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Leveraging the Natural Advantages of the Electric Utility: A 51st State Roadmap

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Background

- In September 2014, the Smart Electric Power Alliance (SEPA) launched the 51st State Initiative with two primary objectives:
  - To create equitable business models and integrated grid structures to ensure that electricity is provided safely, reliably, efficiently, affordably, and cleanly
  - To meet customer demand in the near and long term for solar and other distributed options
- In Phase I of the Initiative, stakeholders were asked to articulate their own vision for the energy future, operating under a scenario where they had a new 51st state that was a blank slate in terms of regulatory regimes, market structures, and utility business models
  - A "crowd-sourced" effort resulted in SEPA receiving 13 "concept papers" from a variety of perspectives, including former FERC Chairman Jon Wellinghoff, American Public Power Association, National Rural Electric Cooperative Association, and Pace Energy & Climate Center
- In September 2015, SEPA launched Phase II of the Initiative to identify what specifically needs to change, when those changes should occur, and how all aspects of the industry are impacted
  - SEPA once again used a crowd-sourced effort to solicit roadmaps that move current utility structures toward visions of the future. In particular, SEPA requested that roadmaps outline the incremental steps required to make market transformation successful for all parties
  - SEPA also requested respondents address the actions and impacts in six distinct swim lanes: Retail Market Design, Wholesale Market Design, the Utility Business Model, Asset Deployment Timing and Requirements, Information Technology Needs, and Rates and Regulation
  - SEPA received 14 Phase II Roadmap submissions, with participants including American Public Power Association, Arizona Public Service, PSEG, Siemens, and Vermont Energy Investment Corporation
- ScottMadden submitted a 51st State Phase II Roadmap in March 2016. This presentation outlines key findings from our analysis and provides a high-level framework designed for a specific future state examined during the thought exercise

51st State Phase II Roadmaps were designed to reach a future state with high penetrations of distributed energy resources that provide net benefits to the electric system (e.g., congestion relief) and broader society (e.g., emission reductions).

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Guiding Principles

Guiding principles can be used ensure a future state with distributed energy resources (DER) is sustainable and meets long-term objectives.

- Expand customer choice and access to DER in a manner that promotes competitive and strategic deployment based on value, benefits, and costs while ensuring cost-effective and reliable grid operations
- Maintain a simple, easy-to-understand basic service with simple rates. Offer alongside it additional services with differentiated pricing—as occurs with almost any other good or service. For additional services, minimize complexity in market design and transactions
- Promote least-cost operation of the electric system. When customer choice does not result in least cost, price accordingly using an equitable, cost-causer-pays basis
- Ensure the electric utility retains an obligation to serve all customers and remains the energy provider of last resort
- Ensure the electric utility retains the opportunity to earn a return on prudent investments and is neither constrained nor advantaged in offering new services
- Ensure third-party DER service providers are granted non-discriminatory access to the distribution grid. Conversely, allow the electric utility to leverage comparative advantages (e.g., low cost of capital) when offering new services
- Ensure safe and reliable operations of the electric grid while encouraging testing and deployment of new technologies that improve operational performance

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ScottMadden's Perspective

- DER can provide net benefits to the electric system (e.g., congestion relief) and broader society (e.g., emission reductions); however, despite these advantages, the deployment of high penetrations of DER has proved challenging for the following reasons:
  - **Newness of Technology** – Despite some high-profile markets, DER assets are relatively new to the electric grid. Electric utilities and grid operators continue to learn how to efficiently integrate these technologies
  - **Lack of Granular Information and Data** – Historically, the electric grid consisted of a small number of centralized generation units. Electric utilities and grid operators did not require granular information and data to safely and reliably operate the grid
  - **Misaligned Regulatory Model** – A regulatory model focused on long planning cycles and risk aversion may be stressed by the rapid growth of DER assets and technology innovation
- Against this backdrop, the electric utility is often singled out as a fundamental barrier to deployment of DER assets. To overcome the perceived electric utility shortcomings, many stakeholders conclude that a completely new model is needed for the electric industry. We disagree with this assessment and instead believe electric utilities maintain natural advantages that can be leveraged to deploy renewables and DER assets as well or better than some models being offered. Specific natural advantages of the electric utility include:
  - **Customer Relationship** – After providing a reliable and valuable service for decades, the electric utility is well positioned to introduce and educate customers about DER assets and other new technologies
  - **System Management** – The electric system will continue to exist, continue to provide value to customers, and continue to require active management. In addition, the laws of physics will continue to dictate where and how electricity moves through the system. The utility has long managed this dynamic system and is best positioned to continue to serve in this role
  - **Reliability and Security** – Along with system management, the electric utility is responsible for the reliability and security of the grid. As the composition of the grid changes, the electric utility needs to continue to meet reliability and security standards
  - **Transaction Costs** – The electric utility is in the best position to "balance" transaction costs during operations. The alternative is the implementation of costly administrative overlays

ScottMadden believes DER assets can be deployed at high penetrations without creating a whole new *construct* for the electric industry. Instead, we propose leveraging the natural advantages of the electric utility in order to accelerate the deployment and penetration of DER assets.

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High-Level Framework

Stage 1: Develop Standards, Protocols, and Codes of Conduct

- Standards, protocols, and codes of conduct are essential to provide clear and transparent guidance to third-party service providers and the electric utility on a range of system control issues
- Key topics include data communication protocols, grid operations, and grid visibility (e.g., knowing the location and operating status of DER assets)

Stage 2: Define Retail and Wholesale Interaction

- The interaction between retail and wholesale markets is critical in order to achieve a high DER penetration and efficient system operations
- The regulator, electric utility, and RTO/ISO (if present) play key leadership roles in defining DER assets eligible for rate riders, developing methodologies that assign value to DER assets, linking aggregated DER assets to the wholesale electricity market, and building IT infrastructure and processes required for robust data analytics

Stage 3: Reform Rates and Regulations

- Reforms use market signals to encourage targeted and incremental deployment of selected DER asset, thereby mitigating stranded costs
- Different rate rider payments within a customer class is a break from traditional ratemaking

Stage 4: Modify Utility Operations and Business Model

- Modifications to the utility operations and business model do not require any regulatory action; reforms in previous stage authorize changes to rates and new business models
- In this stage, the electric utility will need to address real-time operations, review organizational structure and processes, and conduct customer outreach. The development of utility DER business models should include customer engagement and pilot projects

Stage 5: Iterate and Improve Framework

- The final stage ensures long-term success by evaluating early lessons learned and incorporating DER assets into long-term planning
- A cycle of continuous improvements will allow the addition of new DER assets and manage changes in broader market or policy conditions

Checkpoint #2
- Enact rate and regulatory reforms

Checkpoint #1
- Confirm standards, protocols, and codes of conduct are comprehensive and ensure safe and reliable grid operations
- Confirm retail and wholesale market interaction will promote high DER penetration and efficient system operations

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Case Study: Wires-Only Utility

Current State

- The current state assumes an investor-owned distribution utility operating in a deregulated market and serving urban and rural customers who may select their energy provider
- The utility may not own any generation assets, and the wholesale market is managed by an RTO/ISO
- The current state does not include aggressive state-level policies supporting renewable energy. In particular, there is no renewable portfolio standard nor state tax credit. Third-party ownership of distributed generation is not permitted in the current state
- The only policy mechanism supporting DER is retail net metering. The policy has resulted in a small, but growing base of distributed solar PV systems

Future State

- Customers connecting DER assets to the distribution grid receive a payment or incur a charge through a rate rider on their utility bill as authorized by DER rate schedules. The payment or charge is commensurate with the positive or negative value the DER asset provides the electric system
- The value of a particular DER asset is influenced by the time and location at which the asset is installed. DER rate schedules may include caps (e.g., maximum MW of distributed solar on the system or a circuit) and are updated at regular intervals (e.g., annual update). Rate rider values may change significantly between updates, thereby reflecting current grid composition and value of DER. While the rate rider may change for new customers, existing customers are grandfathered on their original rate
- Customers may obtain a portfolio of DER assets from the electric utility or third-party service providers. The electric utility may install, own, and earn a return on investment on DER assets in their service territory. Third-party service providers may also own and operate DER assets
- The introduction of DER rate schedules is coupled with the phasing out of full retail rate net metering. In addition, a system charge (or similar mechanism) is implemented to ensure the electric utility is being adequately compensated for the reliability, backup ancillaries, and other values of the grid that are essential to the economy
- DER assets are aggregated and provide services to the RTO/ISO operating the wholesale market

Case study is derived from ScottMadden's 51st State Phase II Roadmap submission. Full report can be found at sepa51.org

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Case Study: Wires-Only Utility (Cont'd)

KEY ACTIONS

Stage 1: Develop Standards, Protocols, and Codes of Conduct

- Develop and maintain grid interconnection and integration standards and protocols
- Develop and maintain robust cybersecurity standards
- Develop third-party code of conduct for customer data
- Update utility code of conduct to ensure fair competition if utility owns DER assets

Stage 2: Define Retail and Wholesale Interaction

- Identify DER assets to be supported by retail customer rate riders
- Develop methodologies to price the value of each type of DER asset on the distribution grid
- Identify DER assets to be aggregated and provide services to RTO/ISO
- Develop mechanisms and markets for aggregated DER assets in the wholesale electricity market
- Develop infrastructure and processes to allow robust data analytics

Checkpoint #1
- Confirm standards, protocols, and codes of conduct are comprehensive and ensure safe and reliable grid operations
- Confirm retail and wholesale market interaction will promote high DER penetration and efficient system operations

Stage 3: Reform Rates and Regulations

- Require DER providers to comply with standards, protocols, and codes of conduct
- Establish rules for utility ownership and returns on investment in DER
- Permit stakeholders to aggregate and leverage DER assets in wholesale market
- Design system charges to cover fixed operating costs to accommodate DER
- Replace net metering with DER rate riders

Stage 4: Modify Utility Operations and Business Model

- Refine utility operations to reflect growth of DER assets
- Identify utility-owned DER opportunities and business models
- Market test utility-owned DER business models
- Select successful utility-owned DER business models

Checkpoint #2
- Enact rate and regulatory reforms

Stage 5: Iterate and Improve Framework

- Modify market and regulatory rules based on early lessons learned
- Develop processes and methodologies that integrate DER into long-term distribution planning
- Develop processes and methodologies that integrate DER into long-term ISO/RTO planning

Swim Lanes

RM	Retail Market Design
WM	Wholesale Market Design
UB	Utility Business Model
AD	Asset Deployment
IT	Information Technology
RR	Rates and Regulation

Signposts
- Emergence of new technologies or major advances in existing technology
- Acceleration of DER penetration
- Change in public policy

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Moving Forward: No Regrets Actions

- ScottMadden recommends electric utilities consider how they can build the platform necessary to deploy high penetrations of DER assets. The platform should be robust and flexible enough to accommodate a variety of existing and future DER assets
- While the high-level framework provides a comprehensive approach to build this platform, immediate “no regrets” actions that may be considered include:
  - **Building a data system infrastructure to prepare for the future addition of DER assets to the electric grid.** The growth of DER assets will require analysis of large volumes of operations data from disparate sources. Developing IT processes and infrastructure will allow real-time exchange of data between grid operators and inform operational decisions impacting grid reliability
  - **Developing a regulatory model and strategy to shape DER growth on the electric grid.** Moving to a future state with high penetrations of distributed energy resources will require significant regulatory changes. Now is the time to envision the preferred future state and regulatory model and strategy to get there
  - **Refining real-time operations to reflect the management of DER assets on the electric grid.** Real-time operation updates may require expanding grid visualization and further distribution automation tools to provide more granular insight into grid operations. This may also include reviewing organizational structures and processes
  - **Develop processes and methodologies that integrate DER into long-term distribution planning.** Achieving high penetrations of DER deployment and efficient grid operations will require electric utility to develop processes that integrate DER into long-term planning

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