

**United States House of Representatives  
Select Committee on the Climate Crisis**

**Hearing on June 13, 2019  
“Solving the Climate Crisis: Ramping Up Renewables”**

**Questions for the Record**

**Katherine Hamilton  
Chair  
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**The Honorable Kathy Castor**

1. In some regions of the United States, it may be difficult to use renewable energy during extreme weather, such as during extremely cold weather in the northern part of the country. How could greater use of flexible energy resources help address this challenge?

Interestingly, based on the evidence, the issue of resources unable to operate in extreme weather situations is almost entirely limited to traditional generation, not renewables and flexible resources. Several examples of resilience provided by flexible resources were cited in my testimony. In addition, I would refer the Committee to Hurricane Florence news stories that discuss the nuclear and coal plants not only having to shut down in preparation for the storm, but also coal ash ponds being breached, causing collateral environmental damage to water systems in North Carolina. The resources most quickly brought back on line were solar farm, and, luckily, the state has many solar systems. Another story to point to is natural gas in the Midwest this past winter; in many parts of the country, there is a tension between natural gas being used for home heating and the supply for generation. Wind energy resources are hearty in hurricanes with self-managing systems to ensure blades are locked and feathered to prevent damage. As I mentioned in my testimony, demand response, microgrids, and distributed generation (as long as it is able to disconnect from the overarching grid) all prove to be the most resilient resources on the system.

2. Conventional fossil fuels are often more energy dense than newer technologies. How should Federal Research and Development (R&D) investments be targeted to address this challenge?

Rather than thinking about energy density as the attribute we need, I recommend instead focusing on end-states (parity of cost and performance at the system level). Taking electric vehicles as an example, rather than comparing the size of the battery to the size of the gasoline tank, one would look at the mileage achieved in a similar sized vehicle at a particular price—performance and service provided rather than one specific measurement that may not translate (or be relevant) between technologies. In recent testimony before House Science Committee, I discuss this issue of attribute as well. I use the example of energy storage to state that “rather than identifying this research as ‘grid-scale’ or prescribing time durations for storage technology operations, I recommend instead stating the problems that should be solved or the services delivered, and allow new chemistries and technologies—individually or as a system--be developed that can fit those needs.” The same should be true for other flexible technologies: state the problem that

needs solving and build the R&D around possible solutions. Comparing fossil fuel to renewable plus storage systems, the question might be whether we want leaded or unleaded paint; one resource exacerbates climate change while the other mitigates it.

3. Most decarbonization scenarios anticipate electrification of transportation and industry and greater use of battery storage. However, batteries require the use of precious metals that are mostly imported. How should the Federal government drive the development of battery recycling?

Precious metals (Rhodium, Platinum, Gold, Palladium, and Silver) are used in electronics and catalytic converters, but are not used in lithium-ion batteries. Rather, metals such as Cobalt, Nickel, Lithium, Aluminum, Manganese, and Iron are used in manufacturing those batteries. The cathode of the battery is made from a Lithium-Cobalt-Nickel oxide mixture on an Aluminum foil while the anode of the battery is made from graphite on Copper foil. Recycling end of life lithium-ion batteries in the U.S. should encourage processes that return those elements to be reused in battery materials. Reuse of the recovered elements only makes sense, of course, if there is a robust lithium-ion battery manufacturing industry, accompanied by collection, dismantling and pre-processing, and refining capability. While the U.S. has established collectors and pre-processors, there is no lithium-ion refining capacity in the U.S. By establishing federal policies—establishing best practices for collection, requiring labeling and responsibility from manufacturers, and ensuring the federal government leads by example, as just a few ideas—we could create the certainty and market scale for refiners to build recycling plants here in the U.S.

4. What should Congress do to ensure that flexible demand-side resources are integrated into wholesale power markets?

With jurisdiction over the Federal Energy Regulatory Commission, Congress is able to exert pressure on that agency to make a final rule on the Distributed Energy Resource rulemaking. Senators and Members of the House (on both sides of the issue) have sent letters urging FERC to act on the rulemaking. A more durable solution, of course, would be legislation that clarifies flexible demand-side (consumer) resources in the Federal Power Act as being able to serve as resources—just as generators serve as resources—and have access to a participation model in the wholesale market.

5. During the hearing, the challenges that European countries, especially Spain and Germany, faced in the last decade as they have increased their use of renewable energy were raised. Overall have Spain and Germany succeeded in increasing their use of renewable energy in a way that has benefited their economy? Are there any overarching lessons that the United States can learn to inform the development of national policies from these countries?

European countries have indeed experimented with renewable energy policy and technology and felt some growing pains, although the result has been that renewable energy is now the cheapest source of electricity in those regions. Spain and Germany, in particular, each put into place a Feed-In-Tariff (FIT), which set higher payments for renewable energy, thus drawing investment from those industries. Over time, this policy kept prices higher as the cost of renewables dropped. Subsequently, adjustments have been made to ensure that consumers are not paying more than market price for renewable energy. Today, Spain and Germany have adjusted down or removed their FIT altogether and have seen some of the highest penetration of renewable energy, while also enjoying economic and environmental benefits. In fact, a quarter of the start-up companies in Germany contribute to the green economy. A FIT was also instituted in Ontario, Canada, setting

high prices to incentivize renewable energy deployment. While this policy worked to scale renewables, over time it also kept prices higher than the market. The U.S. has not instituted a FIT policy on the federal or state level, but instead has used tax incentives, Renewable Portfolio Standards, emissions trading schemes, and other procurement policies to scale renewable deployment and lower prices for consumers. Today, thanks to experimentation by countries in Europe as well as the U.S., solar and wind are in many cases the cheapest sources of energy.

## References

### *Question #1 references*

Hurricane Florence and nuclear:

[https://www.washingtonpost.com/news/powerpost/paloma/the-energy-202/2018/09/18/the-energy-202-hurricane-florence-blows-hole-in-trump-team-s-case-for-helping-coal-and-nuclear-power-critics-say/5ba022621b326b47ec9596b9/?utm\\_term=.a25d19c1e4f5](https://www.washingtonpost.com/news/powerpost/paloma/the-energy-202/2018/09/18/the-energy-202-hurricane-florence-blows-hole-in-trump-team-s-case-for-helping-coal-and-nuclear-power-critics-say/5ba022621b326b47ec9596b9/?utm_term=.a25d19c1e4f5)

Hurricane Florence and coal:

<https://www.nytimes.com/2018/09/21/climate/florences-floodwaters-breach-defenses-at-power-plant-prompting-shutdown.html>

Hurricane Florence and solar:

<https://insideclimatenews.org/news/20092018/hurricane-florence-solar-panel-energy-resilience-extreme-weather-damage-wind-flooding>

Nuclear and cold temperatures:

[https://www.pressofatlanticcity.com/news/below-freezing-temps-shut-down-salem-nuclear-reactor/article\\_2fb9b5c7-931f-57be-b4a1-0db516b7e439.html](https://www.pressofatlanticcity.com/news/below-freezing-temps-shut-down-salem-nuclear-reactor/article_2fb9b5c7-931f-57be-b4a1-0db516b7e439.html)

Midwest natural gas story: <https://www.nepr.net/post/deep-freeze-puts-strain-midwest-gas-and-electricity-grids#stream/0>

DOE study on wind energy and natural disaster:

<https://www.energy.gov/eere/articles/wind-turbines-extreme-weather-solutions-hurricane-resiliency>

Advanced Energy Management Comments to California Wildfire Strike Force: <https://aem-alliance.org/aema-urges-consideration-of-der-in-wildfire-mitigation/>

### *Question #2 references*

Link to Science Committee Testimony can be found here: <https://science.house.gov/hearings/the-future-of-electricity-delivery-modernizing-and-securing-our-nations-electricity-grid>

### *Question #3 references*

See new DOE program on battery recycling: <https://americanmadechallenges.org/batteryrecycling/>

Umicore, Inc. chart shows where facilities are located:

<https://csm.umicore.com/en/recycling/battery-recycling/e-mobility/>

Recycling in the EU is driven by the WEEE directive, which creates certainty for industry:

[https://ec.europa.eu/environment/waste/weee/legis\\_en.htm](https://ec.europa.eu/environment/waste/weee/legis_en.htm)

<https://www.pv-magazine.com/2019/03/25/innovation-boosts-lithium-ion-battery-recycling-rate-to-over-80/>

*Question #4 references*

Letter to FERC on DER NOPR from House Members in support of DER rulemaking:

<https://mikelevin.house.gov/sites/mikelevin.house.gov/files/Letter%20to%20FERC%20re%20DER%20Rulemaking%20021119.pdf>

Letter to FERC on DER NOPR from Senators in support of participation model:

<https://www.whitehouse.senate.gov/imo/media/doc/2019-02-11%20FERC%20Letter.pdf>

Letter to FERC on DER NOPR from Senators opposed to DER in wholesale market:

<https://www.hoeven.senate.gov/imo/media/doc/2019.05.07%20Hoeven%20Letter%20to%20FERC%20on%20DER%20Aggregation%20by%20Third%20Parties.pdf>

*Question #5 references*

See analysis on current solar boom in Spain: <https://www.greentechmedia.com/articles/read/spanish-gold-rush-fuels-new-european-solar-boom#gs.tz3kf7>

Solar as engine for economic boom in Spain: [https://www.renewableenergymagazine.com/pv\\_solar/solar-power-is-engine-of-spain-s-20190410](https://www.renewableenergymagazine.com/pv_solar/solar-power-is-engine-of-spain-s-20190410)

Germany has also seen a rise in solar installations as a result of cutting back their FIT: <https://www.pv-magazine.com/2019/08/01/germany-installed-2-gw-of-solar-in-six-months/>

Report on start-ups in Germany: <https://www.cleanenergywire.org/news/quarter-german-start-ups-contribute-green-economy-report>

Blog from NRDC on economic benefit of climate policy to state of California:

<https://www.nrdc.org/experts/ralph-cavanagh/new-report-shows-how-climate-action-and-healthy-economy-wo>

New York is taking much of its offshore wind strategy from what Europe has learned:

<https://www.nypa.gov/news/press-releases/2019/20190807-key-learnings-offshore-wind-transmission-models>