TESTIMONY OF

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AMERICAN ELECTRIC POWER

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American Electric Power, based in Columbus, Ohio, is powering a cleaner, brighter energy future for its customers and communities. AEP's approximately 16,800 employees operate and maintain the nation's largest electricity transmission system and more than 223,000 miles of distribution lines to safely deliver reliable and affordable power to 5.5 million regulated customers in 11 states. AEP also is one of the nation's largest electricity producers with approximately 31,000 megawatts (MW) of diverse generating capacity, including 2,100 MW of nuclear power and more than 5,900 MW of renewable energy. With regards to nuclear power, the Cook Nuclear Plant is located along Lake Michigan's eastern shoreline. With both Cook units at full power, more than 2,100 MW of electricity are generated – enough for more than 1.5 million homes. With regards to renewable energy, the company's plans include growing its renewable generation portfolio by approximately 16,600 MW to reach about 50% of total capacity by 2030. AEP is on track to achieve an 80% reduction in carbon dioxide emissions from 2000 levels by 2030 and has committed to achieve net zero by 2050. AEP is recognized consistently for its focus on sustainability, community engagement, and diversity, equity and inclusion. AEP's family of companies includes utilities AEP Ohio, AEP Texas, Appalachian Power (in Virginia and West Virginia), AEP Appalachian Power (in Tennessee), Indiana Michigan Power, Kentucky Power, Public Service Company of Oklahoma, and Southwestern Electric Power Company (in Arkansas, Louisiana, east Texas and the Texas Panhandle). AEP also owns AEP Energy, which provides innovative competitive energy solutions nationwide. For more information, visit aep.com.

The United States operates the largest and highest performing fleet of nuclear reactors in the world. This fleet currently supplies over half of the carbon-free electricity consumed in the United States. Our current fleet of reactors does this at very high capacity factors providing carbon-free electricity on a 24/7/365 basis, and has performed very well in extreme weather events that have occurred over the past decade. These reactors also can be applied to non-electricity generation applications such as:

- The production of clean hydrogen using excess power (Exelon Nine Mile Point).
- The production of clean hydrogen using excess power and process heat (APS Palo Verde).
- The production of medical isotopes (Bruce Plant – Canada).
- The desalination of water (see below).
- Military and national security purposes. USAF has selected Eielson Air Base in Alaska for deployment of a micro-reactor in 2027.

While the current fleet of reactors operates at the highest levels of safety, several companies have begun work on advanced reactor designs. The advanced reactors being designed incorporate decades of operating experience and technology improvement to produce even safer reactor designs.

The reactors in the current fleet are very large, typically 600-1,400 MWe, and were mostly constructed on their operating sites, resulting in lengthy and expensive construction schedules. Advanced reactors are smaller, typically 60-300 MWe, simpler, and utilize modular construction techniques. They are referred to as small modular reactors (SMRs). The size and inherent safety features of these designs eliminate the need for many systems, greatly simplifying the design and construction. In addition, modular construction techniques enable much of the construction to be completed in a factory setting resulting in reduced site fabrication activities and cost. These advanced reactors also require a smaller footprint. They can be deployed much more rapidly in "packs" or groups of reactors, which allows additional reactors to be added as the need arises. Finally, these smaller reactors employ air cooling systems and use far less water than reactors that use cooling water from a river, lake, or ocean.

Several advanced reactors are currently in the design and development phase. These reactors fall into the following general categories:

- Advanced light water reactors – These reactors are of similar design to the existing fleet of reactors. They incorporate advanced safety features, use the same fuel that our current fleet of reactors use and are of modular design. These reactors are being designed and developed by NuScale, Holtec, and GE-Hitachi, for example.
- So-called next generation reactors – These reactors utilize different cooling mediums, such as helium gas, or molten sodium. In addition, they utilize advanced fuel designs that often use high-assay low-enriched uranium (HALEU) fuel that can incorporate additional resistance to possible fuel melt events. These types of reactors are being designed and developed by TerraPower, X-energy, and Kairos, among others.

- Micro-Reactors – Very small nuclear reactors, typically 1-5 MWe. Some are miniature versions of SMRs, others will function like batteries or fuel cells. These reactors are being designed and developed by Oklo, Westinghouse, and Ultra Safe, for example.

SMRs and micro-reactors have several benefits that extend beyond bulk power production and can support the decarbonization of other segments of our economy:

- Their smaller size makes them ideal to power micro-grids that need a dedicated, reliable source of carbon-free power. Micro-grids perform a critical role as part of many power systems, and can directly contribute to other goals.
- Desalination plants will need SMRs as the world continues to stretch the supply of fresh water. The use of SMRs for desalination could be of critical importance in the future in some parts of the developing world, as access to fresh water emerges as a critical issue due to a combination of increased demand for water caused by population growth and decreased water supplies due to climate change and droughts.
- Distributed energy resources (DER) will challenge the grid of the future. SMRs and micro-reactors can load follow, can be dispatched as needed and provide uninterrupted voltage and frequency support to the power grid.
- They offer resilient, long-term power to facilities important to national security, like military bases. They can operate several years or more between refueling and maintenance outages.
- Similar to existing nuclear reactors, they can supply hydrogen without emitting carbon. SMRs can be located near hydrogen production facilities and transport hubs. This makes SMRs an ideal partner to large oil and gas companies that will transition to hydrogen production and transportation. (The Royal Dutch Shell chief scientist spoke to the NEI board of directors in October and explained that in the future, Shell will rely on SMRs and renewables to produce hydrogen as part of repurposing storage and transport infrastructure for the transport of hydrogen.)
- Advanced nuclear plants that operate at high temperatures also provide an option to assist in the decarbonization of some sectors like the steel industry, providing both electricity and process heat.
- SMRs may have a future role in the production of medical isotopes.

The Nuclear Regulatory Commission (NRC) has completed the technical review of one SMR design from NuScale and is currently reviewing a micro reactor application from Oklo. Several other vendors are expected to submit their designs for NRC review in the next few years. NRC’s current regulatory framework and review processes are oriented toward light water reactors like the plants we operate today. The NRC is currently assessing their processes to complete technical reviews and to issue licenses for non-light water reactors. Establishing an efficient and timely process for licensing advanced reactors is essential to enabling nuclear power to support decarbonization of our economy.

Individual states also have a role in the licensing of new reactors via environmental reviews, water rights and other regulatory constructs.

The first SMRs are expected to be placed in service in the 2027-2029 time frame. NuScale, TerraPower, and X-energy are working with federal and state authorities for design certification and combined operating licenses, and with government and private entities for financing.

There are several business models for the construction of SMRs. These include:

- Construction of reactor(s) at a government facility in partnership with a municipal utility and DOE (NuScale to build SMRs at Idaho National Laboratory in partnership with the Utah Associated Municipal Power System)
- Construction of reactor(s) at the sites of decommissioned fossil power plants in partnership with DOE (TerraPower and Pacificorp to build SMR in Wyoming, NuScale has met with various utilities)
- Construction of reactor(s) in areas of need in partnership with DOE (X-energy with Energy Northwest in Washington)
- Construction of a SMR at a decommissioned nuclear reactor site (Holtec)

This is a good start but continued engagement between the private sector and federal government is needed to advance the technology and offset the financial risks to early adopters of this technology. Engagement includes:

- Investment or production tax credits to offset the first-of-a-kind expenses to be incurred for the initial facilities to be built. The ITC and PTC have worked well to encourage the adoption of wind and solar energy.
- Zero emission credits (ZEC), which have been utilized to compensate existing nuclear power plants for their carbon-free electricity in states such as Illinois, New York, Connecticut, and New Jersey.
- Continued DOE grants and funding for new reactor designs, testing, and fuel fabrication.

There are several promising small modular, or advanced, reactor designs being put forward by American companies. Across the globe other countries, most notably Russia, China, Canada, and the UK, are currently designing and deploying these advanced reactors to meet their carbon-free energy needs. Nuclear power has proven to be a large-scale source of 24 / 7 electricity production needed to complement numerous other sources of carbon-free electric generation to reliably power the U.S. and the global economy in the near-term and the long-term, while also providing critical non-electrical services including the production of clean hydrogen and desalination of fresh water.