THE CASE FOR A NATIONAL ELECTRICITY COUNCIL

A GTM Research Policy Brief

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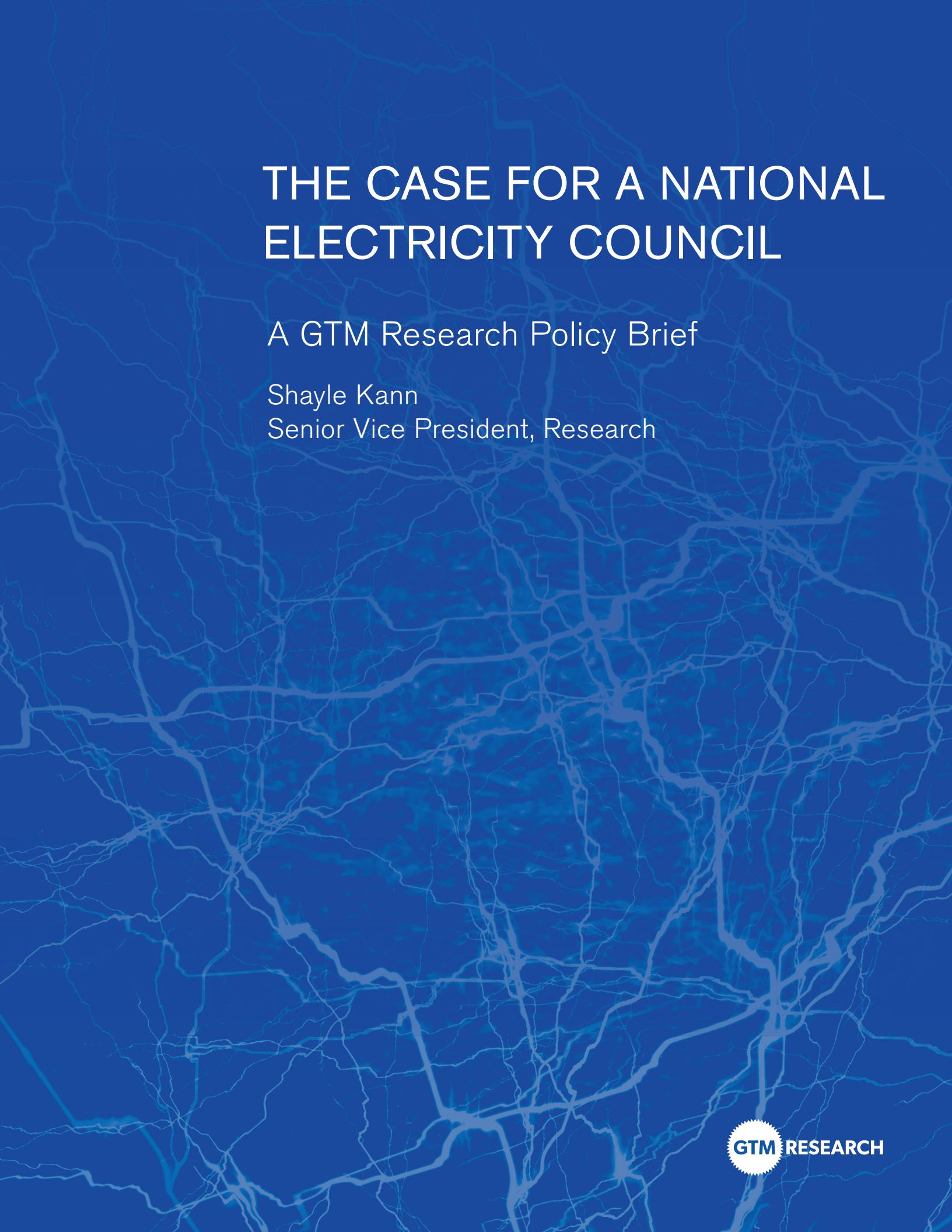

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1. Executive Summary

Since 1941, the National Petroleum Council (NPC) has acted as the unified voice of the oil and gas industry to advise the Secretary of Energy on domestic and international policy issues. The NPC has published over 200 influential reports on the state and future of America's oil and gas industries, with specific recommendations on how to maximize our resources. This federally chartered but privately funded group has had a substantial impact on the national energy discourse for generations. But nothing akin to the NPC exists for the electricity sector, which accounts for 40% of our energy consumption in the U.S., and the sector has never needed it more than it does today.

Our electricity infrastructure is in the midst of a series of dramatic changes, all of which could threaten the stability, reliability, resilience, affordability and environmental impact of this vital source of commerce. The rise of distributed energy resources such as solar power, demand response, and energy storage threaten to upend the traditional utility business model, as well as necessitating significant infrastructure upgrades. Cybersecurity threats to the electric grid are at an all-time high, and the grid remains dangerously unprepared for a large-scale attack. Sweeping innovation is needed in order to catalyze the transition to a cleaner, more intelligent electricity market. The federal government, and particularly the Department of Energy (DOE), has a vital role to play in this transformation, but it needs formalized input from the increasingly complex electricity industry.

President Obama should charter a National Electricity Council (NEC), similar in scope and form to the National Petroleum Council. Comprising a wide swath of electricity industry players, observers and advocates, the NEC would help the Secretary of Energy navigate the increasingly complex landscape of electricity generation and delivery in the U.S. The National Petroleum Council has been invaluable for over 70 years – now is the time to do the same for electricity.

2. Introduction

In 1941, in the midst of World War II, President Roosevelt appointed Harold L. Ickes, then Secretary of the Interior, to the additional post of Petroleum Coordinator for National Defense. Roosevelt's primary objective, as stated in the official appointment letter, was "the development and utilization with maximum efficiency of our petroleum resources and our facilities, present and future, for making petroleum and petroleum products available, adequately and continuously, in the proper forms, at the proper places, and at reasonable prices to meet military and civilian needs."

Ickes promptly invited leaders of the petroleum industry to Washington and stated his intention to facilitate increased public/private cooperation to meet the president's goals. To that end, Ickes formed The Petroleum Industry War Council, a private-sector, membership-based organization with the explicit task of advising Secretary Ickes on petroleum-related policy and regulation efforts.

The program was considered to be an unadulterated success. In 1946, after the war ended, President Truman elected to keep the council active in perpetuity under the peacetime designation "National Petroleum Council" (NPC). That council is still active today, now chartered under the Federal Advisory Committee Act of 1972 and reporting directly to the U.S. Secretary of Energy.

NPC's membership roster represents a who's who of the oil and gas industry. The list includes the chairs of BP America, Exxon Mobil, and Chevron, natural gas giants such as Kinder Morgan and TransCanada, construction/drilling companies like CH2MHill and Halliburton, consultants and analysts such as IHS CERA, JP Morgan, and utilities like AEP and Duke Energy. There is also some representation of public interest groups, such as the Alliance to Save Energy.

Over the years, the privately funded NPC has published more than 200 reports on the state and future of oil and gas in the U.S. and abroad. Its most recent report was issued in 2011 upon request from then-Secretary Steven Chu. Titled Prudent Development: Realizing the Potential of North America's Abundant Natural Gas and Oil Resources, the report serves as an authoritative compendium of the industry's view on the recent domestic resource boom.

Historically, the focus of the NPC was largely on transportation, since electricity generation was dominated by coal. In recent years, NPC has touched more on electricity because of the ascendance of natural gas power plants, but electricity is treated largely as a source of end demand, not a topic in itself.

In fact, nothing akin to the NPC exists for the electricity sector, and the sector has never needed it more. One could simply take President Roosevelt's opening quote and replace "petroleum" with "electricity" – many of the same concerns regarding petroleum in 1941 exist today for electricity. According to the Energy Information Administration, in 2011 electric power accounted for 40% of all energy consumption in the U.S., as compared to only 28% for transportation. And the nation's electricity infrastructure is in the midst of a series of dramatic changes, all of which could threaten the stability, reliability, resilience, environmental impacts and economics of this vital source of power.

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3. The NEC's First Task: Managing the Transformation at the Grid Edge

There is a transformation occurring at the edge of the grid,[1] where the utility meets the customer. Today's electricity infrastructure was built to support predictable, one-directional power flows. Capital-intensive, centralized power plants generated electricity, which flowed through the transmission and distribution systems, ultimately serving all of every customer's load. System reliability was maintained by utilities' and grid operators' impressive ability to balance a few sources of electricity supply with many sources of electricity demand.

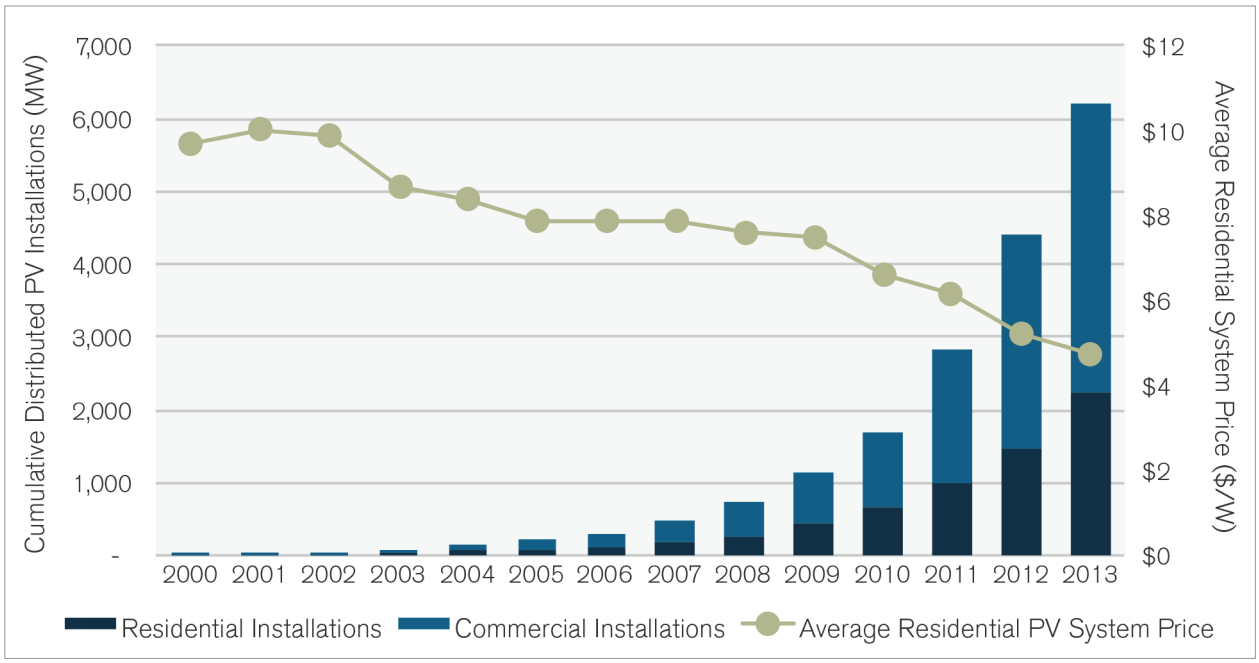
Distributed energy resources (DER) are upending that model. Those technologies, which include distributed solar, demand response, energy storage, and electric vehicles, offer end users a variety of opportunities to manage and supply their own electricity. A homeowner's rooftop solar array may feed power back into the grid, blurring the line between customer and generator. An on-site energy storage system may gather power when it is less expensive and use it when it is cheaper, smoothing out the peaks and valleys of electricity use. Customers participating in demand response programs may be able to reduce their own load during peak times when prices spike, decreasing the need for new peaking power plants. Meanwhile, utilities are charged with maintaining the high level of reliability which is necessary for society's daily operation.

Distributed energy resources are only beginning to proliferate in the U.S., but solar in particular is poised to play a significant role in the electricity mix sooner than most observers anticipated. There are a total of 6.2 gigawatts (GW) of distributed photovoltaics (PV) on the grid today, supplying less than 1% of total customer load. Still, the growth rate of distributed PV is accelerating as costs continue to fall. A total of 68% of all distributed PV on the grid came on-line in the past 2 ½ years, and the cumulative total of PV will triple over the next 3 ½ years. In 2013, a PV system was installed in the U.S. every four minutes; by 2016, an installation will take place every 90 seconds. By the end of 2016, there should be more than 17 GW of distributed PV operating in the U.S. And these numbers pale in comparison with the market's long-term potential. The National Renewable Energy Lab estimates that there is 664 GW of technical rooftop PV potential in the U.S., along with another 1,200 GW of urban utility-scale PV potential.[2]

1 For more on the concept of the "grid edge," see greentechmedia.com/gridedge

2 U.S. Renewable Energy Technical Potentials: A GIS-Based Analysis. Lopez et al., National Renewable Energy Lab, July 2012

Figure 3-1: U.S. Distributed Solar PV Growth, 2000-2013



Source: GTM Research/SEIA U.S. Solar Market Insight

As DER penetration grows, the grid will need to adapt, and new technologies will need to be deployed on a broad scale. The distribution system will require widespread deployment of sensors and monitors to accurately gauge the impacts of these "behind-the-meter" technologies. Power electronics, which provide an interface between electrical systems, will need to become smarter as the portion of electricity flowing through them increases from 30% to 80% by 2030.[3] And utilities will need to adopt intelligent software systems to manage the millions of individual transactions that will be occurring each day between customers and power sources.

In addition to presenting technical challenges, the growth of DER creates a business model challenge for utilities. There is a growing sense among influential executives, analysts and utilities that DER could disrupt and threaten the traditional utility business model. There is even some discussion of a "utility death spiral" in which increasing penetration of distributed generation (DG) and energy storage could prompt utilities to raise the rates of their customers, who in turn would have additional incentive to install their own generation sources, causing utilities to further raise rates on the remaining customers, and so on. Across the country, utilities are grappling with strategic decisions regarding their role in the increasingly distributed electricity market.

Amidst all of this change, all electricity customers must retain access to reliable, affordable electricity. Navigating changing customer dynamics while maintaining that access should be a primary task of the National Electricity Council. With representation from all sides of the issue – DER providers, utilities, grid operators and consumer advocates – the NEC will be in a unique position to seek and recommend viable solutions to the myriad challenges posed by a rapidly changing electricity paradigm.

3 DOE Office of Electricity Delivery & Energy Reliability, Power Electronics Research & Development Program Plan, April 2011

4. Additional Tasks for the NEC

While managing the transformation at the grid edge should be the primary initial focus of the Council, myriad other issues would also benefit from NEC input.

- Maintaining Grid Cybersecurity

As the electric grid and electricity markets become more transactive, distributed, and bidirectional, the challenge of maintaining system-wide security will grow. This will come as no surprise to America's enemies, who have already targeted the nation's electricity infrastructure as an attractive target for attack. An October 2009 report by the Government Accountability office stated that 31 of the Department of Defense's 34 most critical global assets rely on commercial operated electricity grids for their primary source of electricity. Meanwhile, according to the Department of Homeland Security, the energy sector was the target of more than 40% of all reported cyberattacks on critical infrastructure networks in 2012. A May 2013 report by the staffs of Congressmen Ed Markey and Henry Waxman, based on a survey of more than 100 utilities, found that many utilities report that they are the subject of "daily" or "constant" attacks. One utility even reported being the target of around 10,000 cyberattacks each month.

Just three weeks into his tenure, Energy Secretary Ernest Moniz created a cybersecurity council. While this is a positive reflection of Secretary Moniz's recognition of the danger of electricity infrastructure cyberattacks, this council is composed only of representatives of various DOE offices and divisions. Meanwhile, the vast majority of the grid infrastructure, and thus the majority of cybersecurity targets, is under the control of private-sector firms. The NEC will be in a unique position to advise the DOE on how to minimize these risks and fend off attacks on our infrastructure.

- Identifying Infrastructure Investment Gaps

Our need for new investment in electricity grid infrastructure goes well beyond the management of distributed energy resources. A 2011 study by the American Society for Civil Engineers found that, given current trends, we will have a $732 billion gap in electricity spending by 204. Only 11.5% of this gap comes from the need for new generation, while more than 88% is related to the cost of upgrades to the nation's existing transmission and distribution infrastructure. This gap would come at a real expense to consumers ($354 billion) and businesses ($641 billion) because of higher resultant costs for power, disruptions due to unreliability, and the need to adopt more expensive industrial practices. The NEC may help counsel the Secretary of Energy on the most immediate infrastructure needs, as well as identifying longer-term gaps before they become problematic.

- Confronting Climate Change

Combating climate change remains the biggest energy challenge of the 21st century. As a primary source of greenhouse gas emissions, the electric sector will need to undergo a dramatic transformation toward low-carbon and zero-carbon fuel sources if the worst effects of climate change are to be avoided. What's more, any market structure put in place to account for the true costs of greenhouse gas emissions will further complicate the already byzantine nature of our electricity markets. The NEC will have a vital role to play in this process by studying the impacts of potential solutions on electricity pricing, the economy, and local air quality.

5. The Council Members

The NEC should have broad representation from across the electricity sector, from those generating power to those consuming it. Membership could be divided into six categories:

1) Electric Utilities: This group would include utilities from various regulatory structures, including vertically integrated utilities and competitive suppliers. It would include retail electricity providers, as well as pure lines-and-wires companies. Finally, it would include a mixture of investor-owned utilities, municipal utilities and electric cooperatives.

Examples: Pacific Gas & Electric, Southern Company, Duke Energy, Reliant Power, Sacramento Municipal Utilities District, Austin Energy, Tennessee Valley Authority

2) Distributed Energy Resource Providers: This group would include a mixture of developers of solar projects, energy storage vendors, demand response providers, intelligent energy efficiency providers and other distributed energy representatives.

Examples: EnerNOC, SolarCity, Stem, Tesla Motors, SunPower

3) Independent Power Producers: This group would include the companies that own and operate power plants, both centralized and distributed, fossil- and renewable-based. The group would provide equal representation for natural gas developers and nuclear developers, as well as for coal generators and wind generators.

Examples: MidAmerican Energy, NextEra Energy, LS Power, Sempra Generation, Exelon Generation

4) Public Interest Groups: This group would include organizations representing electric ratepayers, environmental interests, workers' interests, and general economic interests.

Examples: The Utility Reform Network, BlueGreen Alliance, Natural Resources Defense Council

5) Consultant and Service Provider Industries: This group would include engineering consultants, strategic consultants, investors, and project financiers.

Examples: Black & Veatch, DNV GL, Mckinsey & Company

6) System Operators: This group would include representatives of the actual electric system operators that manage power flows.

Examples: PJM, California Independent System Operator (CAISO), New England Independent System Operator (ISO-NE), Electricity Reliability Council of Texas (ERCOT)

There is one area in which the NEC would diverge significantly from the NPC. Generally speaking, the NPC comprises many companies with aligned interests. As such, the NPC is typically able to achieve consensus with relative ease. In contrast, the NEC would include members on opposite sides of some issues, as utilities and solar advocates are today in a number of states when discussing the issue of net energy metering.

But instead of being a hindrance to the NEC, this could be one of its biggest strengths. Rather than being entirely consensus-based, the NEC could operate in a manner akin to the Supreme Court. A majority view would be provided, but the minority would also have an opportunity to present its case. The Secretary of Energy would then be responsible for taking both views into account when making policy decisions.

6. Conclusion

It is easy to take for granted the reliability and overwhelming importance of the electric grid. But we must be careful not to assume that electricity delivery will always look as it does today. Right now, technological developments are beginning to collide with customer choices in a manner that will reshape the nature of the grid over the next ten to twenty years.

During this period of transition, it is of vital importance that we maintain reliability, minimize environmental impact, and enforce security while enabling the innovations that will drive us into the future. This is no small task, and the questions that must be answered require no small amount of analysis. This would be one of the chief functions of the National Electricity Council.

While the NEC is certainly not a panacea, it could provide a truly unique and valuable resource to the U.S. government as it navigates the electricity grid's complexities and changes.

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