, such as time-of-use pricing, to send retail customers much more accurate price signals about the real-time cost of their power, but those retail rate design issues are matters of state regulatory authority, not federally-regulated RTO wholesale markets. Further, for time-of-use rate designs to be effective they require the wide deployment of costly advanced metering infrastructure, known as "smart meters." And such rate designs require a major effort to re-educate customers who for decades have been used to rates that are the same whenever power is being consumed.

buying and selling various packages of services -- real-time power, day-ahead financial hedging, financial transmission rights, ancillary services, future capacity deliverability. Indeed, RTO markets themselves have long undercut this commodity theory of electrical power through the use of devices such as "uplift" (a form of supplemental, out-of-market payment for certain necessary attributes)[76] and extended load carrying capability (ELCC) criteria, which adjust the accredited value of resources offered in capacity markets based on their assumed ability to perform at peak or emergency times. So, any pricing model based on a theory of the fungibility of electrons has long been compromised by the variety and differentiated characteristics of the products traded in RTO markets.

Even more importantly, the *political* reality is that certain state and federal policies, which create the context in which RTO markets operate, no longer treat electricity as a commodity at all. On the contrary, certain policies now regard the *source* of the power as far more important than the *price* of the power. Again, history provides relevant context. When RTOs and their markets were set up under Order No. 2000, the states joining RTOs to participate in those markets – as well as Congress and FERC – all generally shared a goal of obtaining power from any generator that represented the most efficient and least cost to consumers.[77]

Over the past two decades, however, that expectation has changed radically. Roughly half of the states adopted mandatory renewable portfolio standards (RPS) that explicitly favor renewable generation resources, primarily wind and solar, over thermal resources such as coal and gas.[78] A mandatory RPS is typically characterized by a legal requirement that load-serving utilities in the state must procure and sell to their customers a minimum but continually increasing percentage of power from renewable resources.[79] Obviously, a state law that mandates the purchase of certain preferred generation resources, but not their competitors, is in direct conflict with the principle of markets agnostically choosing winners based on price and efficiency.[80]

Further, at the federal level, Congress has enacted a whole array of subsidies in the form of investment and production tax credits. The recently passed "Inflation Reduction Act of 2022" increased the monetary values and lengthened the time periods for using the various subsidies available to preferred competitors in

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76. Clark & Duane, *supra* note 5, at 3.

77. For example, the Energy Policy Act of 2005 provided a definition of the policy goal of "economic dispatch" as "the operation of generation facilities to produce energy at the *lowest cost to reliably serve consumers*, recognizing any operational limits of generation and transmission facilities." Energy Policy Act, 42 U.S.C. § 16432(b) (2005) (emphasis added).

78. *State Renewable Portfolio Standards and Goals,* NAT'L CONF. STATE LEGISLATURES (Aug. 13, 2021), https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx. Several additional states have voluntary or aspirational goals; some others have repealed or allowed mandatory standards to expire. *Id.*

79. Nancy Radar & Scott Hempling, THE RENEWABLES PORTFOLIO STANDARD A PRACTICAL GUIDE, U.S. DEP'T OF ENERGY (2001), https://www.energy.gov/oe/articles/renewables-portfolio-standard-renewables-portfolio-standard.

80. Implementing a state RPS is actually more practicable in a vertically integrated, cost-of-service regulatory model, in which state regulators can direct their state's utilities to meet the RPS goals through an integrated resource planning process which balances all resources – transmission, generation, demand-side – while maintaining reliability.

RTO markets, such as wind and solar generators, but these subsidies were not made available to other competitors, such as gas and coal generators.[81] These federal subsidies effectively pick winners and losers in RTO markets.[82]

Thus continuing to use single-clearing price mechanisms in power markets produces a windfall (no pun intended) for the policy-preferred intermittent resources, which can offer at zero or below but receive the highest clearing price. So while the theory of RTO markets two decades ago may have born some resemblance to Justice Kagan's efficient-market theory from Econ 101, the reality today is that the wide array of state and federal subsidies has created a chasm between the RTO administrative constructs called "markets" and true markets in which competitors operate on a level playing field.

As a result, it is appropriate to consider whether single-clearing price mechanisms can still produce just and reasonable rates, which is, after all, what the Federal Power Act requires.[83] Do SCP mechanisms really produce benefits for consumers that are worth the costs? These questions are especially serious in capacity markets but should be examined in the context of all RTO markets. The deregulation tide that washed single-clearing price mechanisms into RTO markets has receded, and to paraphrase Warren Buffett, "when the tide goes out, you find out who's been swimming naked."[84]

So let's turn to a discussion of possible alternatives to single-clearing price mechanisms across different types of RTO markets.

VIII. ALTERNATIVES TO SINGLE-CLEARING PRICE MECHANISMS IN REAL-TIME AND DAY-AHEAD MARKETS

As noted above, real-time energy markets are what Justice Kagan was describing in her opinion in *FERC v. EPSA*. The arguments offered by Professor

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81. Nicholas James Irmen et al., *Inflation Reduction Act: Implications for Solar and Wind Tax Credit Equity Markets*, NAT'L L. REV. (Sept. 1, 2022), https://www.natlawreview.com/article/inflation-reduction-act-implications-solar-and-wind-tax-credit-equity-markets. *See* Adam Schurle et al., *The Inflation Reduction Act: Key Provisions Regarding the ITC and PTC,* RENEWABLE ENERGY OUTLOOK (Aug. 12, 2022), https://www.foley.com/en/insights/publications/2022/08/inflation-reduction-act-key-provisions-itc-ptc.

82. Katherine Nelson & Steve Piper, "Inflation Reduction Act-led decarbonization and the future of fossil generation," S&P GLOB. CAP. IQ (Dec. 19, 2022) ("The Inflation Reduction Act of 2022 creates tailwinds for green energy that put corresponding pressure on coal and natural gas generation. S&P Global Market Intelligence Power Forecast *predicts 117 GW of fossil generation will retire, with coal plants accounting for 70% of this capacity. Just as importantly, little new gas generation is forecast*, as storage undercuts gas capacity value and renewable generation undercuts gas in merit dispatch. . . . *Green energy incentivized by the act is poised to undercut project-financed merchant generation as we have understood it over the past 20 years*."). (emphases added)). It is deeply ironic given the history of federal energy policy since the Clinton administration, which has pushed competition in RTO markets as superior to state-regulated cost-of-service models, that these federal subsidies both undercut the competitiveness of RTO markets at the same time they make the state cost-of-service models much more attractive for fully utilizing these subsidies.

83. 16 U.S.C. § 824.

84. *Swimming Naked When the Tides Goes Out*, MONEY, (Apr. 2, 2009), https://money.com/swimming-naked-when-the-tide-goes-out/. The author has heard this quote also attributed to former Federal Reserve Board Chairman Paul Volcker, who served from 1979-1987. Buffett may have said it, but Volcker proved it when he relentlessly raised interest rates to squeeze out the double-digit inflation of the 1970s.

Hogan and others advocating the use of an SCP mechanism – specifically LMP – are most persuasive when applied to real-time energy markets.

Operated by all RTOs, they are the simplest constructs and most closely resemble real markets. Real-time energy markets enable the buying and selling of a *physical* product, the electrical power itself.[85] All use LMP as their single-clearing-price mechanism. In RTOs, however, only about 5% of load is scheduled in real-time markets; 95% is scheduled in day-ahead markets.[86]

Day-ahead markets, which are operated by most RTOs,[87] enable trading in a *financial* product, a contract setting a price on power to be delivered the next day.[88] The day-ahead markets also enable the system operators to schedule power generation commitments on an hourly basis, as well as ancillary services,[89] the day *before* what is called the "operating day." System operators use the real-time markets to balance supply with actual load.[90] Like real-time energy markets, RTO day-ahead markets use LMP as their single-clearing price mechanism. On the operating day, even if real-time LMP is higher than the agreed-upon day-ahead price, the buyer of the day-ahead contract pays no more than the contract price.

In the RTO real-time and day-ahead markets, one obvious alternative to any single-clearing price mechanism is simply to allow buyers and sellers to agree upon a mutually agreeable price for each transaction, just like in real markets. Consumers would benefit from paying the prices offered *below* the highest clearing price, instead of paying the highest clearing price to all sell offers, as happens now in those markets.

This simple pricing mechanism is already what takes place in bilateral trading markets, which operate in both RTO and non-RTO regions,[91] either in real-time trading or through power purchase agreements (PPAs). Willing buyers and willing sellers agree on the price for each transaction, as they have for decades. That is what power pools were originally established to do, to facilitate bilateral power trades between utilities, first to provide power to avoid outages during emergencies, then more generally to facilitate cost-savings by sharing reserve generating capacity.[92]

It is important to emphasize that bilateral trading can be just as competitive, even more so, than in market constructs, so it is wrong to assume that a bilateral

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85. ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS, *supra* note 18, at 127.

86. *Id.* at 62-64.

87. The California Independent System Operator (CAISO) does not currently operate a day-ahead market, but is developing one. *Initiative: Extended Day-Ahead Market (EDAM),* CAISO, https://stakeholdercenter.caiso.com/RecurringStakeholderProcesses/Extended-day-ahead-market.

88. ENERGY PRIMER: A HANDBOOK OF ENERGY MARKET BASICS, *supra* note 18, at 62-64.

89. Ancillary services are "functions performed by electric generating, transmission and system-control equipment to support the transmission of electric power from generating resources to load." *Id.* at 77. Ancillary services can include reserves that have different ramping time attributes, from a few minutes to as much as thirty minutes, and include spinning reserves, non-spinning reserves and supplemental reserves. *Id.* at 56-57, 88.

90. *Id.* at 1.

91. *Id.* at 58-59. It should be noted that some bilateral transactions in both RTOs and non-RTOs are based on cost-based, not market-based, rates.

92. *Id.* at 36-37.

trading system is somehow an abandonment of competition.[93] In both RTO and non-RTO states these transactions should still remain subject to FERC's duty (i) to protect consumers from exercises of market power, (ii) to grant or deny market-based rate authority and (iii) to punish bad actors who manipulate bilateral trading or engage in predatory pricing.

Nor should it be assumed that bilateral trading between utilities can only be conducted in the traditional and time-consuming way, such as by telephone calls. Bilateral trading systems are subject to continual improvements based on technology and can be set up to operate in real time, just as RTO markets do. For example, the Southeast Energy Exchange Market (SEEM) is already operating a real-time, bilateral, power trading market. This is a fully automated bilateral market operating on a computer algorithm that matches willing buyers and sellers every 15 minutes.[94] There are no transmission costs because only unused transmission capacity is used, so there is no "rate pancaking."[95] A willing buyer and a willing seller set the price for *each* transaction, using a "split the difference" pricing formula that automatically settles each transaction at the mid-point between the offer and bid. No SCP mechanism is used. Prices are localized to the buyer and seller. Price signals are transparent and available.[96]

Another alternative being considered in Europe is to bifurcate the market, establishing different clearing prices for low-marginal cost resources such as wind and solar, and another for gas.[97] This could solve the perceived problem with pay-as-offered, that low marginal cost sellers would simply game the market by offering at or near what they think the clearing price will be anyway, so consumers really save no money.[98]

Yet another option to consider could be some form of average pricing, so that the highest clearing price was not exclusively the price that is paid to all sell offers.

The point is not to advocate a specific alternative, but to ask whether any of these options -- pay as offered, average pricing, automated, real-time bilateral trading, or a market bifurcated between low and high marginal cost generators -- represent better pricing mechanisms than paying the highest clearing price to all

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93. Mullin & Downing, *supra* note 44 ("[Robert] McCullough . . . among the first to identify the manipulation that sparked the Western energy crisis of 2000-01 . . . has long been a vocal critic of RTOs and ISOs, which he refers to as 'administered' markets, compared with what he calls the 'competitive' bilateral wholesale markets that predominate in the West. 'Northwest power markets are large and competitive and low-price, but we don't have a central administrator to tell us what to do.'").

94. SE. ENERGY EXCH. MKT., https://southeastenergymarket.com/.

95. *Pancaking*, HARVARD ELEC. POLICY GRP., https://hepg.hks.harvard.edu/faq/pancaking ("Rate pancaking" means paying multiple charges to more than one utility to move electric power across multiple utility systems.).

96. *Regulatory Filings and Documents*, SE. ENERGY EXCH. MKT., https://southeastenergymarket.com/filings/.

97. India already operates bifurcated markets separating renewables from other generating resources. *See supra*, note 3.

98. *Action and measures on energy prices*, *supra* note 3 ("In the pay-as-bid model, producers (including cheap renewables) would simply bid at the price they expect the market to clear, not at zero or at their generation costs.").

sellers.[99] No one should prejudge the answers, but those are the types of questions that should be explored, without limitation, in a cautious and thorough reconsideration of pricing mechanisms in US real-time and day-ahead power markets.

IX. CAPACITY MARKETS AND ALTERNATIVES

"I've always viewed forward capacity markets as the original sin of market design."

– Professor William Hogan[100]

When one of the leading theorists of power-markets rate design pronounces capacity markets a sin, it is obviously time to ask whether capacity markets themselves are an experiment that is no longer working as intended, if it ever did, regardless of the pricing mechanism.

As noted above, U.S. capacity markets use a single-clearing price mechanism, but not LMP, so the arguments in favor of LMP's granularity do not apply.[101] Capacity markets do not enable the purchase and sale of physical power, but rather a *promise* to deliver power (or to reduce load, which promise does not represent a generating resource) at a *future* point in time to meet a predicted peak demand. The transactions involve essentially futures contracts. Price signals do not reflect real-time power sales, but only the trading in what Professor Hogan below calls "financial hedging contracts."[102]

Again, as briefly referenced above, the argument that all electrons are fungible, that power is a commodity, and therefore that all promises to deliver power in the future should be priced at the *highest* clearing price, simply evaporates in application to capacity markets. State policies mandating that utilities must purchase

99. At least one RTO implicitly acknowledged concerns with LMP and did try to develop an alternative. PJM discussed a proposal for something called an "Integer Relaxation for Electricity Market Clearing" mechanism. Clark & Duane, *supra* note 5, at 4-5. It ultimately went nowhere.

100. Sam Mintz, *NECA Panelists Talk Capacity Market, DERs*, RTO INSIDER (Dec. 14, 2022), https://www.rtoinsider.com/articles/31291-neca-panelists-talk-capacity-market-ders ("'I know it's politically embedded in the system . . . but *I don't think they're a solution to any real problem other than mailing checks to people,*' Hogan said." (emphasis added)).

101. Harvey and Hogan distinguish the use of LMP in American energy markets with the lack of its use in the UK and EU, which according to the authors use much less granular, and therefore less effective, SCP mechanisms. Harvey & Hogan, *supra* note 7, at 5, 15. Which may be true, but not necessarily dispositive of the question whether paying all offers the marginal price is appropriate. Regardless of the geographic scope of the "L" in Locational Marginal Pricing, it is the "M" in LMP that may be the problem, as it is in all single-clearing price mechanisms.

102. Hogan, *supra* note 7, at 23.

power *based on the type of generator* or other attributes, other forms of state subsidies, such as zero emissions credits (ZECs),[103] combined with lavish federal subsidies in the form of investment and production tax credits,[104] undercut any continuing claim that capacity markets are simply procuring the lowest-cost capacity on an agnostic basis. As one former FERC commissioner pungently put it, "Hundreds of billions in favored federal tax treatment and subsidies for renewable[s] . . . is more than a thumb on the scale of energy markets, it is a twelve-ton dump truck."[105] So what purpose is served by giving *all* sell offers the *highest* clearing price? If their promises of future deliverables are based on their *actual* costs, discounted for subsidies, why shouldn't each seller that clears simply get its offer price?

As a result of the "twelve-ton dump truck" on the scale, the large multi-state RTOs such as PJM now contain states with such widely divergent energy policies that trying to operate a credible capacity market on an RTO-wide basis increasingly appears to be a hopeless exercise, as the intense controversy among the states over PJM's most recent minimum offer price rule (MOPR) proposal demonstrates.[106]

Even the strongest advocates of the use of the single-clearing price mechanism of LMP in real-time and day-ahead markets are highly critical of the capacity market construct itself, regardless of the SCP pricing mechanism. As Professor Hogan puts it:

> The problems with forward capacity mechanisms and stimulating investment arise in part because *ensuring specific performance of physical capacity contracts is beyond the capability of our knowledge*. If we knew how to guarantee deliverability of specific generation determined years ahead in capacity auctions, we would not need organized markets to manage the complex conditions that arise in the real-time market.

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103. *NY Creates New Emissions Credit for Nuclear Plants*, MCDERMOTT, WILL & EMERY: ENERGY BUSINESS LAW (Sept. 20, 2016), https://www.energybusinesslaw.com/2016/09/articles/environmental/ny-creates-new-emissions-credit-for-nuclear-plants/) ("The ZEC, or zero-emissions credit, is the first emissions credit created exclusively for nuclear power . . . . The ZEC is the result of a highly politicized effort to support New York's struggling nuclear power plants."); *see Zero Emission Credits*, ILL. POWER AGENCY, https://www.ipa-energyrfp.com/zero-emission-credits/ (Illinois also legislated a ZEC subsidy.).

104. Irmen et al., *supra* note 81; Schurle et al., *supra* note 81. *See also* Nelson & Piper, *supra* note 82. This article acknowledges that the federal tax code and budget are riddled with various forms of tax and spending subsidies for a wide range of energy resources, depending on how one defines "subsidies," including some benefitting oil, natural gas and coal. ENV'T AND ENERGY STUDY INST., FOSSIL FUEL SUBSIDIES: A CLOSER LOOK AT TAX BREAKS AND SOCIETAL COSTS (2019), https://www.eesi.org/files/FactSheet_Fossil_Fuel_Subsidies_0719.pdf. Such subsidies do not have the specific and immediate impact on the operation of pricing mechanisms in RTO power markets, however, that the tax subsidies in the Inflation Reduction Act do.

105. Tony Clark*, Inflation Reduction Act adds fuel to RTO reform imperative, generator interconnection backlog*, UTILITY DIVE, (Nov. 8, 2022), https://www.utilitydive.com/news/inflation-reduction-act-ira-rto-interconnection-queue-ferc-tony-clark/635959/. Renewables advocates might argue that thermal resources such as coal and gas have also long received *implicit* subsidies by not being charged for negative externalities such as carbon emissions. The debate over quantifying externalities, which to be serious must consider all externalities, *both* negative and positive, is needed, but is not the subject of this article.

106. See, *e.g., Amended Joint Petition for Rehearing of the Pennsylvania Public Utility Commission and Public Utilities Commission of Ohio to the Commission's Failure to Issue an Order Accepting or Denying PJM's Filing Concerning Application of the Minimum Offer Price Rule*, FERC Docket No. ER21-2582-000 (Aug. 20, 2021).

> Recognizing that capacity mechanisms are in effect *financial hedging contracts* . . . would allow market reforms and the *gradual atrophy of the existing capacity markets*.[107]

Others have likened the continuous effort to "fix" capacity market constructs through seemingly perpetual tweaking and adjusting to an endless "whack-a-mole" game.[108]

So what are the alternatives to the use of SCP in capacity markets? Indeed, to the use of capacity markets at all?

First, it should be asked whether the pure economics "textbook solution" -- scarcity pricing alone -- should be considered an acceptable regulatory method of achieving resource adequacy.[109] "Scarcity pricing" is another term for "shortage pricing," but socially and economically Americans simply cannot and will not accept extended shortages in the power supply. Indeed, multi-day shortages lead to catastrophes such as Texas during Winter Storm Uri, during which skyrocketing scarcity prices did not lead to an immediate influx of power resources entering the market to restore power, but did produce horrific spikes in power bills for load-serving utilities and ultimately retail consumers.

What happened in Uri should not be dismissed as an outlier.[110] While extraordinary weather events can take down any power grid regardless of market design, often through wind or ice impacts on the wires grid, when the outages are caused by loss of power supply depending on scarcity pricing to restore supply quickly is a recipe for turning an already bad situation into a disaster.[111]

Winter Storm Uri illustrates an important lesson. To ensure that sufficient generating reserve capacity is available at all times of peak demand, in order to deliver the level of reliability Americans expect, generating capacity *must* be funded in advance and cannot depend solely on scarcity pricing.

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107. Hogan, *supra* note 7, at 23 (emphases added).

108. Delia Patterson & Harvey Reiter, FERC CHASING THE UNCATCHABLE: TRYING TO FIX MANDATORY CAPACITY MARKETS IS LIKE TRYING TO WIN AT WHACK-A-MOLE, STINSON, LLP (2016), https://www.lexology.com/library/detail.aspx?g=1017dff1-42c8-4b8f-ada1-6ce816a20fec ("FERC's efforts to get capacity markets "right" . . . have instead led to endless - and futile - tinkering. . . . It's time for FERC to start over, or at least regroup and reassess.").

109. Hogan, *supra* note 7, at 17 ("The Texas experience through 2020 reinforced the need for scarcity pricing and the analysis of the benefits. Prices were high during scarcity conditions, helped alleviate stress on the system, and were supporting new generation investment.").

110. *Id.* at 17-18 ("The exceptional emergency during February 2021 remains a subject of important further study and investigation as part of the regulatory review. However, the weather conditions were a one-in-fifty year event, so extreme and well outside the traditional one-in-ten year reliability standard that it is not clear than any electricity system design would have fared well.").

111. Variations on scarcity pricing, such as an operating reserve demand curve (ORDC), which is used by some RTOs (including ERCOT) to procure reserves needed for reliability, look very much like another way to provide the "missing money," serving a capacity market function by another name. *See generally* Raúl Bajo-Buenestado, *Operating reserve demand curve, scarcity pricing and intermittent generation: Lessons from the Texas ERCOT experience*, 149 ENERGY POL'Y 112,057 (2021) ("The basic idea underlying this mechanism is that generators that participate in the real-time market get paid not only the real-time (locational marginal) price, but also an "extra" price –called the ORDC price adder– if total reserves available in the market cross a lower threshold.").

Certainly, capacity markets are one option to pay generation resources to be available, but even assuming the continuance of capacity markets does not mean an unquestioning acceptance of the use of an SCP pricing mechanism in capacity markets. One possible alternative is instead to pay each winning seller the price it offers. Since RTO capacity markets are not using LMP specifically, the arguments for LMP in terms of the granularity of its price signals do not apply in defense of the less granular SCP mechanisms used in capacity markets. Adopting a "pay as offered" mechanism could cut costs to consumers substantially since consumers could get the benefit of the lower-priced offers from heavily subsidized resources such as wind and solar.

There are several other alternatives to the current pricing mechanisms in capacity markets, even to capacity markets themselves. Among them include (i) developing easier and more attractive methods for load-serving utilities in RTOs with capacity markets to self-supply outside of the capacity market, (ii) replacing forward capacity markets with near-term auctions that do not extend beyond the coming year or season,[112] (iii) using capacity markets only as a residual option, as in MISO,[113] or (iv) phasing out capacity markets entirely. Neither SPP -- an RTO -- nor the Western Power Pool's recently formed Western Resource Adequacy Program use capacity markets to achieve resource adequacy; rather, both use a construct that requires load-serving utilities either to build or purchase through bilateral contracts sufficient capacity to keep the lights on.[114]

In the broadest sense, states in the multi-state RTOs that are relying primarily on capacity markets for their utilities' resource adequacy should consider whether to reclaim their responsibility for resource adequacy, and if necessary, to amend their state's regulatory construct for utility regulation to enable such a reclamation of responsibility.

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112. Kate Winston, *US Forward Capacity Markets are a 'Terrible Idea' Should be replaced: Market Monitor*, S&P GLOB. COMMODITY INSIGHTS: MEGAWATT DAILY (Mar. 9, 2023), https://www.spglobal.com/commodityinsights/en/products-services/electric-power/megawatt-daily ("Forward capacity markets do not work, and key regions that have them should consider switching to a prompt capacity market that procures capacity for just the coming year or season . . . . 'Forward capacity markets are a terrible, terrible idea. They have always been a bad idea,' said David Patton, president of Potomac Economics [and independent market monitor for MISO and ISO-NE]").

113. In MISO, even though the capacity market is considered residual or voluntary, questions are being raised about whether that construct is working well and resource adequacy is becoming a major problem as more and more dispatchable units retire prematurely. Peter Behr & Jason Plautz, *Grid monitor warns of U.S. blackouts in 'sobering report'*, ENERGYWIRE (May 19, 2022), https://www.eenews.net/articles/grid-monitor-warns-of-u-s-blackouts-in-sobering-report/. "MISO officials have agreed with NERC's cautions about the strains on the region's power supplies. MISO is facing increased retirements of coal, natural gas and nuclear generation. . . ." *Id. See* Amanda Durish Cook, *MISO Stakeholders Debate Capacity Accreditation, RA*, RTO INSIDER (Mar. 5, 2023) https://www.rtoinsider.com/articles/31748-miso-stakeholders-debate-capacity-accreditation-ra ("[WEC Energy Group's Chris] Plante said the capacity market has evolved from its 'humble beginnings' . . . . MISO and stakeholders should reestablish what they want from their capacity market. . . .").

114. *See Southwest Power Pool*, 164 FERC ¶ 61,092 (2018); *see also Northwest Power Pool*, 182 FERC ¶ 61,063 (2023).

States have always had the authority to determine how to regulate their utilities; it is embedded in their inherent police powers.[115] Instead of depending on capacity markets, they could resume requiring each load-serving utility to obtain sufficient power capacity through a balanced mix of constructing new generation financed through rate base to ensure availability in emergencies, as well as procuring power through competitively-bid PPAs, a good way to meet state renewable power mandates while ensuring that necessary resources do not prematurely retire. States could require their utilities to conduct robust integrated resource planning that evaluates generation resources comprehensively, including those on the distribution grid, along with transmission and demand-side programs, to produce the optimal outcomes that provide consumers with reliable power at the least cost.

There is another compelling principle at issue here that is not unique to utility regulation: accountability in a democratic system. When elected state policy-makers and regulators are clearly responsible for ensuring that their state's load-serving utilities have adequate generation resources at reasonable costs, the people know whom to hold accountable when the lights go out or costs are unreasonable.

X. CONCLUSION

"This is the best bad idea we have . . . ."

– Bryan Cranston (playing the CIA deputy director in the movie Argo (2012)[116]

It is time to reconsider – carefully and cautiously – the use of single-clearing price mechanisms in RTO power markets, especially in capacity markets. Indeed, with regard to the latter, it is time to consider whether capacity markets themselves are capable of doing the job they are expected to do, regardless of pricing mechanism, or should be replaced with alternative means of achieving resource adequacy.

In so doing, it is important to recognize two key realities about the American power industry:

First, Americans will not tolerate the temporary shortages that occur regularly in every true competitive market. So, applying the textbook theories of market economics to the power grid that animated the deregulation movement of the late 1990s and early 2000s (and was cynically exploited by rent-seekers such as Enron and many others since), will not provide consumers with reliable power service at the *least* cost under applicable laws, the policy goal when regulating monopoly providers of a vital public service.

Second, given that the electric power industry remains to a significant extent a network industry and one with extremely high upfront capital costs, it will tend to produce sellers with market power.

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115. The history of this regulatory authority rooted in the states' inherent police powers is described in the landmark Supreme Court opinion in *Munn v. Illinois,* 94 U.S. 113, 124-28 (1877) and discussed in Christie, *supra* note 24, at 40:949, 954-56. Such inherent authority is, of course, subject to federal pre-emption where constitutional and exercised by Congress.

116. *ARGO* (Warner Bros. 2012).

Both of these features mean that the power industry should and will be heavily regulated. In choosing regulatory models, it is essential to be honest and admit up front *there is no perfect model of regulation.* All regulation attracts rent seekers and contains the threat of regulatory capture. The search is not for the perfect regulatory model; it does not exist. So, like the CIA deputy director in *Argo,* we are seeking the best bad regulatory option. Cost-of-service regulation of vertically-integrated utilities, the model of choice in most American states for most of the past century, and still widely used, undeniably has its many flaws, but it also has its positive attributes.[117] Now more than two decades after deregulation sought to replace state-regulated cost-of-service models with models using RTOs and their power markets that feature single-clearing price mechanisms, it is clear that there are major flaws in those regulatory models as well.

Honesty also requires admitting that these purportedly "deregulated" models are, in fact, just different regulatory constructs. It has always been a false dichotomy to pose the choice as "markets versus regulation," as deregulation advocates used to do and RTO markets advocates still do.[118] As one of history's most brilliant regulatory economists, Alfred Kahn, once said:

"The two principal institutions of social control in a private enterprise economy are competition and direct regulation. Rarely do we rely on either of these exclusively . . . . The proper object of search, in each instance, is the best possible mixture of the two."[119]

In a true market that's competitive, consumers and efficient sellers win and inefficient sellers lose. A competitive market regulates itself and the market participants don't set the rules. So, the regulator's job is not to regulate a competitive market for outcomes but rather to protect competition from rent-seekers and their lobbyists, and to avoid regulatory capture.

Administrative constructs, however, such as RTO markets, where rent-seeking market participants themselves, as well as other interest groups, play a major role in setting the market rules, are far more vulnerable to rent-seeking than truly competitive markets. Now when these constructs have delivered results that were demonstrably cheaper than power purchased through bilateral contracts or from units in rate base, consumers would have benefitted. This article does not deny that there may have been benefits to consumers at times from RTO markets, compared to alternative regulatory constructs, although one could argue just as persuasively that most cost savings to consumers in RTO markets since 2005 were really the result of the fracking revolution that drove natural gas prices down below $3 per MMBtu by 2021 and benefitted consumers just as much in cost-of-service models through lower costs recovered in fuel-factor and other rate mechanisms.

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117. Slocum, *supra* note 23, at 2 ("Although [the pre-restructuring state-regulated system] was often abused because of the enormous political power of the electric utilities and their ability to influence state policymakers, it was regarded as *the most reliable and affordable electric system in the world*.") (emphasis added).

118. Peter Eavis, *Clean Energy Quest Pits Google Against Utilities*, N.Y. TIMES (Dec. 20, 2022), https://www.nytimes.com/2022/12/20/business/google-clean-energy.html ("Google says its goals for carbon-free power are impeded by state-regulated utilities, particularly in the Southeast, that lack a competitive market.").

119. Kelliher, *supra* note 23, at 9 (quoting Kahn, *supra* note 17, at xiii).

And while consumers may have benefitted when these markets produced competitive results at a time of falling gas prices, all too often the special interests that did not get what they wanted from RTO markets went to the politicians in the various states and Congress and lobbied for subsidies, portfolio mandates and other forms of rents. It is hard to argue that RTOs have been more immune from the rent-seeking that too frequently takes place in state legislatures;[120] indeed, RTOs are also vulnerable to it, partly due to governance issues that are not the subject of this article.[121] One argument offered for deregulation at its beginning was that the iron discipline imposed by regional markets would block the rent-seeking inherent in the highly regulated state models. It has become clear, however, that deregulation only expanded the rent-seeking opportunities to the RTO constructs and created even more work for special-interest lobbyists pushing state legislatures and Congress to override or negate the competitive results the RTO markets did manage to produce.[122]

So it is now time for a thorough reconsideration of the pricing mechanisms used in all of our RTO power markets. FERC, as the creator and regulator of RTOs and their markets, should lead it. These pricing mechanisms are part of the legacy of deregulation, and a thorough reconsideration should logically examine whether the assumptions that underpinned deregulation are still valid, if they ever were. This reconsideration should begin with capacity markets and should not be afraid to take on the broader question of whether capacity markets can consistently obtain the power supply necessary to maintain reliability at just and reasonable rates, regardless of pricing mechanism.

While not advocating for any specific outcome, this article asserts that undertaking such a comprehensive reconsideration is both timely and compelling. And the focus should always be on the most important questions of all: whether the power industry's customers – residential, commercial and industrial – are really benefitting from these pricing mechanisms in power markets, or whether alternatives would deliver a more reliable power system at lower costs to consumers.

120. Slocum, *supra* note 23, at 4.

121. On the current problems with RTO governance, while the author may not agree with their ultimate recommendations, Clark and Duane again offer a penetrating insight from expertise and experience. *See* Vince Duane & Tony Clark, WHO OWNS THE RTO?: WHY RTO GOVERNANCE IS AN ACHILLES HEEL IN THE CLEAN GRID TRANSITION, WILKINSON, BARKER, KNAUER, LLP (2021), https://www.wbklaw.com/news/white-paper-who-owns-the-rto/.

122. Slocum, *supra* note 23, at 4; Borenstein & Bushnell, *supra* note 56.