Testimony of

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"America Leads the Way: Our History as the Global Leader Reducing Emissions"

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Chairman Johnson, Ranking Member Tonko, and members of the Subcommittee:

Thank you for the invitation and opportunity to testify before you today on the first of two hearings to examine the importance of American energy and environmental leadership. I am Mark W. Menezes, the President and CEO of the U.S. Energy Association. I am the immediate past Deputy Secretary of Energy, served previously as the and former Chief Counsel, Energy and Environment, for the House Committee on Energy and Commerce, and have over 30 years of experience in the public and private energy policy sectors.

About USEA

The United States Energy Association (USEA) is a nonprofit, educational organization both in function and IRS tax status. Founded in 1924, USEA serves as a policy, science, and technological information resource both here in the U.S. and internationally. Our mission is to foster the advancement of all segments of the energy sector and to promote access to affordable, reliable, clean and sustainable energy domestically and in the developing countries in partnership with USAID, Department of State, and the Department of Energy (DOE), among others.

USEA's membership is comprised of over 130 companies, associations, NGOs, and organizations across the energy sector, from the largest Fortune 500 companies to small energy consulting firms. Our members include both energy production companies, energy savings companies, universities, as well as engineering, construction, utilities, legal, finance, research, and consulting organizations.

USEA seeks to inform and promote a positive, effective dialogue on a path forward in energy policy, implementation, as well as development and construction necessary to bring new technologies to the energy sector. USEA presents several flagship events per year for the press and public per year and conducts a variety of webinars, briefings, and workshops.

In the US and other countries, USEA, along with its government partners, assist in the development and implementation of safe, affordable, clean, reliable and resilient energy systems.

In developing countries in Southeast Asia and Indo-Pacific region, including the countries of Bangladesh, Bhutan, Burma, Cambodia, India, Laos, Malaysia, Maldives, Nepal, Sri Lanka, Thailand, and Vietnam, USEA provides US energy industry expertise to provide advisory and technical exchange activities to developing independent markets, governance of the power sector, regional electricity integration, and creating environments for private investment. Additionally, USEA brings technical, legal, and financial experts for capacity building and training and supporting in-country experts. Just in the past few weeks, USEA was able to assist Bhutan in creating its Hydrogen Roadmap modeled after DOE's.

USEA partners with USAID and utilities in the countries of Central Asia, Latin America and the Caribbean, and Vietnam to provide them with US knowledge and skills to maintain a steady supply of power to ensure reliable generation, transmission and distribution of electricity to meet the needs of consumers, businesses, and all human activity. USEA provides US knowledge and technologies to implement cybersecurity best practices and ensure the security of the digitalization and modernization of the energy sector in these countries.

In Southeast Europe, the Balkans, and the Black Sea area, USEA brings energy industry expertise and experience to assist countries develop and maintain reliable and secure energy systems by integrating regional energy markets, improving system operations, deploying cost-effective clean energy technologies, increase adoption of US-developed or supplied grid enhancing technologies, and improve public understanding of the benefits of a clean energy transition.

After many years of work with the utilities and grid operators of Ukraine and Moldova to modernize their operations, USEA assisted Ukraine and Moldova to disconnect their electrical grids from Russia in the days before and during the invasion which allowed them to operate separately since Russia's invasion.

And in the US, USEA works around the country to ensure the integration and deployment of efficient and cost-effective energy technologies and systems including CCUS and carbon management technologies and CO_2 and carbon byproducts for use in the production of cement, fertilizer, fuels, and promoting hydrogen, energy storage, and the development of rare earth elements and critical minerals. Regarding the latter, along with DOE, USEA works with Native Americans to develop Indian energy minerals, the mainstay for many energy tribes and their economies, to contribute to new technologies to achieve global carbon reductions.

Lessons learned:

When I arrived at USEA a few months ago, I asked our Program Directors, several of whom have almost 30 years of experience working with our governmental and private sector partners to bring US energy technologies and policies to developing countries, what were the hallmarks of a successful program. These experienced experts told me two things: 1) successful, lasting projects were built from the ground up, with community involvement and acceptance, not imposed on them because the US thought it was a good idea; and 2) capacity building to ensure the communities had the resources to construct, operate, and maintain the energy systems over time.

Successful projects take time to plan and build. Projects without these two components, regardless of good intentions and amount of funding, do not last.

Of course, when you think about it, those same principles exist here in the US. Today, very few energy infrastructure projects are permitted or constructed without the community's involvement and without a lengthy and fulsome permitting and construction process.

When I asked USEA board members who are CEOs of energy infrastructure companies what caused them the most concern was that it will take time to build out the energy infrastructure to meet net zero goals. Whether the projects are solar or wind farms, new hydrogen facilities, combined cycle natural gas units, CCS, or small modular nuclear reactors, their message was clear: it takes time to design, permit, procure materials, and construct these projects.

Current state of US emission reductions:

When assessing our history, the US has been a global leader in reducing actual greenhouse gas emissions. According to the U.S. Environmental Protection Agency (EPA)'s latest annual "Inventory of U.S. Greenhouse Gas Emissions and Sinks" report, the U.S. net GHG emissions had fallen by 16.6% since 2005, and that CO_2 emissions have fallen by 17.9%.

https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks

DOE's Energy Information Administration (EIA), in its Annual Energy Outlook confirmed the 17% historical reduction from 2005 levels and projects that the U.S. energy-related CO_2 emissions will decrease in the range of a low of 25% to 38% to as high as 45% below the 2005 levels by 2030, depending on case assumptions, particularly whether the US experiences low or high economic growth through 2030.

In its annual report, EIA attributes these projected future decreases to increased electrification, equipment efficiency, and renewable technologies for electricity generation. All will require deployment of U.S. technology. The US has been a leader in actual CO_2 reductions over the years since 2007 due to its breakthrough technologies. Most US reductions have been attributable to replacing coal with natural gas in the power sector.[1]

This so-called "shale revolution" was caused by smart R&D funding by DOE in the early 1980s when an entrepreneurial Texan, George Mitchell, read a paper hypothesizing about the amount of gas trapped in deep geologic "rock" formations. If that gas could be "fracked" the US would no longer be facing declining reserves but potentially become a world leading producer. It took some DOE R&D funding,[2] the development of improved buffering technologies in the use of hydraulic fracturing and directional drilling technologies. These breakthrough technologies, together with a regulatory structure to promote production and use, propelled the US to lead the

[1] "Numerous studies have demonstrated that the leading cause of these reductions has been the displacement of coal by natural gas in the electricity sector, where CO_2 emissions have fallen by 25% since 2007. This displacement has been led by the availability of a low-cost supply of natural gas, brought about by the shale revolution." The Shale Revolution and Climate Change (rff.org)

[2] George Mitchell, Father of Fracking (nytimes.com)

world in natural gas production. The shale gas revolution has produced an abundance of clean, cheap natural gas.[3] With the deployment of these new technologies, the US became a net exporter of natural gas and today leads the world in natural gas production and in emission reductions. And during this time the US economy grew by a significant amount and its use of energy increased, not decreased. Other countries have not been able to do this.

The advancements to very efficient, flexible natural gas combined cycle units being powered by abundant, affordable shale natural gas has not only replaced coal as the leading source of electricity generation but has also complemented the increased use of renewables. These natural gas combined cycle units can ramp up and down to accommodate renewable power when solar and wind projects experience variability. This almost symbiotic relationship has caused the power sector to reduce emissions to such an extent that the transportation sector now leads the energy sectors in emissions.

US innovation is driving development and deployment of other technologies reducing emissions. US solar companies have developed and are producing here in the US new solar panels, modules, wafers and cells that are more efficient, lower in cost, safer, and more environmentally friendly than conventional technologies like the Chinese crystalline silicon photovoltaic imports we rely on today. These US companies are developing secure supply chains further lessening our dependency on unfriendly nations to support our growth in solar energy.

US long duration battery manufacturers have developed technologies free of the critical materials and minerals upon which the lithium-ion batteries are dependent. Today, companies are deploying on our nation's grid battery storage. These batteries are water-based, safe, 100% recyclable with a low carbon footprint with sustainable production.

Other reductions in the power sector are occurring in our nuclear industry which is completing construction of the Vogtle advanced AP 1000 nuclear plant which will bring 2,234 MW of emission free power to our electricity grid. Several companies are pursuing small modular reactor designs in the US and abroad. In addition to improved small light-water reactors, advanced small modular reactors include high temperature gas reactors, fluoride salt-cooled high temperature reactors, and molten salt fast reactors. Our nuclear industry recently set a record in nuclear power produced due to increased power uprates and improved fuel cycles.

Our wind companies have increased US manufacturing to improve energy output from wind turbines and are developing improved, lighter rotor blades, more reliable drivetrains, and high-performance-optimizing control systems to increase production and decrease capacity factors.

Our oil and natural gas sectors are advancing commercial deployment of Carbon Capture, Utilization and Storage, advancing hydrogen technology and infrastructure, employing new technologies to better detect, measure, monitor and reduce methane emissions and upstream flaring. Our natural gas companies produce the most environmentally compliant natural gas in the world and seek to develop differentiated gas markets to sell their gas to EU as a cleaner

[3] Yergin, Daniel: The New Map: Energy, Climate, and the Clash of Nations, 1st Ed. (New York: Penguin Press, 2020), pp. 4-13.

choice than Russia pipeline gas as well as to our friends and allies all over the world desiring more environmentally friendly produced natural gas.

Pipeline companies, utilities, and distribution companies are developing ways to increase hydrogen use in natural gas EGUs and in the home. DOE's public private partnerships are developing retrofit technologies to existing natural gas turbines to increase combustion of hydrogen blends. Pipeline companies are examining ways to accommodate the increased use of hydrogen in existing pipelines. And now, traditional hydrogen and industrial gas producers are using their expertise to enter the energy sector to lead in the use of hydrogen as an energy source and, of course, to qualify for the clean hydrogen energy tax credits. These companies are also developing projects here in the US to export hydrogen to countries committed to net-zero goals.

It is important to remember that our utilities, energy companies, and USEA, with its work in developing countries and rural America, must figure out ways to provide energy that is reliable, affordable, clean and resilient. Energy accessibility has reduced global poverty, improved the health and lives of billions, is the basis of a sound and prosperous economy, and is necessary for national and global security. It is also important to remember that those with the obligation to provide energy to your constituents and the developing world cannot choose one over the other. It matters not to those without electricity today that energy is clean if it's not reliable, affordable, and resilient. Some of these issues were discussed at USEA's 5th Annual Advanced Energy Technology Forum available here: 5th Annual Advanced Energy Forum | USEA | United States Energy Association

Permitting Improvements

Many studies show the need for substantial increase in infrastructure of all types to achieve net zero goals. All this new infrastructure will require government permits. Permitting reform must happen. Today, it takes much longer to obtain permits than it does to build the projects seeking government permission. It doesn't matter what type of energy infrastructure it is. Solar, wind, large battery storage facilities now have as complicated a permitting process as coal, nuclear, refineries, and interstate pipelines and transmission. Recently, Congress amended NEPA to improve the permitting process, setting reasonable timelines, avoiding duplication, redundancies, and unnecessary delays without changing the strict environmental standards that permittees must meet. This committee should ensure that the clear intent of Congress is implemented by CEQ and carried out by the agencies.

Workforce Needs

Another challenge facing policy makers is that the US has a limited supply of qualified workers, engineers, physical commodities, critical minerals and materials, and robust supply chains necessary for the number of facilities needed to achieve emission reductions. Most of these projects are highly capital intensive, requiring much planning and execution. All are multi-year projects and will benefit from a known and certain permitting process. And even with a more efficient permitting process, policy makers need to recognize that it will take time to design, finance, build and eventually deploy these new technologies. Infrastructure transformation is possible, but it will take time. The IEEE is conducting a study now and will produce a report in

the coming months about our challenges to provide the skilled workforce to meet tomorrow's goals today.

Upcoming COP28:

COP28 will assess the status of global emissions reductions. COP 28 will feature its first Global Stock Take (GST), a process to occur every five years to assess the world's collective progress toward achieving the Paris Agreement climate goals. A "Synthesis Report" released in September found that current climate commitments are insufficient to limit warming to 1.5 Degrees Fahrenheit above pre-industrial levels. It is expected COP28 delegates will discuss the Stock Take findings and recommendations, identify opportunities and challenges, and assess measures for climate action. Countries will collectively produce a summary of key messages, which are to be formalized for adoption by participants for their future climate actions.

Current state of international emissions reductions:

The largest GHG producing countries are the US, EU, China, and India. The US and EU have pledged to reach net zero emissions by 2050, Russia and China by 2060, India by 2070. Only 18 countries have sustained absolute production-based GHG and consumption-based CO_2 reductions for longer than 10 years. And these reductions have only partly offset global emissions growth by China and other countries.

International Forecasts

The UN forecasts that the global population will increase by about 2 billion people by 2050. The population increases will occur not in the US, the EU, or China (or any of the OECD countries) but rather in India and the developing countries in Africa and Southeast Asia. These countries are those with the greatest number of people still without electricity or energy sources to provide the necessities of life. Indeed, many people in these countries use dung and biomass for heat, struggle to produce clean water, have no access to electricity—exist in a world unbearable to all of us. These people will demand access to affordable, reliable, clean energy from their leadership and will expect it from the convening nations at COP.

Since increased global emissions are attributable to increased global temperatures, the Committee should be aware of the international forecasts for future energy use, particularly the EIA, OPEC, the organization of 13 oil exporting countries, and the International Energy Agency IEA, the Paris-based energy agency of the OECD countries. The EIA forecasts growth of renewables, increased electricity demand, and continued use of fossil fuels, mainly natural gas, in countries that will experience increased populations. OPEC forecasts that global oil demand will increase by about 16% by 2050. The IEA, on the other hand, forecasts fossil demand will peak in a few years. Below are forecasts from each:

EIA's International outlook:

Key findings in *IEO2023* include:

- Energy consumption increases globally due to population and economic growth. Renewable energy consumption grows fastest, increasing from 21% in 2022 to a range of 29% to 34% in 2050.
- EIA projects that 81% to 95% of the new electric-generating capacity installed from 2022 to 2050 to meet new demand will be renewables and zero-carbon technologies.
- Major crude oil and natural gas producers will continue producing to keep up with growing demand from consumers such as China, India, Southeast Asia, and Africa under current policies.
- Natural gas consumption will continue to grow. Consumption rises from an 11% to 57% increase. Most of this increase will occur in Asia with both China and India expected to increase imports of natural gas. In addition, Western European natural gas demand is expected to increase about 12% between 2022 and 2050. Most of the increase is due to natural gas replacing coal to generate electricity and in fueling industrial production expansion. The increase in natural gas production and exports will come from the US and Middle East.

https://www.eia.gov/outlooks/ieo/

OPEC's World Oil Outlook 2023

OPEC released its World Oil Outlook last month. Unlike the IEA prediction that there will be peak fossil demand in the next few years, OPEC forecasts an increased use of oil from today's demand of approximately 100 mbpd to 116 mbpd. This increase is due to the increase in population growth, increase in the global middle class, and economic growth in the developed countries.

https://www.opec.org/opec_web/en/press_room/7225.htm

See USEA's recent virtual press briefing on this topic: USEA Virtual Press Briefing: The Oil and Gas Dilemma | USEA | United States Energy Association

International Energy Agency (IEA)'s Net Zero Roadmap

The International Energy Agency's (IEA) Net Zero Roadmap takes a different approach to forecasting future energy use and consumption than the EIA. The IEA outlines a comprehensive global pathway to achieve net-zero carbon emissions by 2050 and keep the 1.5°C goal within reach in line with the Paris Agreement. In other words, it describes what it thinks must happen to meet net-zero goals by 2050, not what current trends forecast.

Key findings include:

- Achieving the 1.5°C goal requires significant changes in behavior, such as reducing meat consumption, adopting more energy-efficient practices, and changing transportation habits.

- Hydrogen will play a key role to decarbonize industry sectors in which electrification will be difficult, such as heavy industry, shipping, aviation, and long-haul transport.

Significantly, the IEA predicts:

- The world will potentially reach peak oil demand, not peak oil supply, in the early 2020s. This peak demand will be due to the rapid adoption of electric vehicles, energy efficiency measures, and a shift towards cleaner and renewable energy sources.

https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach

Conclusion

The US has been a global leader in actual emission reductions due to its innovation and technology development. It has been able to do this while growing its economy and exporting energy for global security and to moderate global energy prices. Most reports forecast that the US will continue to do so while increasing its reductions. Globally, other countries, notably China, India, and the developing countries of Africa, and Southeast Asia, will continue to increase their emissions to meet their growing economies and populations increasing energy needs. USEA will continue to work with its friends and allies to bring US technologies and know-how to provide clean, affordable, reliable and resilient energy to citizens of the US and of the world.