

Mr. Mark Frigo, Vice President and Head of Energy Storage, E. ON North American

“Powering America: The Role of Energy Storage in the Nation’s Electricity System.”

House Energy and Commerce Subcommittee on Energy

July 18, 2018

EXECUTIVE SUMMARY

- E.ON is a global company, providing more than 7,000 megawatts (MW) of electricity from utility-scale renewable generation facilities located primarily in the United States and in Europe. Since 2007, E.ON has invested more than \$14 billion in renewable projects worldwide, with roughly half of that investment made in local communities in the United States. We build, own, and operate utility-scale wind farms, solar photovoltaic plants, and energy storage systems throughout the United States. As such, E.ON is one of the United States’ largest owners of renewable power projects, with more than 3,600 megawatts (MW) under operation.
- As battery technology has evolved and production costs have fallen, energy storage has become an increasingly effective solution to solving grid challenges, making the grid more resilient and saving ratepayers money. More specifically, battery energy storage is a uniquely flexible technology that can be deployed in a myriad of ways to meet the unique needs of the grid, utilities, and ultimately end customers.
- E.ON has three energy storage projects currently in operation, totaling approximately 30 MW, each uniquely designed to solve a problem.
 - Iron Horse, our first energy storage project in the United States, is a combined energy storage and solar photovoltaic project located in Tucson, Arizona. We designed and implemented this energy storage solution to stabilize Tucson Electric Power’s grid. Working with TEP, our team designed and built a 10 MW / 2.5 MWh battery solution paired with a 2 MW solar photovoltaic array to solve this problem.
 - Texas Waves, our other operational energy storage facility, is actually comprised of two 9.9 MW battery projects in West Texas -- one co-located next to our Pyron Wind Farm and the other co-located next to our Inadale Wind Farm. Both facilities went online in January 2018. Texas Waves is designed to provide ancillary services to the Electric Reliability Council of Texas (ERCOT) market and can respond to shifts in power demand more quickly than traditional assets, thereby improving system reliability and efficiency.
- While energy storage technology continues to evolve and costs continue to fall, more steps from both a policy and fiscal perspective are needed to unlock this technology’s full potential to increase grid reliability and resilience, and to save taxpayers money on their electricity bills.

- Energy storage should be a part of grid modernization and optimization to contribute to reliability and resilience. FERC Order 841 was a significant step forward to allow for energy storage's participation on the grid in organized markets, but FERC must now ensure that the RTO/ISOs, over which it has jurisdiction, faithfully and fully implement the order to allow energy storage into their markets to the benefit of customers.
- It is also important that utility commissions in states not included in organized markets ensure that the utilities they regulate evaluate energy storage resources as a viable and cost-effective tool in the utility planning process. Market rules should not only ensure participation but should be examined to ensure that interconnection processes do not constitute barriers to entry.
- Energy storage would also benefit from fiscal policy that rewards investment in this emerging technology for a limited period. For example, an investment tax credit for energy storage would encourage greater investment and faster deployment of energy storage solutions to help utilities, generators, and, most importantly, customers unlock the many benefits of storage.
- Energy storage is an incredibly useful technology that can help meet the needs of the new energy world. It is a uniquely flexible technology that can be designed to meet the specific needs of customers and the grid. It increases grid reliability and will help ensure America continues to lead on the new energy frontier.

Testimony of
Mr. Mark Frigo
Vice President and Head of Energy Storage
E.ON North America

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Good morning Chairman Upton, Ranking Member Rush, and Members of the Subcommittee.

Thank you for the opportunity to appear before you today. My name is Mark Frigo and I am the Vice President and Head of Energy Storage for E.ON North America.

In that role I am responsible for all aspects of our U.S. energy storage business. In my testimony today, I will discuss E.ON’s efforts to deliver this technology to customers across the U.S.

Since 2007, E.ON has invested more than \$14 billion in renewable projects worldwide, with roughly half of that investment made in local communities right here in the United States. As one of the United States’ largest owners of renewable power projects, with more than 3,600 megawatts (MW) under operation, we have also taken a lead role in developing energy storage projects.

Traditionally, electricity could not be stored. Our electric grid was developed as a just-in-time delivery system. However, the energy world has changed. It is a world with computers; smart phones; the Cloud; rooftop solar on people’s homes and businesses; and the explosive growth of electric vehicles. The grid as we used to know it --- with large, centralized power plants

delivering power via transmission and distribution --- will be challenged to meet our nation's future energy needs. This is where energy storage comes into play. Low-cost energy storage has the ability to transform and meet the needs of the new energy world. E.ON is helping to lead this change.

Our projects

E.ON has three energy storage projects currently in operation, totaling approximately 30 MW, each uniquely designed to solve a problem.

Iron Horse, our first energy storage project in the United States, is a combined energy storage and solar photovoltaic project located in Tucson, Arizona. Working with Tucson Electric Power, our team designed and built a 10 MW battery solution paired with a 2 MW solar photovoltaic array to stabilize Tucson Electric Power's grid.

We continue to own and operate the project for use within Tucson Electric Power's system. It is our understanding that our energy storage project, along with another one that TEP has in its system, has significantly improved the situation within the greater Tucson area.

Texas Waves, our other operational energy storage facility, is actually comprised of two 9.9 MW battery projects in West Texas -- one co-located next to our Pyron Wind Farm and the other co-located next to our Inadale Wind Farm. Texas Waves is designed to provide ancillary services to the Electric Reliability Council of Texas (ERCOT) market and can respond to shifts in power demand more quickly than traditional generating technologies, thereby improving system reliability and efficiency.

These two projects went on-line in January of this year and have successfully responded during extreme weather and unplanned generation outages. These projects were able to respond to ERCOT's frequency regulation signal within milliseconds, helping ERCOT manage minute-to-minute fluctuations between load and generation on their grid, and ultimately helping citizens of Texas keep the lights on.

U.S. Energy Policies Should Allow Storage Integration

Despite our successes in the market and its great potential to enhance the grid's reliability and resilience, energy storage remains an emerging technology. While the technology continues to evolve and costs continue to fall, more steps from both a policy and fiscal perspective are needed to unlock this technology's full potential to support the grid and to save taxpayers money on their electricity bills.

Energy storage should be a part of grid modernization and optimization to contribute to reliability and resilience. FERC Order 841 was a significant step forward to allow for energy storage's participation on the grid in organized markets, but FERC must now ensure that the RTO/ISOs, over which it has jurisdiction, faithfully and fully implement the order to allow energy storage into their markets to the benefit of customers.

It is also important that utility commissions in states not included in organized markets ensure that the utilities they regulate evaluate energy storage resources as a viable and cost-effective tool in the utility planning process. Market rules should not only ensure participation but should be examined to ensure that interconnection processes do not constitute barriers to entry.

Energy storage would also benefit from fiscal policy that rewards investment in this emerging technology for a limited period. For example, an investment tax credit for energy storage would

encourage greater investment and faster deployment of energy storage solutions to help utilities, generators, and most importantly customers unlock the many benefits of storage.

Closing

In closing, energy storage is an incredibly useful technology that can help meet the needs of the new energy world. It is a uniquely flexible technology that can be designed to meet the specific needs of customers and the grid. It increases grid reliability, while enabling all of the technological and sustainable advancements our country continues to enjoy. And, best of all, it can do all of these things while saving ratepayers – your constituents – money. I urge you to adopt forward-looking policies to help unlock energy storage’s potential to keep the United States at the forefront of the new energy world.

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In that role I am responsible for all aspects of our U.S. energy storage business, including planning, personnel, and project development and execution. In my testimony today, I will discuss E.ON’s efforts to deliver this technology to customers across the U.S. I will also share my personal perspective on the existing landscape, prospects for energy storage, and the need for continued support.

E.ON is a global company, providing more than 7,000 megawatts (MW) of electricity from utility-scale renewable generation facilities located primarily in the United States and in Europe. Since 2007, E.ON has invested more than \$14 billion in renewable projects worldwide, with roughly half of that investment made in local communities right here in the United States. We build, own, and operate utility-scale onshore and offshore wind farms, solar photovoltaic plants, and energy storage systems throughout the United States. As such, E.ON is one of the United States’ largest owners of renewable power projects, with more than 3,600 megawatts (MW) under operation.

The company develops, constructs, owns, and operates some of the most efficient, highest-performing utility-scale renewable energy projects in the country. In addition, we are a full-service provider of operations, maintenance, and asset management services to a variety of institutional partners across North America. All told, our Control Center manages nearly 7,000 MW of renewable energy across 11 states. Our projects provide enough energy to power approximately 2 million American households.

Delivering energy storage

With nearly 33 million utility customers in Europe, E.ON is acutely aware of the challenges facing utilities and grid operators in the new energy world. As battery technology has evolved and production costs have fallen, energy storage has become an increasingly effective solution to solving grid challenges, making the grid more resilient and saving ratepayers money.

More specifically, battery energy storage is a uniquely flexible technology that can be deployed in a myriad of ways to meet the unique needs of the grid, utilities, and ultimately end customers. E.ON leverages this flexibility to deliver one-stop Energy Storage Systems that provide specifically tailored grid solutions for providers here in the United States. These solutions include providing lower cost and more effective alternatives to transmission and distribution system capital improvements, helping to integrate renewable generation into the grid, accelerating the adoption of distributed energy resources, and delivering electric reliability services to make the grid more flexible, resilient, and reliable.

Traditionally, electricity could not be stored. Our electric grid was developed as a just-in-time delivery system. However, the energy world has changed. It is a world with computers; smart phones; the Cloud; emission-free, yet intermittent, energy; rooftop solar on people's homes and

businesses; and the explosive growth of electric vehicles. The grid as we used to know it --- with large, centralized power plants delivering power via transmission and distribution --- will be challenged to meet our nation's future energy needs. This is where energy storage comes into play. Low-cost energy storage has the ability to transform and meet the needs of the new energy world. E.ON is helping to lead this change.

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Texas Waves, our other operational energy storage facility, is actually comprised of two 9.9 MW battery projects; one co-located next to our Pyron Wind Farm and the other co-located next to our Inadale Wind Farm. Both facilities are located in West Texas and are fully owned and operated by E.ON. Texas Waves participates on a merchant basis in the competitive day-ahead ancillary services market and energy market at the Electric Reliability Council of Texas, or

ERCOT. The ancillary services market includes services like frequency response and regulation, which are vital to keeping the grid stable, online, and delivering power to customers.

These two projects went on-line in January of this year and have successfully responded to several grid events where the grid became unstable due to extreme weather and unplanned outages of other generation units. These projects were able to respond to ERCOT's frequency regulation signal within milliseconds, helping ERCOT manage minute-to-minute fluctuations between load and generation on their grid, and ultimately helping citizens of Texas keep the lights on.

U.S. Energy Policies Should Allow Storage Integration

Despite our successes in the market and its great potential to enhance the grid's reliability and resilience, energy storage remains an emerging technology. While energy technology continues to evolve and costs continue to fall, more steps from both a policy and fiscal perspective are needed to unlock this technology's full potential to support the grid and to save taxpayers money on their electricity bills.

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In closing, energy storage is an incredibly useful technology which can help meet the needs of the new energy world. It is a uniquely flexible technology that can be designed to meet the specific needs of customers and the grid. It increases grid reliability, while enabling all of the technological and sustainable advancements our country continues to enjoy. And, best of all, it can do all of these things while saving ratepayers – your constituents – money. I urge you to adopt forward-looking policies to help unlock energy storage’s potential to keep the United States at the forefront of the new energy world.