



A Journey Across The 51st State

**HIGHLIGHTS AND INSIGHTS
FROM SEPA'S INITIATIVE
ON THE FUTURE OF THE
ELECTRIC POWER SECTOR**

JANUARY 2019

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ABOUT SEPA

The Smart Electric Power Alliance (SEPA) is an educational nonprofit working to facilitate the utility industry's transition to a clean energy future through education, research, standards and collaboration. SEPA offers a range of research initiatives and resources, as well as conferences, educational events and professional networking opportunities. SEPA is founder and co-sponsor of Solar Power International and winner of the Keystone Policy Center's 2016 Leadership in Energy Award. For more information, visit www.sepapower.org.

Executive Summary

Industry transformations are hard and messy—full of both risks and opportunities—and the electricity industry is in the middle of one. Utilities’ technical operations and business models are under significant pressure from growing deployments of distributed energy resources (DERs)—including photovoltaic solar, energy storage, and demand response—as well as increasingly sophisticated sensing, communications, and control technologies. The stresses caused by these technologies are compounded by pressures from new policies and evolving consumer expectations.

In response, given its deep relationships with both electric power utilities and the renewables industry, the Smart Electric Power Alliance (SEPA) launched the 51st State Initiative in 2014. The goal

of the initiative was to try to move beyond the adversarial nature of existing debates and instead foster a community committed to collaboratively and constructively discussing the ways in which the power sector might evolve for long-term optimal deployment of DERs. Simply put, SEPA’s 51st State Initiative aimed to help leaders in the diverse parts of the U.S. power sector figure out how to plan for and navigate their journeys into the future.

The first step in planning that journey was to envision possible future destinations. Accordingly, Phase I of the initiative focused on generating visions for the future of the energy system, including how utilities will operate in various envisioned scenarios.

Defining these potential future marketplaces required participants to envision a hypothetical 51st State—a blank slate, with no existing constraints to prevent the development of an ideal structure. The proposed futures submitted by participants

represented a continuum of transformation, from incremental modifications to extensive changes to the existing paradigm.

With the beginnings of an understanding of potential destinations in hand, the next step in planning the journey was to figure out how to get there. Phase II of the initiative thus aimed to create meaningful dialogue about the fundamental ways in which current structures need to transform to meet different visions of the future. Phase II focused in on six specific market-defining issues: retail

market design, wholesale market design, utility business models, asset deployment, information technology, and rates and regulation.

Based on the various Phase I visions and Phase II roadmaps that were submitted, a series of common perspectives or “doctrines” emerged related to promoting efficiencies, clearly defining roles, outlining the principles of ratemaking, and creating customer choice. These four doctrines were intended to provide the foundation for reform conversations, serving as a compass of sorts to guide discussions about future paths.

The next step in planning the journey, Phase III, was to ask participants to focus again—this time with even greater clarity—on the destinations for utilities, specifically regarding the role of the regulated

“Would you tell me, please, which way I ought to go from here?”
said Alice.

“That depends a good deal on where you want to get to,” said the Cat.

“I don’t much care where—” said Alice.

“Then it doesn’t much matter which way you go,” said the Cat.

“...so long as I get SOMEWHERE,”
Alice added as an explanation.

“Oh, you’re sure to do that,” said the Cat, **“if you only walk long enough.”**

—Lewis Carroll, *Alice in Wonderland*



monopoly utility. Through the insights gathered from Phase III, and from Phase I and II of the initiative, SEPA developed frameworks to help guide thinking on options for choosing a destination—which parts of the natural monopoly to pack for the future and which to leave behind.

Specifically, SEPA developed frameworks to help those in the power sector understand, contemplate, and analyze key criteria for power system design, different constructs for future utility business models, and ways to evaluate those different constructs. For example, SEPA identified five utility constructs: wires only, distribution system platform, interconnector and integrator, DER provider, and energy services company. These constructs can enable and optimize different power system design criteria. SEPA also enumerated the various key functions of the distribution system and suggested questions to ask regarding where the boundaries of the “natural monopoly” lie.

Through the 51st State Initiative, SEPA has come to appreciate that the journey to the future electricity

marketplace is one fraught with complicated choices. Given the complexity, scale, and diversity of actors involved in this transition, SEPA does not claim to have definite answers on what the right utility business model or role should be—or even on all the questions that must be addressed along the way. Moving forward, the four doctrines that emerged in Phase II and the various frameworks that emerged in Phase III can serve as important starting points for broad stakeholder conversations, however. The doctrines and frameworks can also lead to agreement on some strategies that utilities, regulators, and policymakers can put into place early to prepare the electric power system for optimal DER deployment.

As the 51st State transitions from a stand-alone initiative into part of SEPA’s organizational DNA, this paper aims to be a useful guide for the 51st State community and others in the U.S. power sector. SEPA will continue to convene its members both to look around the corner to what the future might hold and to help individuals and entities progress on their transformational journeys.

Reasons for the Journey: Key Industry Trends and History of the 51st State Initiative

Industry transformations are hard and messy—full of both risks and opportunities—and the electricity industry is in the middle of one. Fundamental changes lie ahead.

To be sure, the United States has navigated major power sector transitions several times in the past, including wholesale market restructuring 20 years ago. A transition is currently underway in bulk power, with a shift in generation from coal to natural gas and renewables. However, the transition from a centralized, one-way grid to a more distributed, digital, multidirectional system

that enables greater customer choice could have more sweeping ramifications and be far more complex. The roles of utilities, customers, and technology providers will have to be rethought, as will the approaches that regulators and utility decision makers are taking to address these changes.

The deployment of DERs—photovoltaic solar, energy storage, and demand response, among others—is at the heart of this transformation. Distributed (i.e., rooftop) solar costs have plummeted while performance and consumer

awareness have improved. Distributed energy storage is of growing interest to consumers and is becoming more affordable. Demand response is likely to see a renaissance due to new data analytics capabilities.

At the same time, sensing, communications, and control technologies have become both less expensive and more sophisticated. The combination of lower generation and storage costs (primarily through distributed solar and batteries) and improved technological capabilities (enabling demand flexibility) is forcing the power industry to re-evaluate market design at the distribution level.

Over the past several years, some utilities' technical operations and business models have been under significant pressure from these innovative DER technologies, as well as from new policies and evolving consumer expectations. Other utilities have so far felt little pressure from regulators, stakeholders, or customers.

Regardless of where utilities currently fall on the spectrum in terms of pace of change and degree of urgency, the rapid changes in technologies, costs, and customer desires will, sooner or later, put significant pressure on all electric utilities. Where pressure on utilities from DERs is already strong, utilities have been challenged in responding to and staying ahead of forces of disruption and the threats and opportunities they present.

Some electric utilities' first reaction to DER deployment, specifically in the form of distributed solar, was to oppose and try to repeal net energy metering policies in jurisdictions across the country. That led not only to contentious battles, but also to a growing perception that utilities were part of the problem rather than part of the solution to decarbonizing and democratizing the power system.

The focus on DERs as a threat also fostered talk of a potential "utility death spiral." The fear was that more DERs would lead customers to rely less on electricity from the grid, which would mean fewer kilowatt-hours over which to spread utilities' fixed

costs. That, in turn, would cause rates to go up, which would lead customers to further reduce their reliance on the grid.

Compounding the challenge is the fundamental tension between the drive for innovation, which tends to involve failing fast and often, and the drive for safe, reliable provision of power, which tends to be associated with strong risk aversion. This tension creates a cultural chasm between disruptive technology providers and incumbent utilities.

The Smart Electric Power Alliance (SEPA) conceived of the idea for the 51st State Initiative because many of the state battles over electricity rate reform and net energy metering devolved into intractable conflicts characterized by polarized, all-or-nothing rhetoric. This rhetoric ran counter to the reality that DERs, whether deployed at low or high levels in the years ahead, provide optimal value when deployed for both individual consumer value and system benefits. The issue is not whether DERs are "better" than the traditional central station approach, but rather that deployment of these technologies should be designed for maximum consumer and societal value and not be constrained by current regulatory or business models.

Between any given state's existing policies and legacy systems and the future vision of a cleaner, smarter, more distributed grid lay what SEPA called a "big freakin' wall" of entrenched interests and complex changes. Given its deep relationships with both electric power utilities and the renewables industry, SEPA launched the 51st State Initiative in 2014 to attempt to breach that wall—to move beyond the adversarial nature of existing debates. SEPA aimed instead to foster a community committed to collaboratively and constructively discussing the future direction of the power sector and the ways in which utility business and regulatory models might evolve for long-term optimal deployment of DERs. Rather than starting from existing paradigms, the initiative focused on the end game. That meant it was most usefully situated not in one of the 50 existing U.S. states,

FIGURE 1. THREE PHASES OF THE 51ST STATE INITIATIVE



Source: Smart Electric Power Alliance, 2019.

where legacy systems, policies, and interests would shape views of the future, but rather in a hypothetical 51st state, where it was possible to start with a blank slate.

The 51st State Initiative proceeded in three phases. Phase I focused on generating visions for the future of the energy system, including how utilities would operate in that future. The dozen papers produced as part of this phase then laid the groundwork for Phase II’s more complex challenge of creating practical roadmaps from current models to future ones. The papers and ideas from Phases I and II, in turn, spurred the Phase III effort to more clearly examine the role of the regulated monopoly utility and to create frameworks to guide thinking about the journey towards realization of those future utility models.

In addition to the papers submitted during each phase, the initiative also held summits and intellectual salons during which power industry experts reviewed the submitted papers, discussed core ideas, and built a community rooted in respectful and constructive discourse.

SEPA successfully built a community of hundreds of industry experts across dozens of utilities, regulatory agencies, trade associations, solution providers, advocacy groups, academic institutions, consultancies, and trade press. This community came together to discuss, debate, brainstorm, share, and synthesize their expertise, experience, and perspectives to accelerate the transition to a power system in which DER deployment can be optimized.

SEPA’s 51st State team has been driven by the concept that fostering a safe, collaborative space to exchange ideas and perspectives can expand people’s thinking and advance potential solutions that create value for consumers, solution providers, utilities, and society as a whole. The initiative has now spanned four years, several dozen papers, numerous convenings, hundreds of new relationships, and thousands of conversations.

Even after all that, SEPA does not claim to have definite answers—or even all the relevant questions. Still, SEPA continues to believe that the regulated monopoly utility will continue to play a central role in the supply and delivery of electric power, albeit possibly in profoundly different ways. DERs represent both a threat to utilities’ business models and an opportunity for utilities, if they can adapt both strategy and tactics, to drive value and to be recognized as key enablers of decarbonization, consumer engagement, and grid modernization over the next decade.

As the energy industry, the 51st State, and SEPA all transition, this paper—the capstone for SEPA’s 51st State Initiative—aims to capture the evolution of thought throughout the various phases of the initiative and highlight key learnings and insights drawn from and inspired by the range of papers and conversations. Although the perspective in this paper is purposefully high-level, the hope is that it will prove to be a useful guide for the 51st State community and others in the U.S. power sector as they begin or continue along their transformational journeys into the future.

Envisioning Destinations: Key Takeaways from Phase I

Phase I of the 51st State Initiative focused on generating visions for the future of the energy system, including how utilities will operate in that future. To best encourage broad participation, SEPA issued a call for papers on what the electricity marketplace in a hypothetical 51st state might look like. Defining potential future marketplaces in Phase I required participants to envision a blank slate where no existing constraints, programs, structures, regulations, or restrictions would prevent the development of an ideal structure. This process drew over a dozen conceptual frameworks of varying degrees of complexity (see [Appendix B](#)).

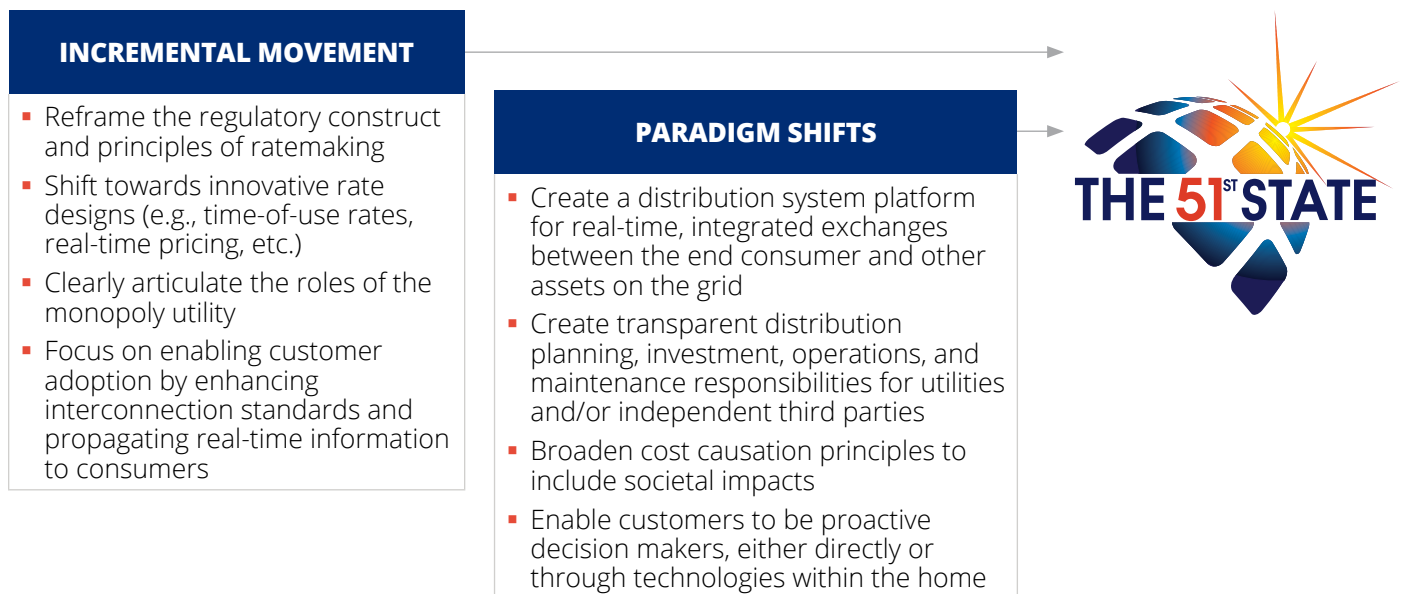
The proposed futures submitted by participants represented a continuum of transformation, from incremental modifications to extensive changes to the existing paradigm.

Among the numerous ideas and perspectives found in the Phase I submissions, there were common elements, as well as points of divergence. Many of the submissions focused little on wholesale markets and much more on transformations of the retail marketplace.

Some authors declared that the current distribution utility already provides an adequate platform for DERs, or could easily adapt to do so, while many others envisioned the need for a wholly new distribution entity or framework.

How such distribution platforms would evolve, which distribution-related functions would need to be provided, and which technological advances were necessary all varied considerably among the Phase I submissions. With regard to rate design, time-of-use or dynamic pricing was a central element in most of the papers that prescribed specific innovations.

FIGURE 2. PROPOSED FUTURES SUBMITTED BY PARTICIPANTS



Source: Smart Electric Power Alliance, 2019.

Building on the papers, the 2015 Phase I Summit introduced additional thoughts and ideas from a range of industry stakeholders, touching on the opportunities presented by fast-evolving technologies, customer empowerment, and increased competition. All in all, Phase I resulted in a diversity of ideas and revealed a range of underlying concerns related to moving toward a more distributed grid.

Beyond the substance of the submissions and discussions, Phase I helped reset the conversation. It gave participants, at the height of the net metering debates, a collaborative space for expanded thinking about the future of the sector. Phase I brought in diverse ideas from a wide range of experts in an unusually open way, increased understanding and coherence around some thorny

issues, and expanded people’s sense of the range of possibilities.

From SEPA’s perspective, another clear outcome of Phase I was heightened awareness of how complicated it actually is to define a future vision of the electricity marketplace. Taken as a group, the concept papers and summit discussions showed the breadth of ideas available for exploring how a future power system that optimizes DERs might look. The more creative the visions, the more they generated questions and a desire for more detailed information, however.

What emerged for SEPA were several concrete, tactical questions, the answers to which might help fill some of the gaps in the visions presented. These questions formed the basis for Phase II.

Figuring Out How to Get There: Key Takeaways from Phase II

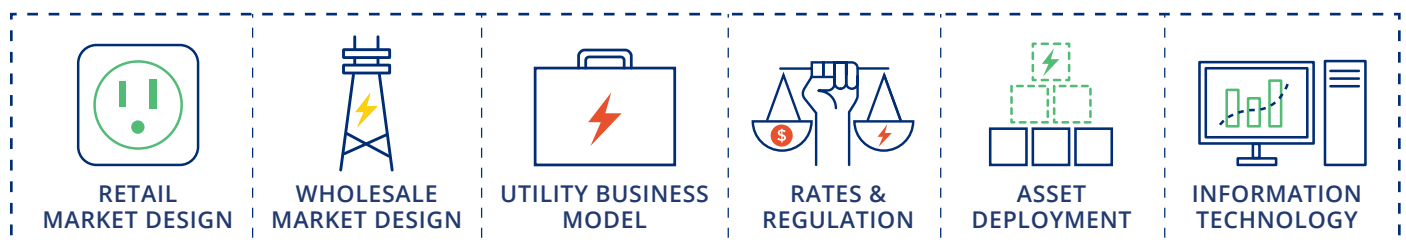
The blank slate ideas from Phase I could not, by themselves, drive the types of constructive conversations that the industry needed to move forward. Those conversations would inevitably have to recognize the wide variety of starting points that exist nationally. Phase II of the 51st State Initiative was designed to do just that—to create meaningful dialogue about the fundamental ways in which current markets need to transform to meet different visions of the future. Phase II aimed to

give more direction to the thought leadership that emerged from Phase I.

SEPA thus issued a call for “roadmap” papers that addressed six specific, market-defining issues or “swimlanes”:

- **Retail market design**—how customers of all classes receive electricity in the 51st State, what DER assets are at their disposal, and how those assets interact with the grid;

FIGURE 3. 51ST STATE SWIMLANES



Source: Smart Electric Power Alliance, 2019.

- **Wholesale market design**—impacts and modifications, if any, to wholesale market models, generation (and generation dispatch), capacity planning, and transmission assets and services;
- **Utility business model**—how utilities need to evolve, if at all, to support new market structures while maintaining safe, reliable, and cost-effective service;
- **Rates and regulation**—how regulatory bodies, rules, and regulations must adapt, and how retail rates must transform over time to allow for the continued economic health of the system and its participants;
- **Asset deployment**—what required technologies (e.g., advanced metering infrastructure, smart inverters) utilities would need to deploy to support the future state, the timing and triggers for those deployments, and how costs would be recovered;
- **Information technology**—what software and communications platforms would be needed to enable the grid of the future, as well as who would own customer data and how cybersecurity would be ensured.

These swimlanes were meant to depict the wide spectrum of areas impacted by the future state of the industry, creating a structured and logical breakdown of the intricacies involved in the power sector. By examining each of these aspects of the marketplace individually, stakeholders could foster a more well-rounded and holistic conversation about how to incrementally revamp today's constructs into something new. Indeed, Phase II challenged participants to think through some tough questions and have robust conversations—both within their organizations and with external stakeholders—about views of the future of the sector.

No clear roadmap or set of roadmaps emerged from Phase II to illuminate the pathway forward. Still, despite differences across and conflicts among the Phase II papers submitted, some common threads emerged out of the roadmaps and the discussions at the Phase II Summit.

For instance, a relatively clear point of consensus at the summit and in the roadmaps was that maintaining the status quo is not an option and would be bad for everybody. Other areas of basic accord were: technology, climate change, and equity were key drivers of change; regulators and utilities face a range of challenges; and structural changes in rate design are needed, as are investments in essential grid infrastructure.

Customers were very much at the heart of many of the Phase II roadmap ideas, with general agreement on the need for an electricity system designed to meet consumer needs and expectations.

Out of the various areas of commonality, SEPA identified four “doctrines” that, while not explicitly stated in any individual paper, permeated the thinking of the broad group of stakeholders that participated in the 51st State Initiative. These four doctrines—promote efficiencies, clearly define roles, outline the principles of ratemaking, and create customer choice—could be viewed as the foundation for reform conversations between utilities, regulators, policymakers, customer groups, and other market participants. The doctrines are not meant to be all-encompassing precepts, but rather starting points for focusing broad stakeholder conversations around market transformation.

The roadmaps and discussions also made clear that regardless of what future markets actually look like, no-regrets investments can be and are being made, such as making the grid more efficient using digital technology to boosting utilities’ “big data” processing capabilities and enhancing cybersecurity.

As in Phase I, the Phase II submissions often did not exactly answer the precise questions. Nonetheless, they offered tremendous insights. In particular, the papers illuminated the four common doctrines and spurred SEPA, in Phase III, to probe more deeply into one doctrine in particular: clearly defining utility roles. Phase II produced many visions of the role of the utility in the 51st State, and the issue seemed to require further exploration.

TABLE 1. FOUR DOCTRINES OF THE 51ST STATE

DOCTRINE		DESCRIPTION
1.	PROMOTE EFFICIENCIES	A primary goal of the market should be to promote efficiencies in the production, consumption, and investment in energy and related technologies.
2.	CLEARLY DEFINE ROLES	The role of the utility, as a public service entity, should be clearly defined so that all market participants can understand their roles in enabling customer options in a fair, transparent, and nondiscriminatory manner.
3.	IDENTIFY PRINCIPLES OF RATEMAKING	Rate structures should provide transparent cost allocation that supports a sustainable revenue model for utility services providing a public good.
4.	FOSTER CUSTOMER CHOICE	Customers should be presented with a variety of rate and program options that expand their choice of and access to energy-related products and services that are simple, transparent, and create stable value propositions.

Source: Smart Electric Power Alliance, 2016.

Deciding on Utility Destinations: Key Takeaways from Phase III

In Phase III, SEPA focused on the second doctrine that emerged from Phase II: “The role of the utility, as a public service corporation, should be clearly defined so that all market participants have open access to enable customer options in a fair, transparent, and nondiscriminatory manner.” In asking participants how one might achieve more clarity on the role of the regulated monopoly utility at the distribution level, SEPA identified the following core questions.

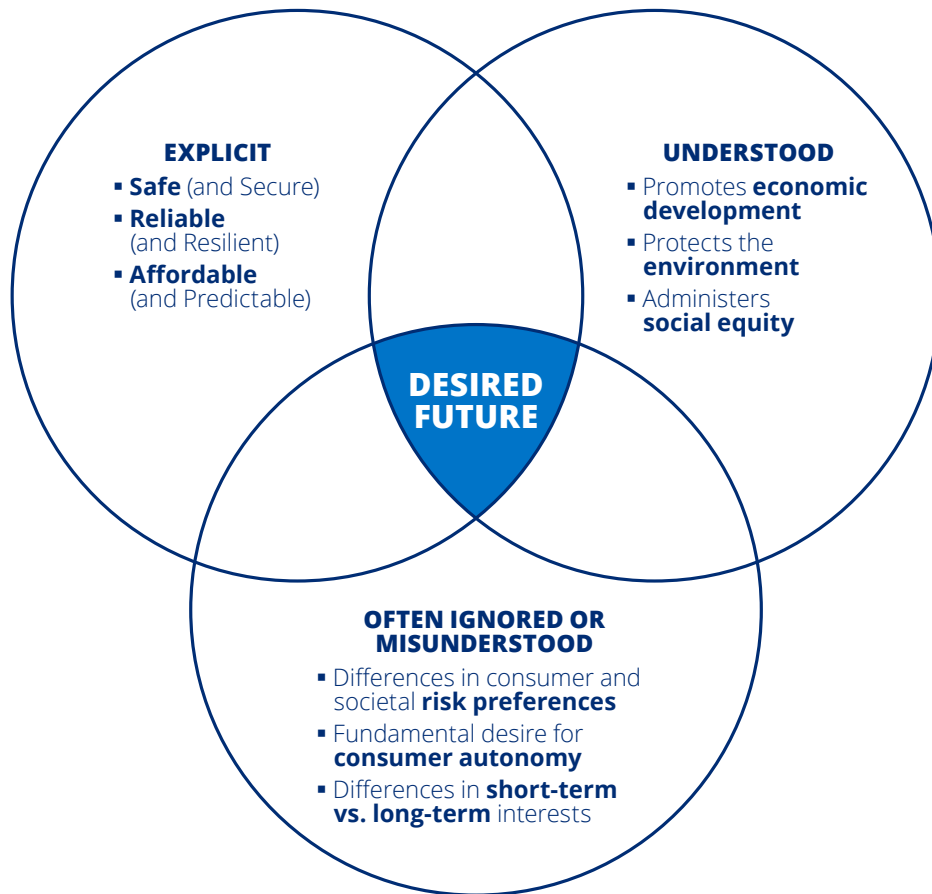
- What are the necessary utility functions regarding generation and delivery of power to consumers?
- Which functions meet the economic or legal definitions of a “natural monopoly?”
- Which additional functions, and related investments, should be compensated through regulated, cost-of-service based revenues as part of the utility’s monopoly franchise, and what is the basis for this determination?

- Which other functions, if any, should the regulated utility be allowed to provide under regulated, cost-of-service business models in competition with “non-regulated” third-party providers, and what is the basis for this determination?
- Which functions, if any, should the regulated, cost-of-service utility be prohibited from offering to utility consumers, and what is the basis for this determination?

The results brought the 51st State Initiative full circle in some ways—back to visions of the future electricity marketplace and the role of the utility within it.

The Phase III process included gathering and reviewing submissions from 13 organizations, follow-up discussions with authors, custom-designed private and public events, participation in other industry events and research, and application of frameworks from earlier phases of the initiative.

FIGURE 4. DESIGN CRITERIA FOR FUTURE CLEAN & MODERN GRID



Source: Smart Electric Power Alliance, 2019.

Through this process, SEPA developed a set of frameworks to help synthesize the collective insights gathered. These frameworks can help those in the power sector understand, contemplate, and analyze key power system design criteria (both explicit and implicit), different constructs for future utility business models that optimize different design criteria, and evaluation criteria for the different utility business model constructs.

■ **Key Power System Design Criteria**—The widely understood and accepted core of monopoly utilities’ responsibilities is to provide safe (and secure), reliable (and resilient), and affordable (and predictably priced) electricity to all. Other expectations of electricity service, however, are not always fully articulated, which

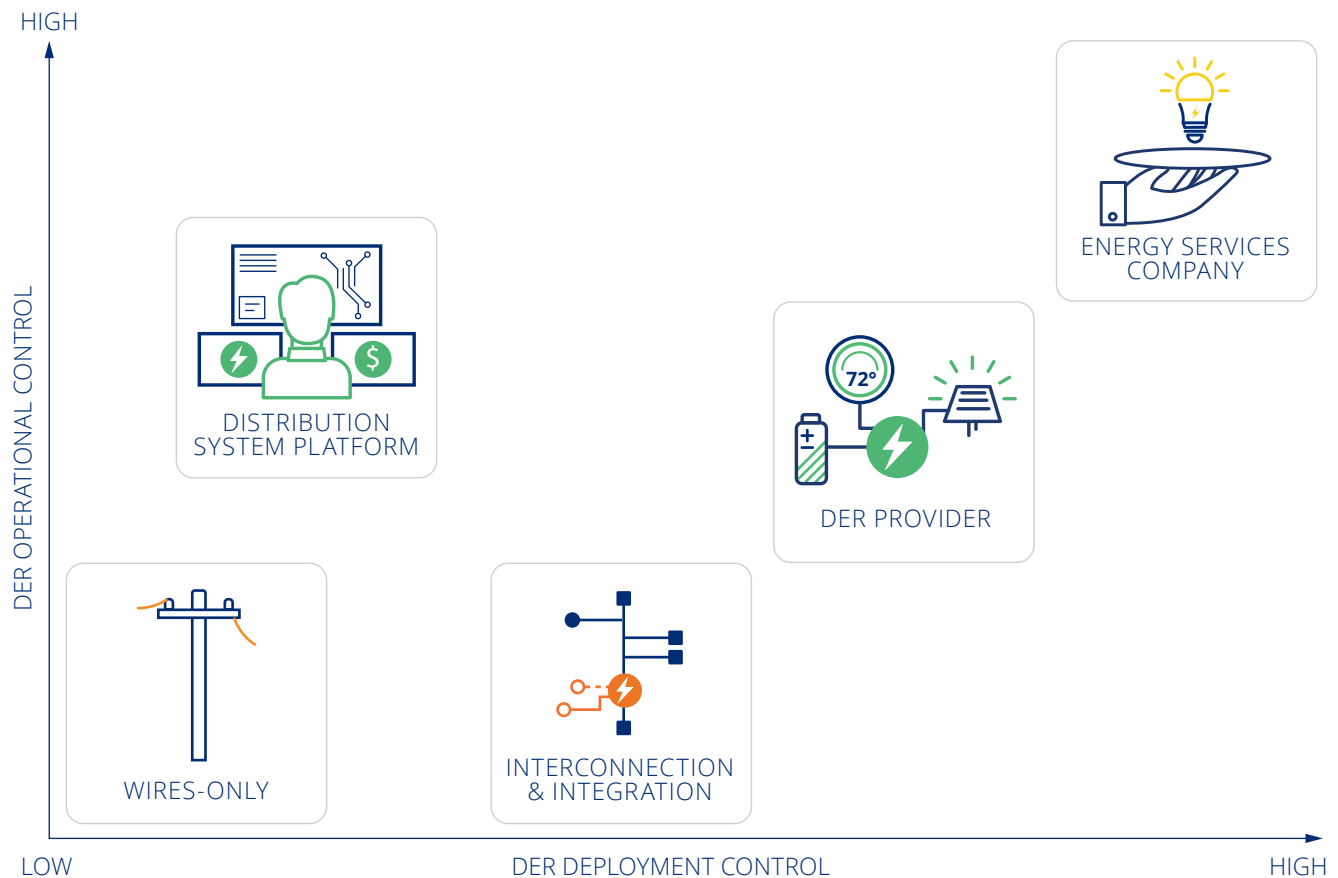
makes discussions around transformation even more difficult.

For instance, sometimes taken for granted—or at least not made as explicit—are expectations that provision of electricity should promote economic development, protect the environment, and advance social equity.

Likewise, often ignored or misunderstood are expectations that electricity provision will account for differences in consumer and societal preferences for financial and operational risk, desires for consumer autonomy or control, and differences in long-term and short-term interests.

Picking a future destination and engineering a system optimized for the trade-offs that will be inevitable among these nine variables will

FIGURE 5. CONSTRUCTS FOR THE FUTURE ELECTRIC UTILITY



Source: Smart Electric Power Alliance, 2019.

be key challenges. It is important to keep these design criteria in mind whenever a seemingly intractable disagreement arises between parties. Asking whether the disagreement is based on a difference in the balance of these values (which requires compromise and political leadership) or in methods for achieving them (which requires communication and innovative problem-solving) can be very helpful in aligning interests.

- Constructs for Future Utility Business Models**—Which utility business models might fulfill the above design criteria? Throughout the three phases of the 51st State Initiative, participants submitted papers with a variety of different visions for the future role of the utility. About half suggested some form of “distribution system optimizer” as that ideal role,

but 51st State participants made credible cases for other models as well.

Taking the visions from over 40 papers, as well as feedback from hundreds of subject matter experts and industry decision makers at numerous events across the country, SEPA developed a framework laying out five core visions of a distribution utility within the regulated monopoly.

- 1. Wires only**—the utility is reduced to designing, building, financing, owning, operating, and maintaining the physical infrastructure necessary to deliver power, e.g., poles, wires, substations, transformers.
- 2. Distribution system platform**—the utility is responsible for developing, operating,

and updating a distribution- and retail-level market(s), over which third-party suppliers and consumers transact for retail electricity needs.






- 3. Interconnector and integrator**—the utility facilitates DER interconnection and integration to maintain reliability and power quality, but it does not proactively encourage deployment or control dispatch.
- 4. DER provider**—the utility proactively deploys behind-the-meter DERs to serve the needs of both individual consumers and the grid (through targeted incentives, direct ownership, aggregation, technical assistance, etc.).
- 5. Energy services company**—the utility deploys DERs for a range of possible services beyond commodity electricity supply, from premium retail services (resilience, for example) to new services, such as asset health monitoring, to boundary-pushing models, such as selling lighting as a service.

These five constructs are not mutually exclusive. In practice, a utility could be a combination or hybrid of the models shown here, with different roles for different market segments (e.g., residential vs. commercial and industrial, mass market vs. low-income). Still, these five constructs can help focus discussions about potential destinations for utilities’ transformational journeys.

■ **Evaluating Future Utility Business Models**

Each construct has its pros and cons, and some may serve the interests of a particular stakeholder group better than others. Determining which model (or combination of models) is most appropriate may be guided by an evaluation of where the boundaries of the natural monopoly lie with regard to the various key functions of the distribution system. As technologies and societal expectations evolve, so too may the scope of the natural monopoly.

TABLE 2. LINKING THE MONOPOLY FUNCTIONS TO THE CONSTRUCTS

	 WIRES	 DSP	 I AND I	 DER	 ESC
SYSTEM PLANNING	■	■	■	■	■
SYSTEM OPERATION	■	■	■	■	■
ASSET DEPLOYMENT	■	■	■	■	■
DATA STEWARDSHIP	■	■	■	■	■
MARKET MANAGEMENT	■	■	■	■	■
CUSTOMER ENGAGEMENT	■	■	■	■	■

■ UTILITY ONLY ■ COMPETITIVE/JOINT ■ UTILITY PROHIBITED

Note: Table is illustrative and for discussion only.

Source: Smart Electric Power Alliance, 2019.

Asking questions about the natural monopoly, the regulatory compact, space for competition, and prohibited utility activities with respect to the key functions necessary to run the modern electricity distribution system can help guide thinking and discussion. Functions that clearly demonstrate characteristics of a natural monopoly or that are managed primarily for agreed societal goals with a single point of accountability should be fulfilled by the utility as a regulated monopoly. Roles that clearly are not in the natural monopoly or regulatory compact category should be held for competitive market participants. Those functions in which there is some uncertainty may involve both monopoly participation and access by third-party providers. Understanding which functions have consensus, divergence, and uncertainty among stakeholders will help guide policymakers, regulators, utility leadership, and others in understanding where to focus on investment, where to mediate, and where to invest in further

study. (Sample questions and utility functions can be found in [Appendix E](#).)

The insights gathered from examining the nature of each function can, in turn, guide discussions of which utility construct may prove viable to stakeholders.

Evaluating which utility construct makes the most sense for a given jurisdiction must also assess traditional and innovative revenue mechanisms that can ensure financial sustainability for the functions for which the regulated monopoly is responsible. This may well require changes to existing cost-recovery mechanisms and creation of new sources of revenue, including earnings derived from performance-based regulation and new fee-for-service offerings. The more traditional mechanisms generally align best with the most traditional view of utility responsibilities. Cost-of-service regulation, for example, works well for the wires-only model, but it is likely incompatible with the energy services model.

Moving Forward

The 51st State Initiative has brought together diverse viewpoints and helped foster collaborative, thoughtful conversations on fractious issues related to the future of the electric power sector. Over the past four years, participants have shared how these engagements have inspired their own national initiatives, such as APPA’s Public Power Forward, the creation of new jobs, such as several utilities’ “Director of the Utility of the Future” positions, the launch of new regulatory proceedings, and in some cases—and most compelling—changes in experienced industry professionals’ own perspectives.

At SEPA, we found the ideas and approaches compelling enough that even as we are retiring the

51st State as a stand-alone initiative, we are moving forward by incorporating them into our broader efforts. More specifically, we are seeding them in SEPA’s Content Pathways and using them to

inform our work in Puerto Rico and Washington, D.C.






What started as a thought exercise has grown into a community of diverse people exchanging ideas and inspiring thoughtful moves in this messy industry transition. Given the complexity, scale, and diversity of actors involved in this transition, SEPA does not claim to have

definite answers on what the right utility business model or role should be—or even all the questions that must be addressed along the way.

“As for the future, your task is not to foresee it, but to enable it.”

**—Antoine de Saint-Exupéry,
*The Little Prince***

TABLE 3. FUTURE UTILITY CONSTRUCTS AND CORRESPONDING REVENUE BUSINESS MODELS

	 WIRES	 DSP	 I AND I	 DER	 ESC
COST OF SERVICE	●	●	●	◐	○
PERFORMANCE-BASED REG	◐	◐	●	◐	◐
FEE-FOR-(NEW) SERVICES	○	◐	◐	●	●

○ LESS COMPATIBLE ◐ SOMEWHAT COMPATIBLE ◑ COMPATIBLE ● MORE COMPATIBLE

Note: Table is illustrative and for discussion only.

Source: Smart Electric Power Alliance, 2019.

SEPA also has yet to encounter a single entity that has addressed the full scope of issues in utility business model transformation in a complete and compelling way—the challenges are too complex to be resolved from a single perspective. However, through the collaboration of experts from across the industry SEPA has been able to produce the series of frameworks described earlier in this paper to help those in the U.S. power sector think about and collaboratively plan for a journey of transformation.

Moving forward, the four doctrines that emerged from Phase II and the various frameworks that emerged from Phase III can serve as important starting points for broad stakeholder conversations. They can lead to some early “least-regrets” moves (listed in [Appendix E](#)) that utilities, regulators, and policymakers can put into place to prepare the electric power system for optimal DER deployment. Some of these are mutually exclusive, and they are not intended to be implemented en masse. Rather, they represent potential strategies that could help move a market forward and could form starting points for conversations regarding the future of the grid.

Having a structured, facilitated, and detailed process based on the 51st State frameworks can greatly bolster chances for success. SEPA recommends that jurisdictions use a roadmapping process broadly similar to the following:

- Secure a cross-section of viewpoints and affected stakeholders;
- Gather stakeholder input on the most important design criteria and on the four doctrines as a centering point for moving forward;
- Work with stakeholders to explore the key distribution functions, including an assessment of the natural monopoly roles for the utility;
- Determine which utility constructs may be the best fit based on the results of that input;
- Understand which revenue models work given the determination of possible utility constructs;
- Consider and begin investment in least-regrets moves based on the selected potential constructs;
- Allow for, track, and learn from multiple approaches;
- Revisit these analyses on a regular basis;
- Document the process to ensure transparency.



The insights, tools, and tactics from the 51st State Initiative will be used to help individual members develop roadmaps and to inform, guide, and inspire content generation and delivery through SEPA

programs, working groups, publications, online offerings, workshops and advisory services. The journeys to the future envisioned by the participants in the 51st State Initiative have only just begun.

SEPA CONTENT PATHWAYS

SEPA has identified momentum on issues, or pathways, as critical to accelerating the energy transition, and the opportunities it creates, across the diverse state markets in the U.S.

- **Regulatory innovation:** Regulation must keep pace with technological change and foster growth.
- **Grid integration:** Continued growth of large-scale renewables and DERs, whether behind or in front of the meter, will require new tools and business processes.

- **Utility business models:** Rather than relying on capital investments, utilities will need to look at new programs and business models that provide value to customers and the grid.
- **Transportation electrification:** Electrification represents new power demand for utilities, while also driving innovation and rapid decarbonization.

Appendix A: 51st State Authors

AUTHORS

The 51st State Initiative asked thought and industry leaders to think creatively and dream big about the future. These esteemed organizations and authors responded to the call for ideas and authored Phase I visions, Phase II roadmaps, and Phase III papers on the role of the utility.

ABB	Clean Coalition	Navigant	Stoel Rives LLC & Clean Power Finance
Accenture	Distributed Sun	NC Clean Energy Technology Center & Pace Climate & Energy Center	Strategic Utility Management LLC
American Public Power Association (APPA)	Energy Innovation	PSEG	Southern Company
Arizona Public Service	Graceful Systems LLC	Rocky Mountain Institute	Union of Concerned Scientists
Baker Street Publishing & TeMix Inc.	Institute for Local Self Reliance	ScottMadden, Inc.	VEIC
Black & Veatch, sponsored by Southern Maryland Electric Cooperative	Landis+Gyr	Siemens	Wisconsin Energy Institute
	National Rural Electric Cooperative Association (NRECA)		



AND THE INDIVIDUAL AUTHORS

Allen Mosher	David Hill	Jenny Hu	Michael O'Boyle
Andrew Bray	David Lee House	Jim Kennerly	Mike Hennen
Ankit Saraf	David O'Brien	Jim Mazurek	Mike Jacobs
Asaf Nagler	Dimitris Vantzis	Joe Slater	Pamela Morgan
Bob Lasseter	Doug Karpa	John Farrell	Paul Quinlan
Bradford Crist	Ed Cazalet	John Pang	Paul Zummo
Bruce Beihoff	Ed Regan	Jon Wellinohoff	Rachel Gold
Bruce Nordman	Edwin Overcast	Jonathan Lopez	Ray Brooks
Carl Linvill	Frances Huessy	Julie McNamara	Renée Guillory
Carl Pechman	Gary Rackliffe	Justin Davidson	Rex Stepp
Chris King	Gary Radloff	Karl Rabago	Scudder Parker
Chris Vlahoplus	Howard Smith	Larry Dickerman	Stephen Barrager
Courtney McCormick	James Tong	Leia Guccione	Ted Walker
Damon Lane	James White	Mackinnon Lawrence	Tom Jahns
Dan Cross-Call	Jan Ahlen	Marc Romito	Tyler Lancaster
Dave Shepherd	Jeff Weiss	Michael Jochum	Virginia Lacy

Appendix B: 51st State Submissions

To read the ideas of these authors please see:

- [Phase I summary of submissions](#) | [Phase I download all submissions as zip file](#)
- [Phase II download all submissions as zip file](#)
- [Phase III summary of submissions](#) | [Phase III download all submissions as zip file](#)

FIGURE 6. SEPA'S 2019 IDEAS

CALLS FOR CONTENT

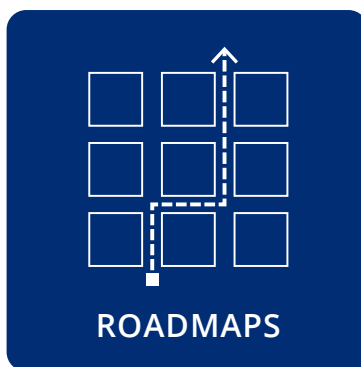


PHASE I

VISIONS for the future, starting from a blank slate

Read submissions at:

<https://sepapower.org/our-focus/51-state-initiative/phase-1>

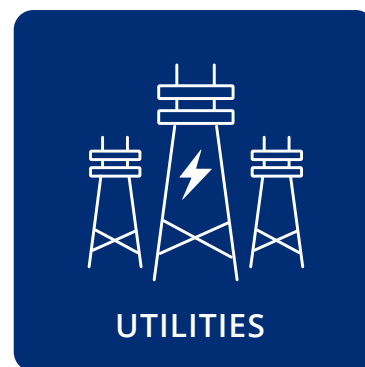


PHASE II

ROADMAPS that articulate how we get from "here" to "there"

Read submissions at:

<https://sepapower.org/our-focus/51-state-initiative/phase-2>



PHASE III

ROLE of the UTILITY that articulates who should do what in our future energy system.

Read submissions at:

<https://sepapower.org/our-focus/51-state-initiative/phase-3>

Source: Smart Electric Power Alliance, 2019.

Appendix C: 51st State Advisors, Partners, and Sponsors

ADVISORY GROUPS

Two advisory groups helped guide the 51st State Initiative.

INNOVATION REVIEW PANEL

- **Ron Binz**, Former Chairman, Colorado Public Utilities Commission
- **Nancy E. Pfund**, Founder & Managing Partner of DBL Investors
- **Jim Rogers**, Former Chairman & CEO, Duke Energy
- **Jigar Shah**, President Generate Capital, Former CEO & Founder, SunEdison
- **Dr. Susan Tierney**, Senior Advisor, Analysis Group, Former Chair MA Water Resources Authority

EXECUTIVE LEADERSHIP COUNCIL

- **Ron Binz**, Former Chairman, Colorado Public Utilities Commission
- **Ben Bixby**, Former GM, Energy & Safety, Nest
- **Mike Champley**, Former Commissioner, Hawaii Public Utilities Commission
- **Steve Corneli**, Former SVP, Policy & Strategy, NRG

- **John Di Stasio**, CEO, Large Public Power Council
- **Seth Frader-Thompson**, President, EnergyHub
- **Lisa Frantzis**, SVP, Strategy & Corporate Development, Advanced Energy Economy
- **Ralph Izzo**, Chairman, President, CEO, PSEG
- **Steve Malnight**, SVP, Strategy & Policy, Pacific Gas and Electric Company
- **Ken Munson**, CEO, DC Systems
- **Frank Prager**, VP, Policy & Strategy, Xcel Energy
- **Anne Pramaggiore**, SEVP / CEO of Exelon Utilities
- **Joe Slater**, CEO, Southern Maryland Electric Cooperative
- **Kelly Speakes-Backman**, CEO, Energy Storage Association; Former Commissioner, Maryland PUC
- **Adam Umanoff**, EVP/General Counsel, Edison International
- **Mark Vanderhelm**, VP, Energy, Walmart

PARTNERS AND SPONSORS

- Alliance to Save Energy
- Energy Storage Association
- National Association of State Energy Officials
- PwC
- SmartGrid Consumer Collaborative
- Energy Foundation

51ST STATE GOVERNORS CLUB



51ST STATE PATRON



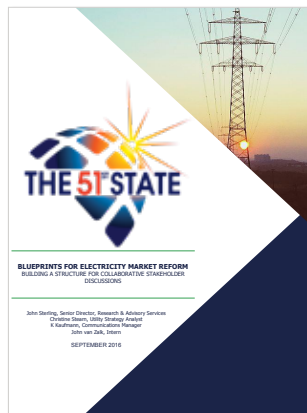
Appendix D: 51st State SEPA Reports

TABLE 4. 51ST STATE SEPA REPORTS



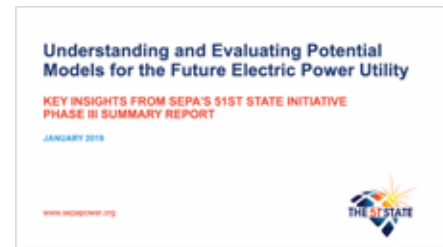
Phase II Roadmapping launch document

Learn about the 51st State’s Phase II designed to move from exploring the big picture concepts and theories presented during Phase I to the development of specific roadmaps that show how we get from ‘here’ to ‘there’. Thought leaders were asked to roadmap across 6 areas: utility business models, rates and regulation, wholesale market design, retail market design, asset deployment, and IT.



Blueprints for Electricity Market Reform

Phase I & Phase II Submissions have been summarized to provide a pathway forward through ideas and actions towards market transformation. The ideas or doctrines provide foundations for stakeholder agreement at the outset of conversations.

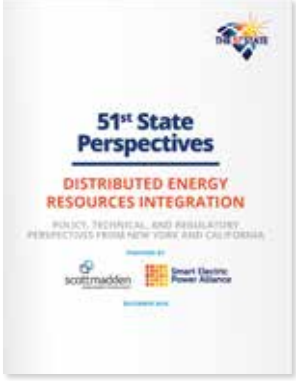
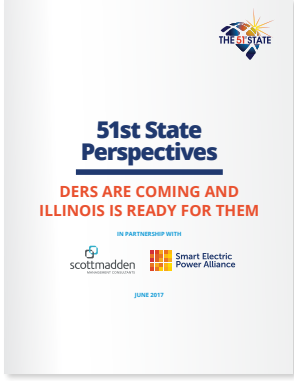
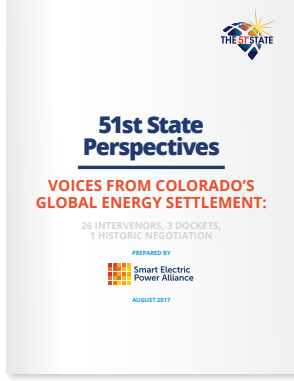



Understanding and Evaluating Potential Models for the Future Electric Power Utility—Key Insights from SEPA’s 51st State Initiative—Phase III Summary Deck

This slide deck summarizes the key insights and frameworks that SEPA developed throughout Phase III of the 51st State Initiative.

51st State Perspective Series Reports include the curation and evaluation of **real-world** cutting-edge efforts happening across the United States.

TABLE 5. 51ST STATE PERSPECTIVE SERIES REPORTS

			
<p><u>The Integration of Distributed Energy Resources: California and New York</u> (January 2017).</p> <p>This report examines the similarities and differences between the distributed energy planning processes for California and New York.</p>	<p><u>DERs are Coming and Illinois is Ready for Them</u> (June 2017).</p> <p>This report focuses on how grid modernization initiatives in Illinois apply across the swimlanes and address each of the doctrines.</p>	<p><u>The Colorado Settlement: An Oral History</u> (August 2017).</p> <p>This report goes behind the scenes in the “global settlement” in Colorado that was negotiated in summer 2016 based on interviews with key participants, focusing on the process.</p>	<p><u>Massachusetts: A Great Clean Energy Story—DERs and the Next Chapter</u> (June 2018).</p> <p>This report discusses the degree to which Massachusetts is transforming its grid to accommodate DERs.</p>

Appendix E: Tools For Evaluating Phase III Utility Construct Options

For more details on these tools for evaluating utility construct options please see [Understanding and Evaluating Potential Models for the Future Electric Power Utility—Key Insights from SEPA’s 51st State Initiative—Phase III Summary Deck](#).

TABLE 6. FUNDAMENTAL QUESTIONS ABOUT THE MONOPOLY UTILITY

THE NATURAL MONOPOLY	<ul style="list-style-type: none"> ▪ How has our understanding of the natural monopoly for the production and delivery of electric power changed over time? ▪ What has driven that change? ▪ How might it change in the future?
THE REGULATORY COMPACT	<ul style="list-style-type: none"> ▪ What should we expect from our electric power utilities in exchange for the monopoly franchise? ▪ How are evolving societal expectations most effectively and efficiently communicated to the utility? ▪ How can we best evaluate and hold utilities accountable?
SPACE FOR COMPETITION	<ul style="list-style-type: none"> ▪ Are there roles in which the regulated utility might compete with third parties? ▪ What are the regulatory and policy expectations and consequences of this hybrid market dynamic?
PROHIBITED ACTIVITY	<ul style="list-style-type: none"> ▪ What should be off limits for the regulated utility? ▪ What public interest implications arise at the resulting boundary? ▪ Are there public interest issues in these spaces, and if so, what mechanisms can best protect them?



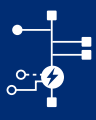


Source: Smart Electric Power Alliance, 2019.

TABLE 7. ANALYZING AND EVALUATING DISTRIBUTION FUNCTIONS

SYSTEM PLANNING	CUSTOMER ENGAGEMENT
<ul style="list-style-type: none"> ▪ Load Forecasting ▪ Resource Adequacy ▪ Distribution Planning ▪ Hosting Capacity Analysis ▪ Locational Value Analysis ▪ Integrated Resource Planning (IRP), Transmission & Distribution (T&D) 	<ul style="list-style-type: none"> ▪ Service Connections ▪ Billing and Account Management ▪ Education ▪ Financing ▪ Rates
SYSTEM OPERATION	DATA STEWARDSHIP
<ul style="list-style-type: none"> ▪ O&M “Wires” ▪ Dispatch and Balancing ▪ Optimization ▪ Sensing and Comms ▪ Interconnection ▪ OMS and Restoration 	<ul style="list-style-type: none"> ▪ Data Collection ▪ Data Ownership ▪ Data Analytics ▪ Data Protection ▪ Data Dissemination/Access ▪ Value Added Services
ASSET DEPLOYMENT	MARKET MANAGEMENT
<ul style="list-style-type: none"> ▪ Distribution Wires, Poles, and Transformers ▪ Distributed Energy Resources ▪ Metering, Sensors and Comms ▪ Control Systems ▪ Service Equipment ▪ Spares and Restoration 	<ul style="list-style-type: none"> ▪ Aggregation ▪ Sourcing Grid Services ▪ Settlement ▪ Price Formation ▪ Market Management ▪ Reliability and Quality Assurance

Source: Smart Electric Power Alliance, 2019.

TABLE 8. SAMPLE LEAST-REGRETS- MOVES FOR UTILITIES

		 WIRES	 DSP	 I AND I	 DER	 ESC
PROMOTE EFFICIENCY	▪ Promote Energy Efficiency and Demand Response		■	■	■	■
	▪ Invest in Distribution Automation and AMI and AMI Functionality	■	■	■	■	■
	▪ Publish DER Hosting Capacity Analyses	■	■	■	■	
	▪ Incorporate DER and Distribution into Integrated Resource Planning	■		■	■	■
CLEARLY DEFINE ROLES	▪ Understand Preferences and Comfort of Stakeholders Regarding Models			■	■	■
	▪ Gather Sentiment on Natural Monopoly and Social Compact		■	■	■	■
	▪ Address Open Questions Regarding Allowed Utility Ownership of DER			■	■	■
	▪ Develop Data Ownership and Allowed Use Policies	■	■	■	■	■
	▪ Understand Breadth and Depth of Needs for Standard Offer Service		■	■	■	
ENSURE SUSTAINABLE REVENUES	▪ Test Rate Impacts on DER Deployment			■	■	■
	▪ Understand Impacts of Changes on Credit and Equity Ratings	■	■	■	■	■
	▪ Tie Investments to Available Revenue Headroom	■	■	■	■	■
	▪ Shift from Focus on Rates to Total Cost for Consumers			■	■	■
	▪ Perform Locational and Time Value Studies and Forecasts	■	■	■	■	■
FOSTER CONSUMER CHOICE	▪ Evaluate Consumer Understanding and Acceptance of Rate Structures			■	■	■
	▪ Understand Consumer Sentiment on Utility and Third Party Brands				■	■
	▪ Explore New Customer Offerings for both BtM and Shared Assets				■	■
	▪ Invest in Transparency and Consumer Education			■	■	■

Note: Table is illustrative and for discussion only.

Source: Smart Electric Power Alliance, 2019.



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