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POLICIES TO SUPPORT A COMPETITIVE WHOLESALE ELECTRICITY MARKET IN THE SOUTHEAST U.S.

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INTRODUCTION

Vibrant Clean Energy's modeling of a regional transmission organization (RTO) in the Southeast United States suggests that introducing competition and regional optimization into electric grid planning, operations, and regulation can have significant benefits to customers– saving 29 percent on electricity costs and reducing emissions 37 percent below 2018 levels by 2040. It will also create new economic development opportunities and hundreds of thousands of new jobs by adding nearly 130 gigawatts (GW) of least-cost clean energy projects – enough to more than offset lost coal and gas jobs. As clean energy resources push expensive fossil power plants off the system, Southeastern customers will see lower electricity rates, cleaner air, reduced carbon emissions, and significant employment gains through clean energy deployment.

Achieving these benefits relies on human-crafted institutions and political compromises. It may look incremental rather than transformative. Each wholesale electricity market today is a product of these tradeoffs, and no market is complete; markets are always evolving to accommodate new technologies, stakeholders, and state policies. Tried and true policies – both incremental and transformative – can improve regional competitiveness, decrease consumer costs, reduce emissions, and increase jobs. We first cover steps policymakers and regulators can take to achieve market-based outcomes, then cover two policies to support clean energy and job quality in the region.

ENCOURAGING COMPETITION ON THE WAY TO FULL RESTRUCTURING

WIS:dom®-P's optimization of the Southeast region offered at least five competitive benefits in the RTO Scenario when compared to existing utility IRPs. These five benefits align with the

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[2] GridLab https://gridlab.org/

[3] Vibrant Clean Energy https://www.vibrantcleanenergy.com/

functions of a competitive regional market and RTO, although each is achieved with varied success across market structures:

- Least-cost but secure unit commitment and dispatch.
- Efficient entry of low-cost generation and exit of uneconomic generation.
- New value streams for distributed energy resources.
- Reserve sharing to accomplish resource adequacy (RA) more efficiently.
- Coordinated non-discriminatory transmission operation and planning.

In order to capture the benefits of increasing competition in the electric sector, regulators should begin to encourage competitive behavior in advance of a traditional RTO or ISO.

POWER POOLS AND ENERGY IMBALANCE MARKETS

The Southeast can take a number of important steps to begin moving to a fully organized wholesale market, as highlighted in a recent report from the Nicholas Institute for Environmental Policy Solutions.[i] Energy Imbalance Markets (EIM), such as the Western EIM, allow transmission-connected utilities to buy and sell excess energy on a real-time basis. Western utilities are mostly vertically integrated monopolies, much like the Southeast. These utilities still retain control over generation and transmission, but are able to opt into the EIM to better balance supply and demand across the region and save money. While the Western EIM only accounts for about 5 percent of total energy traded in the region, it has reported gross economic benefits of more than $1 billion and avoided more than 533,000 metric tons of carbon dioxide (CO_2) since inception.[ii] Power pools, which might encourage voluntary joint dispatch and regional transmission planning among utilities in the region, can also accomplish similar goals.

However, an EIM alone gets nowhere close to the economic and renewable integration benefits of regional operation and vertical restructuring. Between 10-20 percent of the RTO Scenario benefits come from adopting a regional approach, as opposed to competitive but siloed procurement. While a fully restructured organized market may take significant time to set up, we recommend each state legislature or public utility commission (PUC) open investigations to examine the feasibility and potential benefits of electricity market reform, much like North Carolina has done and South Carolina is planning to do.[iii]

Southern Company recently announced that they are exploring a “centralized, region-wide, intra-hour energy exchange” along with other utilities in the region, which they are calling a Southeast Energy Exchange Market (SEEM).[iv] This announcement, while scant on details, suggests that the utilities are exploring introducing of a voluntary real-time market, but not full restructuring implied by the RTO Scenario design. The suggested market design is likely even less transformative than the more incremental EIM, as SEEM details to date do not indicate EIM benefits such as an independent operator, transparent pricing, or transmission access rules. As such, in the absence of new revelations, SEEM appears to be an unambitious and incremental approach to increasing competition on a scale not implicated by this analysis.

Decision-maker	Policy
Southeast RTO stakeholders (regional utilities, PUCs, advocates, large consumers, IPPs)	If full regionalization is infeasible, explore an Energy Imbalance Market or Power Pool with an independent operator and market monitor as incremental steps toward full regional optimization and competition.

DISTRIBUTED GENERATION REFORM

Approximately 10 percent of the RTO Scenario cost savings in 2040 come from WIS:dom®-P's optimization of distributed energy resources, particularly distributed solar and storage.[v] These resources provide tremendous value operating as both power sources and distribution infrastructure. However, states in the Southeast region lack rules for these resources to participate fairly to provide and be paid for this value. As customers increasingly adopt distributed energy resources (DER) and other demand-side measures, utilities must determine how to encourage efficient DER development, minimize costs and disruptions, and invest in the distribution system to achieve potential benefits.

Effective integrated distribution planning (IDP) can help enable many of these benefits.[vi] IDP expands on traditional distribution planning to include the impacts from all DER, enhanced DER and demand-side forecasting, identification of locational value where DER could provide grid services, and consideration of third-party DER to address grid needs. In particular, VCE®'s modeling makes clear that the combination of community-scale solar and storage below the substation can reduce peak demand by 12 percent, vastly reducing bulk system capacity needs and distribution investment needs. Creating rate designs, planning regimes, and markets to realize this value is crucial to reducing costs in the Southeast region.

To allow small resources to provide value to the bulk system, states also need rules to coordinate the operational interface between the low-voltage and high-voltage power systems, a nexus called the transmission-distribution (T-D) interface.

At the transmission level, a regional RTO needs to develop non-discriminatory rules for aggregated DER participation in these markets. At the distribution level, utilities need to create rules and communication protocols for these aggregators to receive fair value for their services without disrupting local reliability. Though no perfect model exists for this, a research agenda to improve T-D coordination was laid out by California stakeholders in a collaborative process in 2017.[vii]

Decision-maker	Policy

PUCs	Encourage efficient DER investment by undertaking integrated distribution planning. Create rate designs, planning regimes, and markets to realize this value.
PUCs, utilities, future Southeast wholesale energy markets	Investigate and create rules to coordinate the operational interface between the low-voltage and high-voltage power systems, a nexus called the transmission-distribution (T-D) interface.

SUPPORTING COMPETITIVE PROCUREMENT

Complementary to regional energy markets, opening up utility-led procurements to competition can yield significant cost, emissions, and jobs benefits. As VCE®'s modeling shows in the Economic IRP Scenario, about three-quarters of the cost benefits and a third of the emissions benefits of competition can be obtained by improving single-utility planning and procurement.

Vertically integrated utilities have market power as single sellers (monopolies) and single buyers (monopsonies). As sole buyers, they have control over inputs to and methods for conducting resource planning, as well as methods and assumptions used to evaluate bids received in competitive procurement processes. With the acquiescence of their regulators, these utilities can:

- Control information and impose biases on procurement processes, which can discourage or disfavor otherwise competitive procurement opportunities.
- Exercise arbitrary or unfair decision making, which may result in a competitive project being rejected or saddled with unreasonable costs or delays.
- Impose terms and conditions that may result in sellers having to accept below-market prices or onerous contract requirements in order to remain active in the market.

When these practices occur, utilities may retain or procure uneconomic resources. As both monopolies and monopsonies, vertically integrated utilities have financial incentives to seek opportunities to invest their own capital in generation and keep uneconomic resources operating, even at above-market prices, and even to the point of costly over-procurement.

At the time of this report's writing, many Southeastern utilities are rushing to acquire new natural gas-fired capacity and clinging onto coal-fired generation when substantial costs and environmental impacts could be avoided by embracing clean alternatives. This is apparent when comparing the IRP case, in which the reserve margin continues to increase and coal generation lingers, to other scenarios embracing competition. In addition to driving up costs, these planned procurements likely conflict with stated utility goals to reach net-zero carbon emissions by mid-century.[viii]

All-source procurement is an emerging best practice to take advantage of the competitive economics of wind, solar, and storage. All-source procurement means whenever a utility (and its regulators) believe it is time to acquire new generation resources, it conducts a unified resource

acquisition process. In that process, the capacity or generation resource requirements are neutral with respect to the full range of potential resources or resource combinations available in the market. In recent cases, such as Xcel Energy[ix] and Northern Indiana Public Service Company,[x] all-source procurement has revealed that a renewables- and storage-heavy resource mix with accelerated coal retirements is also the most affordable.

A report from Energy Innovation and Southern Alliance for Clean Energy[xi] details best practices for all-source procurement to help regulators replicate leading utilities' results, with the Colorado model as the lead example. The following measures can help ensure competitive all-source procurement results in fair consideration of a portfolio of low-cost clean electricity resources in utility procurement:

1. Regulators should use the resource planning process to determine the technology-neutral procurement need.
2. Regulators should require utilities to conduct a competitive, all-source procurement process, with robust bid evaluation.
3. Regulators should conduct advance review and approval of procurement assumptions and terms.
4. Regulators should renew procedures to ensure utility generation ownership is not at odds with competitive bidding.
5. Regulators should revisit rules for fairness, objectivity, and efficiency.

While regional optimization further improves these outcomes, states that are hesitant to embrace a regional approach or restructure utilities can still make significant progress on cost and emissions by embracing best practices for competitive utility procurement. So long as procurement and resource adequacy remain the responsibility of monopoly utilities, all-source procurement ensures clean electricity resources have a fair shot to serve customers while reducing costs.

This recommendation begs the question – "Is this kind of reform necessary if utilities agree to be part of an independently operated RTO?" The answer depends on the market structure, but is likely affirmative. Some markets such as PJM Interconnection, ERCOT, and ISO-New England require participant utilities to divest from generation (with some exceptions), i.e. generation is fully competitive. These same states have also engaged in retail restructuring, meaning customers can choose and switch their electricity providers, which are essentially financial intermediaries seeking the best possible deal for customers. In these markets, competitive retailers take the responsibility of procurement, while the RTO retains responsibility for ensuring resource adequacy and transmission planning. If the Southeast adopted a similar market structure, regulators generally would not need to engage in integrated resource planning.

By contrast, Midcontinent ISO (MISO) and Southwest Power Pool (SPP) allow vertically integrated utilities to participate in the markets. MISO and SPP states retain jurisdiction over resource procurement and resource adequacy but achieve efficient dispatch, competitive market access,

and transmission planning through RTO participation. If the Southeast adopted a similar market structure, integrated resource planning would take a smaller role complementing the grid operators oversight of resource adequacy.

Decision-maker	Policy
PUCs	As long as resource adequacy and procurement remain under state regulatory authority, require utilities to adopt all-source technology procurement practices.

FULL RESTRUCTURING: MARKET DESIGN CONSIDERATIONS

WIS:dom®-P provides a snapshot into the potential of a regional competitive market to drive down costs in the Southeast, speed the transition to lower-cost clean energy resources, and encourage efficient diversified investments across the region. But this model operates with perfect foresight and information, not implying a particular real market structure but instead simulating a competitive outcome. In practice, competitive electricity markets are imperfect mechanisms balancing many goals which vary by region. Though the consumer benefits of competition are clear, the extent that RTO Scenario benefits are achieved depends in large part on the market design itself.

RTO participation requires choosing how resource adequacy is maintained. Some markets have opted to create mandatory capacity markets to ensure resource adequacy. Unfortunately, these markets have tended to limit participation from resources needed to achieve state goals and promote clean resources while over-procuring other resources. Other markets leave resource adequacy to state jurisdiction, such that regulators approve individual utility plan and regional reliability coordinators simply ensure no utility falls short. States have tended not to pursue reserve sharing efficiencies on their own, or placed investment risk on utilities, leaving over-procurement risks on captive customers of those utilities. These same markets, like MISO, can have residual voluntary capacity markets to efficiently make up for shortfalls. In some cases, the coexistence of vertically integrated utilities within competitive wholesale markets has led to a preference for utility-owned generation, which can operate at steep losses in the marketplace and pass those losses onto captive customers.[xii]

Any Southeast RTO should consider these design challenges as well as where the resource mix is likely to go given recent cost trends and state and federal policy goals. Rather than specify a particular market structure here, Energy Innovation, Grid Strategies, and the Regulatory Assistance Project (RAP) have provided the following principles for market design[xiii] that can achieve a very low-carbon electricity system at least cost:

1. Accommodate rapid decarbonization, including eliminating barriers to zero-carbon resource participation.
2. Support grid reliability, so the incremental costs of reliability do not exceed the amount customers would knowingly be willing to pay for, or do not exceed incremental benefits.

3. Promote short-run efficiency through optimized dispatch of the lowest-cost resource mix, and use existing and emerging technologies to manage reliability and congestion.
4. Facilitate demand-side participation and grid flexibility.
5. Promote long-run efficiency – including efficient, competitive entry to and exit from the market – under conditions of significant uncertainty.
6. Minimize the exercise of market power and manipulation.
7. Minimize the potential for distortions and interventions that would prevent or limit markets' ability to achieve efficient outcomes, consistent with the public interest (including overarching public interest in a sustainable environment and economy).
8. Enable adequate financing of resources needed to deliver cost-effective reliability, based on efficient risk allocation (i.e., those that can best mitigate risk should bear it) to prevent customers from bearing the cost of poor investment decisions made by private investors.
9. Be capable of integrating new technology as electricity needs evolve, and adapting as technology changes.
10. Have readily and realistically implementable designs.

None of the existing market structures are perfect, but consistent application of these principles can help ensure a Southeast RTO is driving toward a cheaper, cleaner, resilient power system that this report shows is possible.

Decision-maker	Policy
Southeast RTO Stakeholders (regional utilities, PUCs, advocates, large consumers, IPPs)	Ensure reserve sharing and open transmission are robust parts of any new market design.
Southeast RTO Stakeholders (regional utilities, PUCs, advocates, large consumers, IPPs)	Ensure that any market design is compatible with rapid, low-cost, affordable decarbonization, using the Energy Innovation/RAP/Grid Strategies principles as guideposts.

ENABLING THE CLEAN ENERGY TRANSITION

SUPPORTING UTILITY DECARBONIZATION GOALS

As modeling indicates, the flexibility and resource diversity supplied by a regional market markedly reduces decarbonization costs. Market reform alone, however, will not ensure that states achieve their necessary (and in many cases stated) decarbonization goals. In concert with market reforms enhancing regional efficiency and competition, states should adopt aggressive, technology-neutral clean energy standards and appropriate procurement mechanisms to incentivize flexible, low-cost resources. Duke Energy and Southern Company have been leaders

in announcing aspirational goals to reach zero carbon emissions by midcentury; a clean electricity standard is an ideal policy to ensure these goals are actually realized while market reform would help ensure this happens closer to least cost.

A recent report from UC Berkeley shows that a national 90 percent clean electricity standard by 2035 is achievable while reducing costs, and a similar state or regional policy is prudent.[xiv] Recent utility announcements to reach similar clean electricity targets are incongruent with their existing proposals to build new natural gas plants and maintain existing coal,[xv] highlighting the need for interim clean electricity targets to hold these companies accountable to their own net-zero ambitions without gold plating the system.

Decision-maker	Policy
U.S. Congress	Pass a federal clean energy standard with the following schedule: 55 percent by 2025, 75 percent by 2030, 90 percent by 2035, 100 percent by 2045.
Governors, state legislatures	Pass state clean energy standards of 90 percent by 2035 (or earlier), 100 percent by 2045 (or earlier), with interim three-five-year targets to ensure continuous improvement. Consider regional compliance mechanisms to save on cost.

MANAGING THE COAL TRANSITION

Transitioning to a competitive market creates winners and losers. As competition completely phases out coal by 2040 in the RTO Scenario, coal plant workers and the communities they support are likely to be hit hard by the transition to a competitive market. Policy can support this community transition including investing in clean electricity resources, transmission, reclamation, and other infrastructure projects in impacted areas.

Communities in which coal power plants operate often heavily rely on current tax revenue to sustain municipal services. With the coal industry's collapse, these communities and workers can transition to a sustainable economic future in part through investment in clean energy infrastructure. Stopgap funding to supplement the tax base provided by retired coal power plants may be required, particularly where coal plants are highly vulnerable to competition. Colorado provides one model for this. Recent legislation created a "Just Transition Office," empowering it to submit a plan to the legislature to establish benefits including supplementing tax revenue and establishing healthcare benefits in coal transition communities.

A second step is reinvesting in these communities through local clean electricity resources. Recent drops in wind, solar, and storage technologies mean these resources are more affordable in more places. A recent analysis by Energy Innovation and Vibrant Clean Energy revealed that nearly all coal-fired power plants have even cheaper solar or wind resources within 35 miles of the plant.[xvi] That's close enough to yield local tax and employment benefits, while also minimizing the need for new transmission to access the grid. A recent coal plant retirement in New Mexico provides a useful model for this approach. Following the passage of the Energy

Transition Act, the Public Service Company of New Mexico announced the retirement and replacement of its 497-megawatt retail share of the San Juan Generation Station. Regulators ultimately accepted an intervenor-proposed portfolio of solar, battery storage, energy efficiency, and demand response to replace the retiring capacity, which will invest over $1 billion directly in the region impacted by the coal plant retirement.[xvii]

Utilities also face significant risk and opportunity in a rapid transition away from coal-fired generation. With regulatory approval, utilities may increase equity earnings by moving capital from uneconomic generation plants requiring very large inputs of fuels, such as coal and natural gas, to capital-intensive plants that employ free fuel, such as solar and wind. This "steel for fuel" investment strategy was called the "Second Wave of Clean Energy" in a recent report from Morgan Stanley, which identified $64 billion in capex upside for utilities replacing coal with renewables.[xviii] However utility ownership of wind, solar, or storage must not come at the expense of consumers; utilities bear the burden of proving utility ownership is the least-cost approach by subjecting resource procurement to robust solicitations.

Decision-maker	Policy
PUCs, utilities	Investigate the economics of clean energy projects local to uneconomic coal generation through competitive bidding. Consider expressing a preference for these projects in bid selection to replace coal generation.
State legislatures	Consider creating a just transition office to provide state technical and financial assistance to communities adversely impacted by fossil retirements.
PUCs, utilities	Embrace the coal-to-clean transition by providing utilities reasonable opportunity to own clean replacement generation in an open, competitive bidding process if the utility can demonstrate cost or risk advantages.

CONCLUSION

VCE®'s Southeast analysis makes it clear that greater competition and regional coordination could create massive cost savings, increase employment, reduce emissions, and improve market access for clean energy resources. Much of the opportunity is a function of the dysfunctional status quo. Aggregating utility integrated resource plans makes it clear they have huge opportunities for improvement. Regional competitiveness, participation in the fast-growing clean energy economy, and market fairness depend upon making significant progress in this direction.

At the very least, policymakers considering going down the road to a regional market or state-level competitive procurement should be encouraged by this analysis to keep pressing in legislative and regulatory forums. It's no longer 2000 – 20 years since the California Energy Crisis have proved that regional competitive electricity markets can work effectively. Incremental

approaches such as an EIM, or competitive utility procurement, can yield significant benefits, and set the region on a path to continue improving the competitiveness of the electricity industry. State stakeholders where utilities block competitive reforms now have new quantitative findings to challenge the assumption that the way utilities have done business is in the public interest. We are in a period of rapid technological transition - the status quo of balkanized uncompetitive monopolies will not leverage the potential of this moment.

ENDNOTES

[i] Jennifer Chen, "Evaluating Options for Enhancing Wholesale Competition and Implications for the Southeastern United States," Policy Brief (Nicholas Institute for Environmental Policy Solutions, Duke University, March 2020), https://nicholasinstitute.duke.edu/sites/default/files/publications/Evaluating%20Options%20for%20Enhancing-Wholesale-Competition-and-Implications-for-the-Southeastern-United-States-Final_0.pdf.

[ii] "ISO Announces the Western EIM Surpassed $1 Billion in Benefits," News Release (California Independent System Operator, July 29, 2020), http://www.caiso.com/Documents/ISO-Announces-Western-EIM-Surpassed-1Billion-Benefits.pdf.

[iii] Murray, "Reforming The Carolinas' Power Markets: Producing A Panacea Or A Pandora's Box?"

[iv] Iulia Gheorghiu, "Duke, Southern Plan Path for Southeast Energy Imbalance Market," *Utility Dive*, July 14, 2020, utilitydive.com/news/duke-southern-plan-path-for-southeast-energy-imbalance-market/581556/.

[v] The RTO Scenario did not consider energy efficiency a resource it could use to optimize cost, beyond what was already present in utility IRP load forecasts.

[vi] Kurt Volkmann, "Integrated Distribution Planning: A Path Forward" (GridLab, 2019), https://gridlab.org/wp-content/uploads/2019/04/IDPWhitepaper_GridLab-1.pdf.

[vii] "Coordination of Transmission and Distribution Operations in a High Distributed Energy Resource Electric Grid" (CAISO, PG&E, SCE, SDG&E, More Than Smart, June 2017), https://www.caiso.com/Documents/MoreThanSmartReport-CoordinatingTransmission_DistributionGridOperations.pdf.

[viii] David Pomerantz, "Utility Carbon Targets Reflect Decarbonization Slowdown In Crucial Next Decade" (Energy & Policy Institute, June 25, 2019), https://www.energyandpolicy.org/utility-carbon-targets/.

[ix] Robert Walton, "Xcel Solicitation Returns 'incredible' Renewable Energy, Storage Bids," *Utility Dive*, January 8, 2018, https://www.utilitydive.com/news/xcel-solicitation-returns-incredible-renewable-energy-storage-bids/514287/.

[x] NIPSCO Announces Addition of Three Indiana-Grown Wind Projects, February 1, 2019, nipsco.com/our-company/news-room/news-article/nipsco-announces-addition-of-three-indiana-grown-wind-projects.

[xi] John Wilson et al., "Making the Most of the Power Plant Market: Best Practices for All-Source Electric Generation Procurement" (Energy Innovation & Southern Alliance for Clean Energy, April 2020), https://energyinnovation.org/wp-content/uploads/2020/04/All-Source-Utility-Electricity-Generation-Procurement-Best-Practices.pdf.

[xii] Jeremy Fisher et al., "Playing with Other People's Money: How Non-Economic Coal Operations Distort Energy Markets" (Sierra Club, October 2019), https://www.sierraclub.org/sites/www.sierraclub.org/files/Other%20Peoples%20Money%20Non-Economic%20Dispatch%20Paper%20Oct%202019.pdf.

[xiii] Sonia Aggarwal et al., "Wholesale Electricity Market Design for Rapid Decarbonization" (Energy Innovation, Regulatory Assistance Project, Grid Strategies, June 2019), https://energyinnovation.org/wp-content/uploads/2019/07/Wholesale-Electricity-Market-Design-For-Rapid-Decarbonization.pdf.

[xiv] Amol Phadke et al., "2035 Report: Plumetting Solar, Wind, and Battery Costs Can Accelerate Our Clean Electricity Future" (Goldman School of Public Policy Analysis & GridLab, June 2020), 2035report.com.

[xv] David Pomerantz, "Utility Carbon Targets Reflect Decarbonization Slowdown In Crucial Next Decade" (Energy & Policy Institute, June 25, 2019), https://www.energyandpolicy.org/utility-carbon-targets/.

[xvi] Gimon et al., "The Coal Cost Crossover: Economic Viability of Existing Coal Compared to New Local Wind and Solar Resources."

[xvii] Catherine Morehouse, "New Mexico Approves 100% Renewables + Storage Replacement for San Juan Coal Capacity," *Utility Dive*, July 30, 2020, https://www.utilitydive.com/news/new-mexico-approves-100-renewable-replacement-for-san-juan-coal-capacity/582557/.

[xviii] Darren Sweeny, "Morgan Stanley: $64B Capex Upside for Utilities Replacing Coal with Renewables," *S&P Global Market Intelligence*, February 18, 2020, https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/morgan-stanley-64b-capex-upside-for-utilities-replacing-coal-with-renewables-56987725.