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ONE HUNDRED SEVENTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE
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June 28, 2021

Hon. Jennifer M. Granholm
Secretary
Department of Energy
1000 Independence Avenue SW
Washington, DC 20585

Dear Secretary Granholm:

Thank you for appearing before the Subcommittee on Energy on Wednesday, May 19, 2021, at the hearing entitled "The Fiscal Year 2022 DOE Budget." I appreciate the time and effort you gave as a witness before the Committee on Energy and Commerce.

Pursuant to Rule 3 of the Committee on Energy and Commerce, members are permitted to submit additional questions to the witnesses for their responses, which will be included in the hearing record. Attached are questions directed to you from members of the Committee. In preparing your answers to these questions, please address your response to the member who submitted the questions in the space provided.

To facilitate the printing of the hearing record, please submit your responses to these questions no later than the close of business on Tuesday July, 13, 2021. As previously noted, this transmittal letter and your responses, as well as the responses from the other witnesses appearing at the hearing, will all be included in the hearing record. Your written responses should be transmitted by e-mail in the Word document provided to Lino Peña-Martinez, Policy Analyst, at Lino.Pena-Martinez@mail.house.gov. To help in maintaining the proper format for hearing records, please use the document provided to complete your responses.

Thank you for your prompt attention to this request. If you need additional information or have other questions, please contact Lino Peña-Martinez with the Committee staff at (202) 225-2927.

Sincerely,

Frank Pallone, Jr.
Chairman

Attachment

cc: The Honorable Cathy McMorris Rodgers
Ranking Member
Committee on Energy and Commerce

The Honorable Bobby L. Rush
Chairman
Subcommittee on Energy

The Honorable Fred Upton
Ranking Member
Subcommittee on Energy

Attachment—Additional Questions for the Record

Subcommittee on Energy
Hearing on
"The Fiscal Year 2022 DOE Budget"
May 19, 2021

Hon. Jennifer M. Granholm, Secretary, Department of Energy

The Honorable Frank Pallone Jr. (D-NJ)

1. Secretary Granholm, I have been pleased to hear you speak about reenergizing the Department's Loan Program Office (LPO). Having a working LPO can ensure that the United States is enabling new innovative technologies that can create jobs and address the climate crisis. With the market having evolved since the Title XVII loan guarantee program was created, some argue that the Department's interpretation of "reasonable prospect of repayment" needs to be modernized.
   a. What steps is the Department taking to evaluate its interpretation of "reasonable prospect of repayment"?
   b. What is the timeline for any Department action on the subject?
   c. Last year the Energy Act of 2020 authorized DOE to use milestone-based demonstration projects, which may require particular technical, financial, and hardware milestones to be met before a participant is awarded additional grants by the Department. Congress included these milestones to ensure that DOE programs meet requirements and deadlines, which can help de-risk first of a kind projects that will help meet the Administration's goals regarding decarbonization and job creation. Implementing milestone-based programs is particularly appropriate for the nuclear industry given its history of cost and schedule overruns, but would also be useful for other DOE demonstration projects authorized by the Energy Act of 2020. How does the DOE intend to use milestone-based demonstration projects? Will DOE implement this initiative for both new and existing demonstration programs?

The Honorable Diana DeGette (D-CO)

1. EM has had 19 leaders since its inception 30 years ago, with the tenure of recent leaders averaging a little more than a year. Each of these leaders has had different priorities. With EM's cleanup costs having grown by nearly $250 billion over the last 10 years—and approaching half a trillion dollars—what is DOE doing to ensure appropriate leadership commitment for addressing EM's responsibilities?
   a. EM's organizational position has changed at least 6 times. Does EM have the appropriate position within DOE to address its cleanup responsibilities, or does it

need to be elevated? Do you have plans to move EM again, and if so, what is the rationale for additional moves within the department?

b. Does EM have adequate authorities to hold its field sites and contractors accountable? If so, why have costs grown so much for major projects and contracts? Why has EM not modified contracts to address root causes (e.g., design-build nature of WTP contract) for its most troubling projects?

c. EM has a small number of contractors that carry out most of its cleanup work. These contractors often regroup to form new companies, which then receive subcontracts—creating significant barriers to entry. Additionally, when reviewing bids, EM gives preference to contractors who have done previous work for EM. What is DOE doing to ensure that it attains the benefits of competition amongst contractors?

2. EM recently developed and implemented a new initiative—the end-state contracting model (ESCM). In January 2021, the National Academies found that ESCM is neither outcomes-based nor completion-focused.

a. ESCM will likely result in dozens of discrete outputs (ID/IQ contracts), many of which will be less than $50 million, which is the threshold above which DOE applies rigorous project management controls. How will DOE ensure proper oversight of scope, cost, and schedule when in many cases activities that would previous be subject to these controls no longer will be?

b. For larger activities, applying ESCM may result in dozens of ID/IQ contracts for a specific activity at a site. How will DOE ensure that EM has capacity to administer and oversee a greater number of contracts than it currently has?

3. GAO and the National Academies have reported that tens of billions or more could be saved if EM adopted a risk-informed approach to its largest cleanup activities—in essence, conducting cleanup in a way that aligns remediation approaches with the risk the contaminated material poses. DOE reported in December 2020 that up to $230 billion could be saved by reclassifying waste to match its level of radioactivity; however, EM has not taken any concrete actions at sites such as Hanford or Idaho where most of those savings could be realized.

a. When will DOE reclassify waste so that low radioactivity waste can be treated as such?

4. In January 2019, GAO recommended that EM develop a program-wide strategy that outlines how DOE will direct available resources to address human health and environmental risks across and within sites. Two years later, EM has since developed a strategic vision, but has not yet developed a strategic plan. Why hasn't EM developed a strategic plan, and when does EM plan to do so?

5. Similarly, in September 2019, GAO recommended that EM revise its 2017 cleanup policy to establish how the EM program and DOE sites should apply the essential elements of a risk-informed decision-making framework into their current decision-making requirements and guidance. How does EM's newly developed Program Management Protocol incorporate the 4 phases and 16 essential elements of risk-informed decision-making?
    a. How does the Program Management Protocol specify how sites should incorporate risk-informed decision-making into their decision-making requirements?
    b. How does EM plan to incorporate the 16 essential elements of risk-informed decision-making into making cleanup decisions going forward?

The Honorable Peter Welch (D-VT)

1. Grid modernization is a key element in efforts to achieve the Administration's decarbonization goals. With that in mind, is the Administration supportive of fully funding the grid modernization provisions enacted last December as part of the Energy Act?

The Honorable A. Donald McEachin (D-VA)

1. To tackle the climate crisis, we know we must move urgently to zero emissions and 100% clean energy for all. As we transition to a clean energy economy, we have the opportunity to ensure that this transition and the energy of the future better protects the communities and environments impacted by energy development. It is imperative that we protect communities that could be harmed by critical mineral and rare earth mining and development by providing sufficient environmental, health, and cultural resource protections, and by creating a more sustainable supply chain. We must focus on sustainable answers as we decarbonize as quickly as possible, and believe that one potentially effective way to create that sustainable supply chain is to prioritize investments and policies to create a circular economy for critical mineral recycling and reuse. What is the Department of Energy already doing to advance the circular economy, and how can circular economy policies surrounding critical mineral recycling and reuse be a better alternative to new extraction? What can Congress do to promote and help create a robust circular economy here at home?

The Honorable G.K. Butterfield (D-NC)

1. The End-of-Year Omnibus Appropriations/COVID Relief Package (Relief Package) requires the Department of Energy (DOE) to establish a program to provide rebates to electric utilities (including co-ops) for expenditures to replace an energy inefficient transformer with an energy efficient one. DOE is required to establish the program within 90 days of the Relief Package's enactment on December 27, 2020.
    a. Secretary Granholm, last year's End-of-Year Omnibus Appropriations/COVID Relief Package (Relief Package) requires the Department of Energy (DOE) to establish a

new program in 2021 to provide rebates to electric utilities for expenditures to replace an energy inefficient transformer with an energy efficient one. Could you provide me with an update regarding your efforts to establish this new rebate program?

The Honorable Kurt Schrader (D-OR)

Secretary Granholm: Secretary Moniz coined the phrase "the forgotten renewables" when discussing the potential for marine energy. The United States has significant marine energy resources, according to the National Renewable Energy Lab (NREL). In fact, NREL conservatively estimates U.S. marine energy potential at roughly 57 percent of 2019 U.S. electricity generation—enough to power 220 million American homes. If we capture just ten percent of this resource, it would equal 5.7 percent of national load in 2019, or three times the solar capacity of that year, or one-quarter of the U.S. coal fleet. Moreover, Department of Energy-supported research and demonstration projects show that marine energy technologies will provide clear and competitive benefits to the electric system. These benefits include marine energy's location near demand loads, relative predictability, generating profiles, and resiliency. Near term, high-value distributed market generation opportunities include underserved communities, port electrification, and green hydrogen production. In addition, DOE's "Powering the Blue Economy" initiative shows that marine energy can provide cost-effective and reliable power for desalination, underwater data centers, aquaculture, and other emerging needs. On top of that, DOE, in partnership with Oregon State University, will soon begin constructing the world's premiere marine energy testing facility, PacWave, near Newport, Oregon, in my district. A similar facility in Orkney, Scotland, the European Marine Energy Centre, which has operated for over a decade now, contributes millions of Euros to the local and regional economy. Europe is clearly seeking a leadership position to commercialize the marine energy sector, outspending us in an effort to capture a significant percentage of the high value jobs that will be created in the process.

In your prepared statement, you testify that "globally, there is a $23 trillion market for clean energy products and for products that will reduce carbon pollution. This is a massive opportunity for the country. Other countries see that opportunity as well, and our economic competitors are working to corner the market on those opportunities. The question is: where are these products going to be built, and who will build them?" With regard to wind and solar technologies deployed in this country, we know the majority of these are built overseas. That is a reality we have dealt with as the country scaled up these sectors over the past decade. However, with marine energy, a newly emerging source of clean, renewable power, the United States still has a chance to compete and capture a significant percentage of these high-value jobs.

The National Hydropower Association's Marine Energy Council just released a Commercialization Strategy for Marine Energy that calls for deployment targets reaching one gigawatt of installed marine energy capacity in the United States by 2035. While modest compared to the current deployments of wind and solar technologies, achieving these targets would spark the domestic marine energy sector and help the U.S. create thousands of new high wage manufacturing jobs.

1. Can you commit to work with the marine energy sector to craft a roadmap to achieve these deployment targets?

2. Can you commit to seeking the resources from Congress needed for the research, development, and deployment efforts of the Water Power Technologies Office (WPTO) to achieve the goals of such a roadmap?
3. Can you commit to including in the Fiscal Year 2022 budget request the funding levels provided in the bipartisan Water Power Research and Development Act, authored by my friends and colleagues from Oregon, Congresswoman Suzanne Bonamici and Senator Ron Wyden, among many others? These new authorized levels include $137,428,378 per year for marine energy and $49,171,622 and per year for hydropower. This request would still be relatively modest compared to solar RD&D funding of $272 million in FY 2021, at a time with over 90 GW of solar capacity now installed across the country.
4. Can you commit to working with Congress to secure the needed funding to construct and operate a robust research and testing program at PacWave, and similar facilities across the country, over the coming years?
5. In your prepared testimony, you set a goal to "quadruple clean energy research in four years." Can you commit to working with Congress to quadruple the WPTO budget and seek the appropriate number of staff for the office over the next four years?
6. Can you commit to making sure that no offshore project interferes with existing fishing and crabbing activities?

The Honorable Kim Schrier (D-WA)

1. EM announced in late April that it has confirmed that another single-shell tank is leaking at Hanford, for a total of 69 tanks that have leaked in the past or are currently leaking. What steps is EM taking to ensure that additional tanks do not leak and to limit impacts to the environment from the 69 tanks that have or had a known leak?
    a. The Office of River Protection estimated that there is a 95% probability that it will run out of double-shell tank space while the waste is awaiting treatment. What impact will this additional leaking tank have on the already-limited double-shell tank space at Hanford? What options is EM considering to address the lack of double-shell tank space?
    b. GAO reported in January 2021 that EM does not have a long-term plan—which is a leading program management practice—for retrieving waste from Hanford's tanks. GAO cited benefits of having a plan for tank closure, including that it would serve as a communication tool with community stakeholders and may help to address technical challenges that EM could face in future waste retrieval efforts. However, DOE states that it already does long-term planning in a collection of documents. When will EM develop a comprehensive long-term plan, rather than piecemeal planning, in line with program management best practices and GAO's recommendation?

2. DOE officials have asserted that the Direct-Feed Low-Activity Waste (DFLAW) facility is on schedule to begin treatment in 2023. However, in May 2020, DOE submitted a proposal to amend the consent decree due to a *force majeure* event, specifically the

COVID-19 pandemic. What is the status of DFLAW construction and commissioning at Hanford, and what impact has COVID-19 had on the start of DFLAW treatment? Are there any additional challenges that could prevent DFLAW treatment from beginning on schedule?

3. EM stopped construction of the WTP's Pretreatment Facility and High-Level Waste Facility in 2012. Almost a decade later, EM has not resumed construction. Meanwhile, in 2018, the U.S. Army Corps of Engineers reported that at current annual funding levels, completing these facilities on time would not be possible. What is the status of the technical challenges facing the WTP, and what is the status of EM's analysis of alternatives to these two facilities? When does EM anticipate making a decision about how it will pretreat and treat Hanford high-level waste? If the WTP as planned is still under consideration, when will EM develop a revised baseline cost estimate for completing the remaining WTP construction?

4. Several outside parties—including GAO, an FFRDC, and the National Academies—have reported that DOE could consider alternate treatment options for supplemental low-activity (LAW) waste. These reports cite benefits of alternate treatment, including reducing certain risks, treating the supplemental LAW sooner, and potentially saving tens of billions of dollars. What steps is DOE taking to evaluate treatment alternatives? What additional information do decision-makers need to make this decision? When does DOE plan to make such a decision?

    a. In June 2019, EM announced that it would be withdrawing its permit application for the Test Bed Initiative, which was seeking to demonstrate the feasibility of treating low-activity waste with grout and disposing of it offsite. Why did DOE withdraw its permit application? What are DOE's future plans to demonstrate the use of grout to treat Hanford's supplemental low-activity waste and dispose of it offsite through the Test Bed Initiative or through another similar initiative?

5. In February 2019, the Office of River Protection released the *2019 Hanford Lifecycle Scope, Schedule and Cost Report*, which estimated that the costs for completing cleanup at Hanford is now between $323 billion and $677 billion. What options is EM looking at to reduce the costs of cleanup at Hanford and/or complete cleanup sooner than the 2070s?

The Honorable Fred Upton (R-MI)

1. As you know, pursuant to authorities Congress provided in the FAST Act of 2015, the Department of Energy is the lead Sector-Specific Agency for cybersecurity for the energy sector. As such, DOE is responsible for coordinating with multiple Federal and State agencies and collaborating with critical infrastructure owners and operators on activities associated with identifying vulnerabilities and mitigating incidents that may impact the energy sector. In March of 2018, Secretary Perry provided input to the Committee to assess the quality of coordination among the various Federal entities relating to

cybersecurity of the Nation's pipeline system. In his letter, Secretary Perry stated that "a coordinated government approach to the cyber and physical security of pipelines, led by the Department of Energy, is essential to ensuring the safe and reliable flow of energy across the U.S."[1]

a. Please describe the coordination conducted by DOE with DHS, TSA, DOT, FERC, and any other relevant Federal and State agencies as it relates to cybersecurity for pipelines.

b. Please describe the Federal resources, including personnel, applied to pipeline cybersecurity vulnerability assessments and related programs.

c. Please describe DOE's specific activities and programs concerning cybersecurity in pipeline systems.

2. The Colonial Pipeline may be the most critical mode of shipment for transportation fuels on the East coast, delivering 2.5 million barrels per day of gasoline, diesel, and jet fuel from Houston up to New Jersey. The shutdown of Colonial's system to contain a cyberattack caused widespread fuel disruptions across the East Coast, leading to long lines at fueling stations and outages at a significant number of stations in multiple states.

   a. Please describe DOE's roles and responsibilities with regard to the cyberattack on the Colonial Pipeline and the resulting energy disruption.

   b. Who designated DOE to lead the Federal government response to the Colonial Pipeline disruption?

   c. Please describe the number, design, and scope of Federal audits or assessments to identify vulnerabilities, including cybersecurity risks, relating to the Colonial Pipeline system.

   d. Please describe any findings and provide any after action reports relating to the Colonial Pipeline disruption.

3. China controls between 80-90% of the critical minerals and materials used to manufacture energy-related technologies such as batteries, solar panels, and wind turbines. As you know, the United States has become the world's leading producer of oil and natural gas, which raises concerns about increasing our import dependence on China and the energy security tradeoffs of shifting away from fossil fuels. As you may also know, it is widely reported that Chinese companies rely on forced labor to manufacture renewable energy components.

   a. Do you support a prohibition on the use of renewable energy technologies and components manufactured with forced labor?

   b. How will U.S. demand for critical raw materials change over the next decade?

   c. What steps are you taking to protect the energy security of the U.S. as it relates to critical minerals?

d. Do you support the permitting of more U.S. mines to produce critical materials?

e. Do you support the permitting of U.S. facilities to process critical materials?

4. The Strategic Petroleum Reserve (SPR) is among the nation's most valuable energy security assets, and represents the world's largest government-owned stockpile of oil. In response to changing market and supply conditions, and to address the building backlog of maintenance requirements for the SPR, Congress required DOE to complete a long-range strategic review of the SPR and authorized an investment of up to $2 billion as part of an SPR modernization program. Congress also directed a series of drawdowns that could reduce the SPR's inventory from its current level of 628 million barrels (MMbbl) to close to 500 MMbbl within the next few years.

   a. What is the current balance of the Energy Security and Infrastructure Modernization Fund and how much spending authority has been granted to DOE?

   b. What is the total estimated cost of the Life Extension II program, and what is the schedule date of completion?

   c. As the Congressionally directed mandatory drawdowns take place in the years ahead, how will DOE manage the empty caverns and spare capacity? What is the appropriate post-sale configuration for the SPR?

   d. What potential upgrades could DOE perform on the SPR to improve its ability to respond to changing crude oil market conditions and the risks of future supply and market interruptions?

5. The current fee model to support Nuclear Regulatory Commission regulatory activities has been identified as a significant barrier to innovation and deployment of advanced nuclear designs. Congress began to take steps to address this in the Nuclear Energy Innovation and Modernization Act, as well as in the Nuclear Energy Innovation Capabilities Act of 2017 (NEICA). In NEICA the Secretary of Energy was directed to establish an "Advanced Nuclear Energy Cost-Share Grant Program" to make grants to applicants for purpose of funding a portion of NRC licensing fees for pre-application and application review.

   a. What is the status of that program?

   b. What issues, if any, have been identified with its implementation?

   c. What are DOE's anticipated funding requirements for that program?

6. The Energy Information Administration (EIA) has a responsibility to assist policymakers and the Administration to analyze and disseminate independent and impartial energy information "to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment," as it notes in its mission statement.

a. What role did EIA serve in the Administration's development of the Nationally Determined Contribution, submitted to the United Nations Framework Convention on Climate Change earlier this year?

b. Will DOE leadership ensure our requests for EIA modeling of scenarios sufficient to meet the goals of the NDC are addressed fully and in a timely manner, including as side cases in the next Annual Energy Outlook? (This includes the May 27, 2021 written request from Rep. McMorris Rodgers and Sen. Barrasso.)

7. You ultimately are responsible for all programs and management across the DOE enterprise, including the National Nuclear Security Administration. In point of fact, all employees and contractors of the Department derive their legal authority to carry out Departmental functions from you, as the Secretary, under the Department of Energy Organization Act. Put another way, you exercise ultimate authority, direction, and control of employees and contractors, as the Secretary of Energy.

   a. To help the Committee identify what you need to fully carry out your responsibilities—and what you need to be held fully accountable for Departmental missions—please describe the importance of having staff to manage the Department and to act on your behalf.

   b. Describe the role of mission-support staff to perform Department-wide functions, including General Counsel, Chief Financial Officer, Chief Information Officer, Intelligence and Counter Intelligence, Congressional and Intergovernmental Affairs, Independent Oversight, and whether these offices have the ability to be proponents or advocates of your policies and authority across the Department. And if these offices do not have this ability, what are the specific reasons why not?

   c. To the extent that these Department-wide functions cannot be proponents of your policies and authority across the Department, can you identify any Cabinet level agency that has similar restrictions on department-wide mission support staff?

   d. To the extent the NNSA Act has provisions that restrict functional proponents of your policies, describe how this inhibits your management and harms your accountability to the President and to Congress.

   e. Describe why removing statutory impediments to your ability to exercise full management of the Department could strengthen the ability of you and your Under Secretaries to carry out and oversee their operational responsibilities under the DOE Organization Act.

   f. Describe how integrating mission-support personnel could more fully help you to carry out your responsibilities for the nuclear deterrent, nuclear nonproliferation, and the DOE-wide scientific and technological operations that support these missions.

8. The Department's role to maintain the nation's nuclear deterrent is its most vital mission. Recent reviews have found the structure of the NNSA has sometimes isolated DOE's work from the needed Cabinet level leadership. Can you commit to us that you will be

working to ensure appropriate Secretarial leadership and management support to enhance this vital mission?

9. The Committee appreciates the efforts by the Department of Energy Office of Science's Isotope Program to identify new means of producing actinium-225 (Ac-225), given the success the radioactive component has for treating a growing number of various forms of cancer.
   a. Given the rapidly increasing demand within the medical and research community, please provide an update on the current supply of natural occurring Ac-225 (as a result of thorium-229 decay) and plans to expand its production to meet increasing demand in the years ahead given the promising medical advancements attributed to this isotope.
   b. The Committee is aware of DOE's plans for expanded production of accelerator produced Act-225 but it has been brought to our attention that this product is not viable for use in pharmaceutical development. Please explain how DOE is addressing this issue.
   c. Finally, explain the procurement process for how the supply of Ac-225 is allocated to the private and research sectors.

10. In mid-January, DOE announced the establishment of a "Division of Minerals Sustainability." According to DOE, the division was created to bring an increased focus to securing a U.S. critical minerals supply chain that will ensure the U.S. energy and manufacturing sectors ensure that the domestic critical minerals supply chain is cleaner, more resilient, and more secure. The Division of Minerals Sustainability reports to the DOE Fossil Energy Office's Clean Coal and Carbon Management. Our understanding is that the Division of Minerals Sustainability is intended to "provide the oversight, management, and direction necessary for DOE's R&D and applied engineering work with the technologies that will extract, process, use, and dispose of critical minerals and rare earths from raw mining materials" (according to OE, https://www.energy.gov/articles/department-energy-launches-minerals-sustainability-division-enable-ongoing-transformation).
    a. What actions have been taken since this announcement in terms of standing up the Division of Minerals Sustainability, including resource allocation, responsibilities, etc.?
    b. Is the DOE committed to prioritizing the Division of Minerals Sustainability as part of its approach with respect to securing a U.S. critical minerals supply chain?

The Honorable Cathy McMorris Rodgers (R-WA)

1. Currently, there are policy discussions to expand the National Science Foundation research grantmaking into more engineering and technology development like the National Labs' work. But NSF does not have a robust program to protect against malign interests—or a counterintelligence program.

a. Given this and the unmatched scientific and engineering expertise and capabilities at DOE and its National Labs, isn't DOE better equipped to advance innovations and technical advantages, when it comes to China?

2. Please provide a progress report on the implementation of the Energy Act of 2020. In the report, please identify each section of the legislation implicating DOE and provide a description of the work plan, and any resource constraints affecting implementation.

3. Please provide a progress report on DOE's coordination with the Environmental Protection Agency relating to implementation of the USE IT Act, enacted in the Consolidated Appropriations Act of 2021.

4. Please provide an update on DOE's work to replace policies established in the suspended Executive Order "*Securing the United States Bulk-Power System,"* including specific timelines for implementing new policies to strengthen protections against high-risk electric equipment transactions by foreign adversaries.

The Honorable Michael C. Burgess (R-TX)

Nuclear Security

1. The Department of Energy (DOE) is charged with the critical mission of maintaining and managing our nation's nuclear weapons stockpile. Will you commit to working with this Committee to ensure the DOE can effectively achieve this important mission, including budget management?

Nord Stream 2

2. On May 18th, it was reported that President Biden had decided to lift sanctions on the company currently constructing the Nord Stream 2 pipeline. Are these reports accurate?

3. In his confirmation hearing, Secretary of State Antony Blinken committed to Congress that he would do everything in his power to see that the pipeline not be completed.
   a. Can you explain why the administration is pivoting 180 degrees away from its initial position?
   b. Were you involved in this decision?

4. Section 1242 of the 2021 National Defense Authorization Act includes a "national interest waiver" for these sanctions. How is allowing the completion of the Nord Stream 2 pipeline in America's national interest?

Energy Infrastructure

5. How do you plan to address cyber threats against our nation's energy sector today and in the future?

6. You recently stated that "pipes are the best" for transporting various energy products. Under your leadership, will the DOE prioritize quick permitting of interstate pipelines?

Energy Efficiency

7. Under the previous administration, it was found that 60 percent of the DOE's rules represent about 96 percent of potential energy savings. Is it reasonable to expect the that DOE focuses only on those standards that save the most energy?

8. Will you commit that consumer choice will be a priority when creating efficiency standards for appliances, lightbulbs, and other products?

9. Many energy efficient products take up more time to use or are less effective; with the DOE consider these factors when redefining or creating energy efficiency standards?

The Honorable Robert E. Latta (R-OH)

1. Secretary Granholm, I am proud to have First Solar in my district, the only American-headquartered company among the top 10 largest solar panel manufacturers. First Solar has achieved this success via innovation, R&D, and its dedicated workforce. Their competition, almost exclusively Chinese, rely on Chinese government subsidies, forced labor, and questionable environmental practices to supply cheap panels both in the United States and across the globe.
    a. If the country is on a path to a clean energy future, what is the threat to America's energy security as we depend on a manufacturing supply chain from an adversarial country like China that can be hostile to our future?
    b. What is the Biden Administration doing to combat these unfair business practices by Chinese solar manufacturers?
    c. In your opinion, what is the best strategy to help companies like First Solar not only remain a top 10 global manufacturer but grow and remain competitive?
    d. How can we assist clean energy manufacturers, up and down the value chain, thrive in the United States?

2. On clean energy, I think it is important to note that you cannot have a serious discussion about addressing climate change without including nuclear power. The United States has fallen behind in the competitive development of nuclear energy, and now relies heavily on foreign sources of uranium. In order to avoid threats to our nuclear supply chain, we need to build up our domestic uranium mining, production and conversion. In last year's

Omnibus, Congress appropriated $75 million for DOE's Uranium Reserve Program. Earlier this year, I reintroduced H.R. 1351, the Nuclear Prosperity and Security Act, a bill that would authorize the establishment and operation of the uranium reserve.

a. Would you commit to working with us on this legislation to make sure we protect ourselves from any market disruptions and support strategic fuel cycle capabilities in the U.S.?

3. Appliance standards are set in a two-step process—a test procedure is established and an energy conservation standard is set. While it seems reasonable to first establish the test procedure and then the conservation standard, it hasn't always worked this way in the past. Sometimes test procedures were not set before working on the conservation standards.

a. Do you agree that it is important for transparency and predictability to understand how to test a product before setting the conservation standard?

The Honorable David B McKinley (R-WV)

Coal & Natural Gas in U.S. Energy Mix

1. Secretary Granholm, you have said that oil, natural gas and coal will still be part of the U.S. energy mix moving forward. In fact at your confirmation hearing you said to Sen. Daines (R-MT) that *"if we're going to get to net zero carbon emission by 2050, we can't do it without coal, oil, gas being part of the mix."*

Coal and natural gas are critical to delivering reliable and resilient electricity to consumers across the country. According to EIA, natural gas and coal generated the bulk of U.S. electricity (59%) in 2020. Advancing technologies such as carbon capture will ensure that we can utilize these fossil energy resources with zero or even NET NEGATIVE carbon emissions.

a. Do you believe that coal should remain part of the U.S. energy mix moving forward?

b. Do you believe that natural gas should remain part of the U.S. energy mix moving forward?

DOE Budget Request

2. Secretary Granholm, during your confirmation hearing, you stated that *"if we're going to get to net zero carbon emission by 2050, we can't do it without coal, oil, gas being part of the mix."* However, the Biden administration zeroed out funding for DOE's Coal FIRST program which is critical to developing a near-zero carbon emission coal-fired power plant of the future. Further, the Coal FIRST program is critical to advancing CCUS and hydrogen production technologies and if co-fired with biomass, Coal FIRST would be net-negative carbon emissions.

a. If the administration is committed to lowering carbon emissions around the world and developing a hydrogen economy, why did it propose to stop funding for critical

research and development that would develop coal plants that utilize coal for power generation with net-zero and net-negative carbon emissions?

3. Secretary Granholm, during your confirmation hearing, you stated that *"if we're going to get to net zero carbon emission by 2050, we can't do it without coal, oil, gas being part of the mix."* However, the Biden administration zeroed out funding for DOE's STEP program which would enable the future deployment of efficient, clean, and cost-competitive coal power plants. Started during the Obama administration, STEP also brings great benefits to gas and solar generation. Coal still generates roughly 20 percent of the electricity in the United States.

   a. If the Biden administration is committed to reducing carbon emissions at home and around the world, why did it propose to stop funding DOE's R&D efforts to develop an efficient, clean, cost-competitive coal power plant?

4. In DOE's budget request, it proposes to move the Office of Petroleum Reserves to the CESER Office. Has this move already occurred? What was the motivation behind this change?

Critical Minerals/EVs

5. We must be honest with the American people as to where the raw materials to make electric vehicle and utility scale batteries come from. Critical minerals like cobalt, lithium, copper, manganese and nickel are critical components of these batteries. Unfortunately, the United States is almost 100 percent reliant on foreign sources for these materials.

Critical minerals like cobalt are being mined in places like the Congo by children. They are also being mined in places like China which is well known for exploiting its citizens and forcing them to work without labor protections.

   a. The Biden administration and DOE have made environmental justice a priority. Does exploiting children and using forced labor to mine minerals needed for EVs align with the administration's environmental justice goals?

   b. The U.S. domestic mining industry is among the most heavily regulated industries in the world – promoting safety of its workers and protection of the environment. What is DOE doing to promote a domestic CM/REE mining and processing industry?

   c. President Biden's budget calls for electrifying the federal vehicle fleet. Will DOE and the administration commit to ensuring that all components, including the EV batteries, are 100 percent made in the USA using 100 percent domestic sourcing of raw materials?

6. What impact would an all-electric or even 50 percent vehicle fleet in the U.S. have on stability of the electric grid and cost of electricity?

7. With increased renewable penetration that would come with the Biden administration's climate goals, how would increased amounts of intermittent electricity balance with more EV's plugging into the grid?

8. If peak demand for charging EVs is at night, how would the grid support this additional demand with increased intermittent sources of electricity?

Price of Electricity

9. According to EIA, the price of electricity in the US has slightly increased in recent years, even as we have had more renewables on the grid. (https://www.eia.gov/todayinenergy/detail.php?id=46276)
   a. The administration claims that more renewables on the grid will lower electricity rates for consumers. Would DOE please provide an analysis to support the administration's claim?
   b. Can you provide some real-world examples of higher renewable penetrations resulting in lower electricity rates and overall lower electricity bills?
   c. What has happened to Germany's electricity rates as their renewable generation has increased over the last 20 years?

Office of Fossil Energy

10. A recent press release highlighting Dr. Shuchi Talati's participation in a Global CCS Institute webinar lists Dr. Talati's title as Chief of Staff in the Office of Fossil Energy and Carbon Management.
    a. Did DOE change the name of the Office of Fossil Energy to the Office of Fossil Energy and Carbon Management?
    b. If so, when did that name change become official?
    c. Would you provide any and all documentation on this name change?

Coal-to-Products

11. At a recent meeting of the National Coal Council, Jennifer Wilcox from the Office of Fossil Energy and Carbon Management, stated that the office would "Absolutely not" pursue research and development into coal to products – specifically using "newly mined carbon ore."
    a. What is the difference in cost between using coal waste and using raw coal, newly mined carbon ore, to make products? Please submit a cost analysis of the two.

b. Will DOE pursue the successes of the previous administration by promoting R&D into coal-to-products using newly mined coal?

c. Will DOE specifically exclude "newly mined carbon ore" from its current coal-to-products research and development program? If so, why?

LNG Exports

12. According to a report released by the National Energy Technology Laboratory, Russian natural gas exported to Europe has a lifecycle greenhouse gas emissions profile that's 41% higher than U.S. LNG exported to Europe. Global demand for natural gas is expected to increase by 40% or more by 2050.

    a. What specific actions is DOE doing to promote U.S. LNG exports?

13. West Virginians have benefitted from the safe extraction of clean natural gas. By allowing West Virginia's natural gas to be sold around the world, we can ensure a growing market and continued job growth for our state. Further, increased use of U.S. natural gas around the world is critical to lowering global CO2 emissions.

In the previous administration, DOE's Office of Regulation, Analysis and Engagement in the Office of Oil and Gas did great work to ensure that LNG export authorizations were processed in a timely manner.

a. Does DOE have any pending applications for LNG export authorizations?

b. If so, will these LNG export authorizations be processed in a timely manner consistent with the previous administration? This is critical to giving the LNG export industry regulatory certainty.

Coal FIRST

14. DOE's Coal FIRST Initiative supports the development of 21st century electricity and hydrogen energy plants that have net-zero carbon or even net-negative carbon emissions. These plants will be fueled by coal, natural gas, biomass, and waste plastics and incorporate carbon capture, utilization and storage (CCUS) technologies. The Coal FIRST Initiative also recognizes the importance of hydrogen production from coal, biomass, and waste plastics. A hydrogen economy is gaining global attention as part of a technology-based approach for reducing global carbon emissions.

    a. Why hasn't DOE been more aggressive to promote the Coal FIRST technology solutions to lower global CO2 emissions?

    b. Does this administration plan to continue the Trump administration's Coal FIRST research and development program?

NETL R&D

15. Can you please provide an update on how the COVID-19 pandemic has affected NETL's R&D operations? And how and when NETL plans to return employees to work?

16. What can Congress do to ensure that NETL has the tools it needs to advance and lower the price carbon capture, utilization and storage (CCUS) technology?

17. When it comes to R&D into direct air capture (DAC), how much of this R&D is dependent on advances in CCUS technology?

18. Can you please provide an update on the R&D that is happening at NETL that would ensure a domestic supply chain of critical minerals/rare earth elements from coal, coal waste and acid mine drainage? Has DOE/NETL consulted with the Department of Defense on this effort to support a domestic supply chain of CM/REEs?

19. In January, NETL's project at WVU's Water Research Institute to extract REEs from coal resources exceeded its REE extraction and purity goals. Can you please provide an update on this project?

20. What is NETL's vision for the future of coal for use in power generation and the impact of commercialized CCUS technologies on the use of coal for power generation?

NETL Infrastructure – Appropriations - Joule

21. Recently, my office submitted a letter to the House Appropriations Committee asking to include $50 million for NETL's infrastructure in the Energy and Water Development Appropriations report for FY22. Specifically, the letter stated:

NETL Infrastructure – the agreement provides $50,000,000 for NETL Infrastructure, and the Department is director to prioritize funds for Joule, the design and construction of a sensitive compartmented information facility, the Computational Science and Engineering Center, site-wide upgrades for safety, and addressing and avoiding deferred maintenance.

a. What are the consequences if Congress does not appropriate this additional funding?

b. What is the current status of NETL's supercomputer and what is NETL's plan for moving forward for the supercomputer?

NETL SCIF

22. The continuity of operations for DOE and the continuity of government is critical during times of crisis.

a. What is the status and schedule for completion of the SCIF at NETL's Morgantown site?

NETL Campuses/Locations

23. Does DOE have any plans to consolidate or close any of NETL's locations and campuses?

White House Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization

24. NETL Director Dr. Brian Anderson and his team are doing great work advancing research and development on fossil energy. As you know, NETL Director Dr. Anderson was recently appointed executive director of the White House Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization. In addition to starting this group, the administration announced $109.5 million for research projects designed to revive economies, remediate environmental issues and support energy workers in communities ravaged by shutdowns of coal mines and coal-fired power plants.

    a. Can you assure me that this $109.5 million will not come from already appropriated dollars directed at fossil energy research and development?

25. The White House Interagency Working Group's initial report to the President on empowering workers through revitalizing energy communities states that DOE will "immediately begin accepting applications for $75 million in available funding to develop customized engineering designs to install carbon capture and storage (CCS) technology for power plants and industrial facilities."

    a. Are fossil energy plants including coal, natural gas and other hydrocarbons eligible to apply for the $75 million in available funding?

26. The White House Interagency Working Group's initial report to the President on empowering workers through revitalizing energy communities calls on DOE to Immediately stand-up an interim staffing team within the department to manage the day-to-day activities of the working group.

    a. Who is on this team?

    b. Who will this team report to and in what office?

    c. Is this a new team hired by DOE or will existing employees be taking on additional responsibilities?

    d. If new staff is being hired, where are the funds coming from?

Justice40

27. On April 30, 2021, Shalanda Baker, Deputy Director for Energy Justice, released a departmental memo outlining DOE's new Justice40 online dashboard and its implementation.
    a. Would you please provide a copy of this memo?
    b. How much money did DOE spend on developing and implementing this dashboard? Where did the funds come from – out of what account?
    c. Would you provide my office with a briefing on this dashboard and how DOE is implementing the administration's Justice40 agenda?

28. According to the White House, the Justice40 Initiative has a goal of "delivering 40 percent of the overall benefits of relevant federal investments to disadvantaged communities and tracks performance toward that goal through the establishment of an Environmental Justice Scorecard."
    a. Can you please provide a copy of the environmental justice scorecard? How is "environmental justice" quantified and measured?
    b. What is the criteria for determining a "disadvantaged community"? Would certain communities in Appalachia meet this determination?

White House Environmental Justice Advisory Council's Interim Report

29. Starting on page 57, the White House Environmental Justice Advisory Council's Interim Report lists examples of projects that will NOT benefit a community.
    a. As an example, the report lists "Fossil fuel procurement, development, infrastructure repair that would in any way extend lifespan or production capacity, transmission system investments to facilitate fossil-fired generation or any related subsidy." How would investments in fossil-fired power generation assets NOT help out-of-work coal miners in West Virginia?
    b. As an example, the report lists "Carbon capture and storage (CCS) or carbon capture, utilization, and storage (CCUS)." CCUS is critical to lowering carbon emissions, ensuring a stable grid by ensuring the use of coal and natural gas for power generation – providing jobs and livelihoods to coal miners and gas workers across the county. How would promoting CCUS NOT help communities?
    c. As an example, the report lists "Pipeline creation, expansion, or maintenance." Pipelines are the safest way to transport energy. Further increased pipeline infrastructure projects around the country mean more American jobs and economic benefits. How would promoting pipelines around the country NOT improve communities?
    d. The report specifically states that "research and development" would not benefit communities around the country. Given that DOE's mission is supported by its research and development efforts, does DOE support the White House Environmental Justice Advisory Council's Interim Report?

DOE's Lease of Ford Mustang Mach-E

30. In a recent interview with WDIV Detroit, Secretary Granholm said that the department recently acquired a Ford Mustang Mach-E.
    a. What was the motivation behind this recent acquisition and given the department's current fleet of vehicles (that transported Secretaries Perry and Brouillette) and the rising national debt, why did DOE make this acquisition?
    b. How much is DOE paying for this vehicle? What funds were used to acquire this vehicle? Out of what account?
    c. Given the economic hardship that many Americans are currently dealing with from the pandemic and with a starting price around $43,000, does Secretary Granholm regret this frivolous acquisition that is nothing more than a PR stunt?

Materials Recycling Facilities

31. In FY19, Congress requested DOE to conduct an analysis and provide a report to Congress regarding the recycling of aluminum and Materials Recycling Facilities. DOE began work on that report in the previous administration.
    a. What is the status of this report? When can you expect a finished product?

The Honorable Bill Johnson (R-OH)

1. Madam Secretary, I recently spearheaded a bipartisan, bicameral letter to you in support of the High Assay, Low Enriched Uranium demonstration program in Piketon, Ohio. We fully favor expanding this vital HALEU capability, to meet the needs of the U.S. advanced reactor community, and to prevent foreign countries from cornering this market.
    a. Do you agree that DOE should build out additional enrichment capacity in Piketon to assure a U.S. source of this essential material?

The Honorable Jeff Duncan (R-SC)

Dedicated DOE Nuclear Waste Management Office

1. As I referenced during the hearing, eight organizations requested in a May 3, 2021 letter that you establish an office within DOE that will be dedicated to nuclear waste management and report directly to you.
    a. As you look to develop a strategic approach to addressing spent nuclear fuel and high-level radioactive waste, do you intend to elevate the Department's focus and prioritization of this issue through such an office?
    b. What steps do you intend to take to facilitate necessary engagement with external stakeholders on nuclear waste management?

c. What level of funding would DOE need to establish and maintain such an office?

d. Can the new funding provided by Congress under the Consolidated Appropriations Act of 2021 facilitate establishment of such an office?

e. What skills and expertise would you seek in filling a position to lead such an office?

Nuclear Waste Management Program Funding

2. The Blue Ribbon Commission on America's Nuclear Future (BRC) recommended "access to utility waste disposal fees for their intended purpose" as further explained in its January 2012 Report to the Secretary of Energy.

   a. Do you agree with that specific recommendation?

   b. How would such access facilitate the work of DOE to develop and maintain a national integrated nuclear waste management program?

   c. Do you recommend that Congress take actions necessary to provide sustainable annual access to the Nuclear Waste Fund to develop and support a national integrated nuclear waste management program?

The Honorable Debbie Lesko (R-AZ)

1. Why are we using taxpayer dollars to increase use of solar panels, wind turbines, and electric vehicles, that deliver benefits to China's economy, when we haven't fully secured our own critical minerals supply chain?

2. You recently said regarding the Colonial Pipeline cyber-attack that "If you drove an electric car, this cyber-attack would not be affecting you, clearly." Do you believe that putting all of our eggs in one basket, by shifting to complete electrification of our energy sector, makes us safer from cyberthreats?

3. Congress has tasked The Department of Energy to work on R&D for minerals and mineral processing. Does the Administration have a plan to increase mining of critical minerals in the U.S.?

Additional Questions for the Record

Subcommittee on Energy
Hearing on
"The Fiscal Year 2022 DOE Budget"
May 19, 2021

Hon. Jennifer M. Granholm, Secretary, Department of Energy

QUESTIONS FROM THE HONORABLE FRANK PALLONE JR. (D-NJ)

Q1. Secretary Granholm, I have been pleased to hear you speak about reenergizing the Department's Loan Program Office (LPO). Having a working LPO can ensure that the United States is enabling new innovative technologies that can create jobs and address the climate crisis. With the market having evolved since the Title XVII loan guarantee program was created, some argue that the Department's interpretation of "reasonable prospect of repayment" needs to be modernized.

Q1a. What steps is the Department taking to evaluate its interpretation of "reasonable prospect of repayment"?

Q1b. What is the timeline for any Department action on the subject?

A1a and 1b. The "reasonable prospect of repayment" evaluation is an important tool to ensure that taxpayer interests are protected. Under the legal standards applicable to the programs it administers, the Department has considerable latitude to exercise administrative discretion and make a determination whether a "reasonable prospect of repayment" exists that includes accountability to ensure that taxpayer interests are protected. This standard has help maintain a relatively low loss rate of 3.4 percent for the innovative portfolio. LPO has revised the timing of when projects are evaluated to have a "reasonable prospect of repayment" until after all the circumstances and materials have been collected later in the process to ensure that clean energy resources and manufacturing capacity is being evaluated comprehensively.

Q1c. Last year the Energy Act of 2020 authorized DOE to use milestone-based demonstration projects, which may require particular technical, financial, and hardware milestones to be met before a participant is awarded additional grants by the Department. Congress included these milestones to ensure that DOE programs meet requirements and deadlines, which can help de-risk first of a kind projects that will help meet the Administration's goals regarding decarbonization and job creation. Implementing milestone-based

programs is particularly appropriate for the nuclear industry given its history of cost and schedule overruns, but would also be useful for other DOE demonstration projects authorized by the Energy Act of 2020. How does the DOE intend to use milestone-based demonstration projects? Will DOE implement this initiative for both new and existing demonstration programs?

A1c. DOE appreciates Congressional support for milestone-based management of demonstration projects as authorized in the Energy Act of 2020 and is working to ensure all demonstration projects funded by the Department adhere to best practices in project and financial management. DOE has funded many demonstration projects in major energy technology sectors, including nuclear. As a result, DOE has amassed a wealth of experience in selecting and funding demonstration projects. Relatedly, decisions on major DOE-funded construction projects are governed through a rigorous process involving critical decision points based on development of, and performance against, well-defined budgets and schedules.

Leveraging this experience and expertise, the Department proposed an Office of Clean Energy Demonstrations (OCED) in its FY 2022 budget request. This office would be a technology-neutral office with expertise in large-scale energy project management and finance. The OCED would leverage the existing technical expertise throughout the Department and would provide project management support to the applied energy offices and National Labs.

As noted in the FY 2022 budget request, the OCED projects would supplement, not replace, demonstration funding across the Department. In its current form, the Department practices milestone-based management of demonstration projects with go/no-go decisions points, typically through the cooperative agreement financial assistance instrument.

The Department is cognizant of the statutory requirement from the *Energy Act of 2020* to report on its portfolio of milestone-based demonstration projects and is currently developing a process to do so in a manner that is effective and efficient. DOE looks forward to providing a report.

QUESTIONS FROM THE HONORABLE DIANA DEGETTE (D-CO)

Q1. EM has had 19 leaders since its inception 30 years ago, with the tenure of recent leaders averaging a little more than a year. Each of these leaders has had different priorities. With EM's cleanup costs having grown by nearly $250 billion over the last 10 years—and approaching half a trillion dollars—what is DOE doing to ensure appropriate leadership commitment for addressing EM's responsibilities?

A1. Achieving EM's mission continues to be a high priority for the Department. Established, knowledgeable, and committed leadership and clearly defined priorities are key to continuing to make significant progress on this mission. Earlier this year, EM published the *EM Strategic Vision: 2021-2031*, with identified cleanup priorities for the entire program. The Strategic Vision provides leaders with clear direction and expectations for achieving cleanup priorities at each EM site, and these priorities are jointly reviewed throughout the year by EM field and headquarters leadership. The Strategic Vision is updated annually with input from key program stakeholders to ensure consistency and focus on key cleanup activities.

Q1a. EM's organizational position has changed at least 6 times. Does EM have the appropriate position within DOE to address its cleanup responsibilities, or does it need to be elevated? Do you have plans to move EM again, and if so, what is the rationale for additional moves within the department?

A1a. Regardless of the EM reporting structure within the Department, senior DOE leadership will always be engaged to achieve EM's mission. The importance of EM's mission to clean up legacy waste and contamination from decades of nuclear weapons production and energy research cannot be overstated. As important as the position of the EM program within the Department is having a strong advocate for the mission of the program to work with local communities to garner support for the regional activities happening at the EM field sites to progress the EM mission. The individual that holds the EM Assistant Secretary position has always had immediate access to the DOE Secretary and Deputy Secretary, regardless of the structure of the DOE organization chart.

Q1b. Does EM have adequate authorities to hold its field sites and contractors accountable? If so, why have costs grown so much for major projects and contracts? Why has EM not

modified contracts to address root causes (e.g., design-build nature of WTP contract) for its most troubling projects?

A1b. EM has adequate statutory authority to hold its field sites and contractors accountable. Many of the remaining EM cleanup sites contain the most complex problems (e.g., high quantities of very radioactive materials and design complications associated with cutting-edge cleanup technologies). To mitigate technology-related complexities, DOE incorporated technology maturation criteria as part of overall project management requirements. For example, EM successfully demonstrated a solvent extraction technology through a full-scale pilot plant operation at the Savannah River Site prior to commencing a start-up of a much larger scale plant using the same technology at the Salt Waste Processing Facility.

In recent years, EM revised its contracting approach to provide greater definition of the scope of work at the time of establishing task orders, thereby reducing uncertainties during the contract duration. EM also established the EM Performance and Fee Advisory Board to better integrate development of the fee incentive structure at the beginning of the contract to ensure EM senior management's buy-in regarding contractor oversight versus just at the site level.

Q1c. EM has a small number of contractors that carry out most of its cleanup work. These contractors often regroup to form new companies, which then receive subcontracts—creating significant barriers to entry. Additionally, when reviewing bids, EM gives preference to contractors who have done previous work for EM. What is DOE doing to ensure that it attains the benefits of competition amongst contractors?

A1c. EM has placed a significant emphasis on consistency and efficiency in the competitive procurement process, along with breaking down barriers to entry into the DOE market. The End State Contracting Model (ESCM) Request for Proposal has streamlined the End State procurements and reduced the proposal preparation cost for industry, thereby reducing the financial barrier to entry. We have seen significantly increased competition using the approach. Over the past several years, EM has achieved the Department's small business goals and has continued to emphasize increased small business involvement in performing meaningful EM mission scope as part of the ESCM priorities, thus continuing

to increase the opportunity for small businesses with relevant work experience for future competition.

Q2. EM recently developed and implemented a new initiative—the end-state contracting model (ESCM). In January 2021, the National Academies found that ESCM is neither outcomes-based nor completion-focused.

A2. ECSM uses an Indefinite Delivery/Indefinite Quantity (IDIQ) contract framework. We expect the task orders issued under that framework to be outcome-based and completion-focused.

Q2a. ESCM will likely result in dozens of discrete outputs (ID/IQ contracts), many of which will be less than $50 million, which is the threshold above which DOE applies rigorous project management controls. How will DOE ensure proper oversight of scope, cost, and schedule when in many cases activities that would previous be subject to these controls no longer will be?

A2a. Typically, the IDIQ contract is a broad framework and individual task orders can be issued using the overall scope defined in the IDIQ framework. The ESCM will result in a single master IDIQ contract award at a site. Task Orders of varying durations and dollar amounts will be issued against the master IDIQ contract. EM anticipates very few task orders with values less than $50 million.

Q2b. For larger activities, applying ESCM may result in dozens of ID/IQ contracts for a specific activity at a site. How will DOE ensure that EM has capacity to administer and oversee a greater number of contracts than it currently has?

A2b. The IDIQ contract is a broad framework and individual task orders can be issued using the overall scope defined in the IDIQ framework. While a single End State IDIQ contract may result in dozens of task orders over the life of the contract, only two or three task orders will be active at any given time.

EM is developing a matrixed system throughout the various EM procurement offices, allowing shared resources and increased availability of contracting staff for short-term periods of increased work.

Q3. GAO and the National Academies have reported that tens of billions or more could be saved if EM adopted a risk-informed approach to its largest cleanup activities—in essence, conducting cleanup in a way that aligns remediation approaches with the risk the contaminated material poses. DOE reported in December 2020 that up to $230 billion could be saved by reclassifying waste to match its level of radioactivity; however, EM has not taken any concrete actions at sites such as Hanford or Idaho where most of those savings could be realized.

Q3a. When will DOE reclassify waste so that low radioactivity waste can be treated as such?

A3a. DOE is committed to implementing the Department's environmental cleanup programs in a manner that is consistent with the law. DOE is reviewing the Department's interpretation of the statutory definition of high-level radioactive waste (HLW) in light of this commitment. The National Defense Authorization Act for FY 2021 prohibits DOE from implementing the HLW interpretation in the state of Washington during FY 2021. The Department's first application of the HLW interpretation was completed in September 2020, when DOE successfully shipped a small quantity (8 gallons) of reprocessing waste from the Savannah River Site (SRS) to Waste Control Specialists LLC, a licensed commercial low-level radioactive waste disposal facility in Texas, for stabilization and disposal as low-level radioactive waste. In January 2021, DOE initiated planning for a second waste stream, issuing a Federal Register notice announcing DOE's intent to prepare a Draft Environmental Assessment for the disposal of SRS-contaminated process equipment at a licensed commercial low-level radioactive wase disposal facility outside of South Carolina. Currently, there is no disposal pathway for the SRS-contaminated process equipment that contains reprocessing waste. DOE will work closely with local officials, regulators, and stakeholders where reprocessing waste is stored and where such waste might be disposed of before any disposal decisions are made.

Q4. In January 2019, GAO recommended that EM develop a program-wide strategy that outlines how DOE will direct available resources to address human health and environmental risks across and within sites. Two years later, EM has since developed a strategic vision, but has not yet developed a strategic plan. Why hasn't EM developed a strategic plan, and when does EM plan to do so?

A4. The Office of Environmental Management responded to the GAO Report, GAO-19-28, by agreeing to the premise underlying the recommendations, namely, that DOE direct its resources to address the greatest risks by developing national cleanup priorities and directing funding to high-risk activities that threaten human health and safety or the environment. EM is in the process of developing an EM Program Plan, which addresses the premise underlying the GAO recommendations. Once completed, the Program Plan will describe the work that EM has completed to date, the remaining work, and alternatives for programmatic consideration and opportunities to acceleration mission completion. This Program Plan will be published next year and will also reflect the individual site program plans.

Q5. Similarly, in September 2019, GAO recommended that EM revise its 2017 cleanup policy to establish how the EM program and DOE sites should apply the essential elements of a risk-informed decision-making framework into their current decision-making requirements and guidance. How does EM's newly developed Program Management Protocol incorporate the 4 phases and 16 essential elements of risk-informed decision-making?

A5. EM's decision-making framework has always considered risk. Individual site cleanup remedies are determined through regulatory processes such as the Comprehensive Environmental Response, Compensation, and Liability Act, Resource Conservation and Recovery Act, and National Environmental Policy Act that follow the four-phase risk-informed decision-making process outlined by GAO in GAO Report 19-339. EM's program and project management processes require satisfaction of these regulatory requirements as part of the work authorization process. The Protocol also outlines the prioritization schema that is used to balance risks across sites. The protocol further addresses key GAO recommendations from this and other reports by requiring that:

- EM Program plans will be driven by consistent prioritization principles, be informed by validated life-cycle cost and schedule estimates and risk assessments, incorporate the U.S. Government Accountability Office's (GAO) best practices for program and project management, and be updated to reflect analyses of strategic alternatives.

- EM Budget requests will reflect both principal mission priorities and other EM Program and site program activity priorities such as risk reduction, cost-effectiveness, regulatory requirements, etc.
- Execution activities will establish a contract management framework that results in cost-effective cleanup achieving significant, measurable progress.
- Results from regular performance evaluation will inform EM's planning, budgeting, and execution activities, as well as provide needed lessons learned in improving contract incentives and management processes.

Q5a. How does the Program Management Protocol specify how sites should incorporate risk-informed decision-making into their decision-making requirements?

A5a. EM site and program plans will be driven by consistent prioritization principles, be informed by validated life-cycle cost and schedule estimates and risk assessments, incorporate the GAO's best practices for program and project management, and be updated to reflect analyses of strategic alternatives. First and foremost, EM seeks to address any issues posing an immediate risk to human health or the environment. EM then addresses issues based on achieving the highest risk reduction benefit per radioactive content (activities are focused on wastes that contain the highest concentrations of radionuclides and sites with the highest radionuclide contamination) within the framework of its regulatory compliance commitments and best business practices. Priorities also take into account the level of radioactive contamination; risks posed by the potential for that contamination to reach surrounding communities; and other matters, including practical matters of scheduling, ease of remediation (availability of an easily deployed, effective known technology), and allowing sites or areas to be fully cleaned up.

Q5b. How does EM plan to incorporate the 16 essential elements of risk-informed decision-making into making cleanup decisions going forward?

A5b. EM site and program plans will be driven by risk-informed prioritization principles, be informed by validated life-cycle cost and schedule estimates and risk assessments, incorporate the GAO's best practices for program and project management, and be updated to reflect analyses of strategic alternatives. EM addresses issues based on

achieving the highest risk reduction benefit per radioactive content (activities are focused on wastes that contain the highest concentrations of radionuclides and sites with the highest radionuclide contamination) within the framework of its regulatory compliance commitments and best business practices. Priorities also account for the risks posed by the potential for contamination to migrate outside of DOE sites, and other matters, including practical matters of scheduling, ease of remediation (availability of an easily deployed, effective known technology).

QUESTION FROM THE HONORABLE PETER WELCH (D-VT)

Q1. Grid modernization is a key element in efforts to achieve the Administration's decarbonization goals. With that in mind, is the Administration supportive of fully funding the grid modernization provisions enacted last December as part of the Energy Act?

A1. Grid modernization and decarbonization are part of the whole of government approach President Biden is taking to enhance climate resilience. The Department looks forward to working with Congress as appropriations supporting Energy Act provisions are developed.

QUESTIONS FROM THE HONORABLE A. DONALD MCEACHIN (D-VA)

Q1. To tackle the climate crisis, we know we must move urgently to zero emissions and 100% clean energy for all. As we transition to a clean energy economy, we have the opportunity to ensure that this transition and the energy of the future better protects the communities and environments impacted by energy development. It is imperative that we protect communities that could be harmed by critical mineral and rare earth mining and development by providing sufficient environmental, health, and cultural resource protections, and by creating a more sustainable supply chain. We must focus on sustainable answers as we decarbonize as quickly as possible, and believe that one potentially effective way to create that sustainable supply chain is to prioritize investments and policies to create a circular economy for critical mineral recycling and reuse. What is the Department of Energy already doing to advance the circular economy, and how can circular economy policies surrounding critical mineral recycling and reuse be a better alternative to new extraction? What can Congress do to promote and help create a robust circular economy here at home?

A1. The President's FY22 Budget Request supports new and continuing efforts to promote a robust circular economy for critical minerals, as part of a multi-faceted approach to reducing material criticality risk through diversification of supplies, development of substitutes, and improvement of usage efficiency, reuse, and recycling. DOE's Vehicle Technologies Office and Advanced Manufacturing Office co-sponsored the Lithium-Ion Battery Recycling Prize. Announced in 2019, the Battery Recycling Prize is a $5.5-million phased prize competition designed to incentivize American entrepreneurs to develop and demonstrate processes that, when scaled, have the potential to profitably capture 90% of all discarded or spent lithium-based batteries in the United States for the eventual recovery of key materials for re-introduction into the U.S. supply chain. The Critical Minerals Institute (CMI), managed by the DOE Advanced Manufacturing Office, supports the development of technologies to recover critical minerals such as rare earth elements, cobalt, and lithium from batteries and magnets. The FY22 request includes funding to leverage the efforts of the existing Critical Minerals Institute (CMI) and other ongoing DOE programs to develop a Critical Minerals Consortium of government, industry, and academic stakeholders, per the Energy Act of 2020. The 100-day review under Executive Order 14017, "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth" also contained several

recommendations related to recycling and reuse of critical materials. These recommendations include establishing a national battery recovery and recycling policy, including incentives, battery recovery, and environmental standards for recycling critical materials such as cobalt. DOE also chairs the interagency Federal Consortium for Advanced Batteries (FCAB), which recently released the National Blueprint for Lithium Batteries 2021-2030.[1] Consistent with the recommendations in the 100-day review, the Blueprint calls for research and development to allow end-of-life reuse and critical materials recycling at scale and the development of a full competitive value chain (i.e., circular economy) for batteries in the United States.

Extracting critical minerals, and specifically, lithium, from geothermal brines is one way to minimize environmental impact and maximize renewable energy development for communities. In March 2021, DOE's Geothermal Technologies Officer (GTO) launched the American-Made Geothermal Lithium Extraction Prize, which will fast-track efforts to identify, develop, and test innovative technical solutions to economically extract lithium from geothermal brines. In the Salton Sea region of California, where DOE is currently funding technology developments and demonstrations to extract and process lithium from geothermal brines, the annual lithium resource potential is estimated by the California Energy Commission to be 600,000 tons, which currently exceeds the annual U.S. demand for lithium and could transform the United States from a net lithium importer to a net exporter. Compared to other mineral extraction techniques, such as hard rock mining, extraction of lithium from geothermal brines releases almost no carbon dioxide, uses less water, and has a much smaller physical footprint.

[1] https://www.energy.gov/sites/default/files/2021-06/FCAB%20National%20Blueprint%20Lithium%20Batteries%200621_0.pdf

QUESTIONS FROM THE HONORABLE G.K. BUTTERFIELD (D-NC)

Q1. The End-of-Year Omnibus Appropriations/COVID Relief Package (Relief Package) requires the Department of Energy (DOE) to establish a program to provide rebates to electric utilities (including co-ops) for expenditures to replace an energy inefficient transformer with an energy efficient one. DOE is required to establish the program within 90 days of the Relief Package's enactment on December 27, 2020.

Q1a. Secretary Granholm, last year's End-of-Year Omnibus Appropriations/COVID Relief Package (Relief Package) requires the Department of Energy (DOE) to establish a new program in 2021 to provide rebates to electric utilities for expenditures to replace an energy inefficient transformer with an energy efficient one. Could you provide me with an update regarding your efforts to establish this new rebate program?

A1a. The Department looks forward to working with Congress as appropriations supporting Energy Act provisions are developed.

QUESTIONS FROM THE HONORABLE KURT SCHRADER (D-OR)

Secretary Granholm: Secretary Moniz coined the phrase "the forgotten renewables" when discussing the potential for marine energy. The United States has significant marine energy resources, according to the National Renewable Energy Lab (NREL). In fact, NREL conservatively estimates U.S. marine energy potential at roughly 57 percent of 2019 U.S. electricity generation—enough to power 220 million American homes. If we capture just ten percent of this resource, it would equal 5.7 percent of national load in 2019, or three times the solar capacity of that year, or one-quarter of the U.S. coal fleet. Moreover, Department of Energy-supported research and demonstration projects show that marine energy technologies will provide clear and competitive benefits to the electric system. These benefits include marine energy's location near demand loads, relative predictability, generating profiles, and resiliency. Near term, high-value distributed market generation opportunities include underserved communities, port electrification, and green hydrogen production. In addition, DOE's "Powering the Blue Economy" initiative shows that marine energy can provide cost-effective and reliable power for desalination, underwater data centers, aquaculture, and other emerging needs. On top of that, DOE, in partnership with Oregon State University, will soon begin constructing the world's premiere marine energy testing facility, PacWave, near Newport, Oregon, in my district. A similar facility in Orkney, Scotland, the European Marine Energy Centre, which has operated for over a decade now, contributes millions of Euros to the local and regional economy. Europe is clearly seeking a leadership position to commercialize the marine energy sector, outspending us in an effort to capture a significant percentage of the high value jobs that will be created in the process.

In your prepared statement, you testify that "globally, there is a $23 trillion market for clean energy products and for products that will reduce carbon pollution. This is a massive opportunity for the country. Other countries see that opportunity as well, and our economic competitors are working to corner the market on those opportunities. The question is: where are these products going to be built, and who will build them?" With regard to wind and solar technologies deployed in this country, we know the majority of these are built overseas. That is a reality we have dealt with as the country scaled up these sectors over the past decade. However, with marine energy, a newly emerging source of clean, renewable power, the United States still has a chance to compete and capture a significant percentage of these high-value jobs.

The National Hydropower Association's Marine Energy Council just released a Commercialization Strategy for Marine Energy that calls for deployment targets reaching one gigawatt of installed marine energy capacity in the United States by 2035. While modest compared to the current deployments of wind and solar technologies, achieving these targets would spark the domestic marine energy sector and help the U.S. create thousands of new high wage manufacturing jobs.

Q1. Can you commit to work with the marine energy sector to craft a roadmap to achieve these deployment targets?

A1. DOE will continue to work with the domestic marine energy sector to advance marine energy, including competing and capturing a significant percentage of high-value jobs to support this growing industry. This includes developing a Strategic Plan, as requested by Congress in the Energy Act of 2020, which we plan to release, and which includes DOE's strategy to continuing to drive down the cost of marine energy.

Q2. Can you commit to seeking the resources from Congress needed for the research, development, and deployment efforts of the Water Power Technologies Office (WPTO) to achieve the goals of such a roadmap?

A2. Yes, I look forward to working with Congress to continue to fund the Water Power Technologies Office's RDD&D activities at a level needed to achieve the President's 2035 goal for decarbonizing the electricity sector and 2050 goal of reaching a net zero energy sector through the deployment of clean energy technologies like marine energy.

Q3. Can you commit to including in the Fiscal Year 2022 budget request the funding levels provided in the bipartisan Water Power Research and Development Act, authored by my friends and colleagues from Oregon, Congresswoman Suzanne Bonamici and Senator Ron Wyden, among many others? These new authorized levels include $137,428,378 per year for marine energy and $49,171,622 and per year for hydropower. This request would still be relatively modest compared to solar RD&D funding of $272 million in FY 2021, at a time with over 90 GW of solar capacity now installed across the country.

A3. The President's FY22 Budget Request makes a strong commitment to increasing funding for water power research, development, demonstration, and deployment by providing $196,560,000 for the Water Power Technologies Office – a 31% increase over FY21 Enacted - with $112,000,000 for marine energy and $84,560,000 for hydropower. In marine energy, the President's Budget supports a full spectrum of foundational research, design, fabrication, and testing of marine energy conversion devices at a range of sizes (including grid-scale and smaller-scale technologies); longer-term demonstrations of wave-powered desalination systems for remote communities and disaster relief and recovery; and demonstrations of marine energy powered ocean observing systems, among other essential marine energy technology development activities. In hydropower, the President's Budget funds the development of technologies designed to lower costs while increasing the efficiency of low head hydropower as well as developing technologies designed to power non-powered dams. It also funds technology R&D into

the most promising pumped storage hydropower concepts to reduce costs or overcome deployment barriers. Finally, it will build on prior-year efforts to develop tools to assist the Nation's irrigation districts in using hydropower as a "building block" toward irrigation modernization by converting canals to pressurized pipes; enabling electrification of farm equipment and elimination of diesel pumps; and helping decarbonize the agricultural sector.

Q4. Can you commit to working with Congress to secure the needed funding to construct and operate a robust research and testing program at PacWave, and similar facilities across the country, over the coming years?

A4. Yes, I look forward to working with Congress to ensure the needed funding to meet the President's clean energy goals, which include support for marine energy technologies and testing infrastructure.

Q5. In your prepared testimony, you set a goal to "quadruple clean energy research in four years." Can you commit to working with Congress to quadruple the WPTO budget and seek the appropriate number of staff for the office over the next four years?

A5. While the goal to quadruple clean energy research does not necessarily imply a commensurate increase for every individual program or technology, I absolutely commit to working with Congress to achieve the overall goal of a quadrupled clean energy research budget, including support for WPTO programs and staffing.

Q6. Can you commit to making sure that no offshore project interferes with existing fishing and crabbing activities?

A6. Thank you for highlighting this important issue. DOE has done much work over the years on the environmental and local community impacts of renewable energy projects, both on and offshore. Some of the primary concerns related to fishing and crabbing activities DOE has identified displacement/habitat loss from seabed alterations, stress/ displacement or inability to communicate from construction or background noise, and potential impacts to magnetic-or electric-sensitive fish and invertebrates.

DOE is supporting research and collaboration to help ensure the co-existence of offshore wind energy and ocean use by fisheries, to the greatest extent practicable. DOE is funding efforts to address the potential impacts of offshore wind energy on the fishing community as well as the fished species that they target. The Wind Energy Technologies Office (WETO), along with the Water Power Technologies Office (WPTO), has partnered with the Northeast Sea Grant College Consortium to advance research on the co-existence of fishing, coastal communities, and regional renewable energy development. Funded efforts will utilize community expertise to gain insight into the interaction of fisheries with offshore wind and identify co-location opportunities. Further, WETO has recently committed $3 million, alongside a $500k contribution from BOEM, to support research on the potential impacts of offshore wind farms on commercially fished species. The research will collect data on fish and ecosystems before and after wind farm construction and will develop novel tools to measure impacts. Through these efforts, DOE will continue working toward responsible deployment of offshore wind energy that supports the fishing community.

Although DOE-funded projects prioritize siting, monitoring, and mitigation to minimize impacts, any development has the potential to impact fishing or crabbing in communities reliant on these activities. While we acknowledge the risk, we are committed to making sure offshore energy is developed in a way that fits with existing uses of the ocean and the interests of local communities. As such, we commit to doing everything we can to understand and map key resource areas/ habitats; understand how activities relate to species abundances and populations; and to monitor+ before, during, and after deployment to reduce risks/impacts with an adaptive management approach. This includes working with affected industries collaboratively to understand and address their concerns – again - before, during, and after deployments.

QUESTIONS FROM THE HONORABLE KIM SCHRIER (D-WA)

Q1. EM announced in late April that it has confirmed that another single-shell tank is leaking at Hanford, for a total of 69 tanks that have leaked in the past or are currently leaking. What steps is EM taking to ensure that additional tanks do not leak and to limit impacts to the environment from the 69 tanks that have or had a known leak?

A1. Mitigation actions have been in place for years to protect workers, the public and the environment. We operate a tank integrity program to ensure safe management of Hanford tank waste.

Pumpable liquids were removed from all the single-shell tanks. Groundwater treatment systems were installed in the vicinity of the tanks and are capturing contamination from past tank leaks as well as from a much higher volume of contaminated liquids that were disposed of in the soil near the tanks during the time that the Hanford Site facilities were actively producing nuclear materials. The Department is installing barriers over the surface of the single-shell tanks to divert precipitation to evaporation ponds, so the water doesn't drive contaminants already in the soil deeper toward groundwater. In addition, we are retrieving waste from the single-shell tanks. The most effective long-term solution to addressing the issue of leaking tanks is treating the 56 million gallons of tank waste that exists at Hanford. This is why treating the tank waste at Hanford is one of the top priorities for the environmental cleanup program.

Q1a. The Office of River Protection estimated that there is a 95% probability that it will run out of double-shell tank space while the waste is awaiting treatment. What impact will this additional leaking tank have on the already-limited double-shell tank space at Hanford? What options is EM considering to address the lack of double-shell tank space?

A1a. The Department's plan maximizes the use of existing space in the double-shell tanks through mission completion, while maintaining the required emergency space of approximately 1.2 million gallons. The plan also relies on beginning tank waste treatment through Direct-Feed Low-Activity Waste (DFLAW), creating one million gallons of space per year, starting in 2023. The space created by DFLAW is roughly equivalent to one tank's worth of space each year of treatment operations. Additional space will be

created as high-level waste and supplemental low-activity waste treatment becomes operational in the future. Spending resources on constructing new double-shell tanks at this time diverts critical resources from the long-term solution to tank waste at Hanford – starting the treatment of tank wastes.

Q1b. GAO reported in January 2021 that EM does not have a long-term plan—which is a leading program management practice—for retrieving waste from Hanford's tanks. GAO cited benefits of having a plan for tank closure, including that it would serve as a communication tool with community stakeholders and may help to address technical challenges that EM could face in future waste retrieval efforts. However, DOE states that it already does long-term planning in a collection of documents. When will EM develop a comprehensive long-term plan, rather than piecemeal planning, in line with program management best practices and GAO's recommendation?

A1b. DOE has long-term plans for retrieving wastes from Hanford's tanks, as documented in the River Protection System Plan. The System Plan is updated at a minimum of every three years to capture changes in assumptions or regulatory requirements. The System Plan informs advance planning, work activities, and budget planning for the tank waste mission at Hanford.

Q2. DOE officials have asserted that the Direct-Feed Low-Activity Waste (DFLAW) facility is on schedule to begin treatment in 2023. However, in May 2020, DOE submitted a proposal to amend the consent decree due to a *force majeure* event, specifically the COVID-19 pandemic. What is the status of DFLAW construction and commissioning at Hanford, and what impact has COVID-19 had on the start of DFLAW treatment? Are there any additional challenges that could prevent DFLAW treatment from beginning on schedule?

A2. All construction on the DFLAW facilities has been completed, start-up testing is scheduled to be completed this fall, and the Office of River Protection is commissioning the DFLAW facilities.

Since March 24, 2020, when moving to the essential mission-critical operations posture due to COVID-19 concerns, the Hanford Site has experienced impacts related to COVID-19-based restrictions or requirements. The full impact of COVID-19 delays cannot be assessed at this point, given there is still the potential to continue experiencing work inefficiencies as a result of the pandemic. There are several risks that are actively being

managed in the commissioning process of this first-of-a-kind plant, but the Department is actively working to start treating tank waste by December 31, 2023.

Q3. EM stopped construction of the WTP's Pretreatment Facility and High-Level Waste Facility in 2012. Almost a decade later, EM has not resumed construction. Meanwhile, in 2018, the U.S. Army Corps of Engineers reported that at current annual funding levels, completing these facilities on time would not be possible. What is the status of the technical challenges facing the WTP, and what is the status of EM's analysis of alternatives to these two facilities? When does EM anticipate making a decision about how it will pretreat and treat Hanford high-level waste? If the WTP as planned is still under consideration, when will EM develop a revised baseline cost estimate for completing the remaining WTP construction?

A3. To support a future decision about how high-level waste (HLW) will be treated, DOE is conducting an Analysis of Alternatives (AoA), in collaboration with the State of Washington. This analysis is evaluating ways to safely and efficiently complete the tank waste mission, including the use of alternative waste forms for supplemental low-activity waste. In all the alternatives analyzed so far, we will still need the HLW facility, and the Department has continued to progress the design of the HLW Facility. The timing for final decisions on the HLW treatment mission and any subsequently revised re-baseline effort will depend on the outcome of the AoA and future decision-making processes.

Q4. Several outside parties—including GAO, an FFRDC, and the National Academies—have reported that DOE could consider alternate treatment options for supplemental low-activity (LAW) waste. These reports cite benefits of alternate treatment, including reducing certain risks, treating the supplemental LAW sooner, and potentially saving tens of billions of dollars. What steps is DOE taking to evaluate treatment alternatives? What additional information do decision-makers need to make this decision? When does DOE plan to make such a decision?

A4. DOE is always working to find safer and more efficient ways to perform its cleanup activities, including the treatment and disposal of Hanford Tank waste. The Department is currently reviewing an Analysis of Alternatives that considers alternative treatment forms for the low-activity waste, and the decision will coincide with the decision-making process discussed above.

Q4a. In June 2019, EM announced that it would be withdrawing its permit application for the Test Bed Initiative, which was seeking to demonstrate the feasibility of treating low-

activity waste with grout and disposing of it offsite. Why did DOE withdraw its permit application? What are DOE's future plans to demonstrate the use of grout to treat Hanford's supplemental low-activity waste and dispose of it offsite through the Test Bed Initiative or through another similar initiative?

A4a. In 2019, DOE withdrew the application to enable further discussions with Washington State. DOE is currently preparing an Environmental Assessment pursuant to the National Environmental Policy Act to evaluate the potential environmental impacts associated with the Test Bed Initiative, also known as the Low-Level Waste Offsite Disposal Project. If DOE pursues the Project, approximately 2,000 gallons of low-activity tank waste would be retrieved and treated to produce a form that is acceptable disposal in a licensed, commercial, mixed low-level waste disposal facility outside of the state of Washington.

Q5. In February 2019, the Office of River Protection released the *2019 Hanford Lifecycle Scope, Schedule and Cost Report*, which estimated that the costs for completing cleanup at Hanford is now between $323 billion and $677 billion. What options is EM looking at to reduce the costs of cleanup at Hanford and/or complete cleanup sooner than the 2070s?

A5. EM is addressing these challenges head-on in a collaborative manner with an eye toward getting waste out of tanks and disposed of sooner, safer and at a reasonable cost. More than ever before, EM has developed a better understanding of tank waste and has made significant progress on evaluating new technologies, commercial treatments and out-of-state disposal options that weren't available when the current plan was developed decades ago.

The Lifecycle Report has informed further discussions with Washington State regulators/stakeholders, as work continues, on options to retrieve waste from the tanks, treat the waste, and remove it from Washington state. Some of the options EM is looking at include:

- Treating low-activity tank waste via the Direct-Feed Low-Activity Waste Program;
- Continuing the Test Bed Initiative effort (Low-Level Waste Offsite Disposal Project);

- Participating in the National Academies of Science, Engineering and Medicine's review of options for treating low-activity tank waste;
- Utilizing new commercial treatment and disposal options outside of Washington state; and,
- Completing an analysis of alternatives for preparing high-level tank waste for treatment.

QUESTIONS FROM THE HONORABLE FRED UPTON (R-MI)

Q1. As you know, pursuant to authorities Congress provided in the FAST Act of 2015, the Department of Energy is the lead Sector-Specific Agency for cybersecurity for the energy sector. As such, DOE is responsible for coordinating with multiple Federal and State agencies and collaborating with critical infrastructure owners and operators on activities associated with identifying vulnerabilities and mitigating incidents that may impact the energy sector. In March of 2018, Secretary Perry provided input to the Committee to assess the quality of coordination among the various Federal entities relating to cybersecurity of the Nation's pipeline system. In his letter, Secretary Perry stated that "a coordinated government approach to the cyber and physical security of pipelines, led by the Department of Energy, is essential to ensuring the safe and reliable flow of energy across the U.S."[1]

Q1a. Please describe the coordination conducted by DOE with DHS, TSA, DOT, FERC, and any other relevant Federal and State agencies as it relates to cybersecurity for pipelines.

A1a. The U.S. Department of Energy is the Sector Risk Management Agency (SRMA) for the energy sector, which includes the electricity, oil, and natural gas sectors. In this capacity, DOE co-chairs the Energy Government Coordinating Council (EGCC) with the U.S. Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (CISA). The EGCC includes interagency partners such as the Transportation Security Administration, Pipeline and Hazardous Materials Safety Administration, Federal Energy Regulatory Commission, and others. The EGCC also includes the National Governors Association, National Associations of Regulatory Utility Commissioners, and National Associations of State Energy Officials to ensure that states are integrated in the broader public-private partnership to strengthen the cybersecurity, resilience, and reliability of energy infrastructure.

In the electricity sector DOE is the SRMA for both the electricity infrastructure and the product (e.g., electrons) and FERC is the cybersecurity regulator. In the oil and natural gas sector DOE is only considered the SRMA for the product (e.g., oil and natural gas) and TSA is the SRMA and cybersecurity regulator for pipeline infrastructure.

DOE, CISA, and the broader EGCC work closely with the Oil and Natural Gas Subsector

Coordinating Council, including the Pipeline Working Group, which represents the private sector interests of the oil and natural gas industry and provides a forum to coordinate oil and natural gas cybersecurity and physical security strategies, activities, policy, and communication across the sector to help ensure the security of the oil and national gas sector.

Q1b. Please describe the Federal resources, including personnel, applied to pipeline cybersecurity vulnerability assessments and related programs.

A1b. The U.S. Department of Energy is the Sector Risk Management Agency (SRMA) for the energy sector, which includes the electricity, oil, and natural gas sectors. In this capacity, DOE co-chairs the Energy Government Coordinating Council (EGCC) with the U.S. Department of Homeland Security's Cybersecurity and Infrastructure Security Agency (CISA). The EGCC includes interagency partners such as the Transportation Security Administration, Pipeline and Hazardous Materials Safety Administration, Federal Energy Regulatory Commission, and others. The EGCC also includes the National Governors Association, National Associations of Regulatory Utility Commissioners, and National Associations of State Energy Officials to ensure that states are integrated in the broader public-private partnership to strengthen the cybersecurity, resilience, and reliability of energy infrastructure.

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TSA has responsibility for the Federal oversight of pipeline physical security and cybersecurity and DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) is responsible for pipeline system safety, developing safety regulations for domestic interstate and intrastate natural gas and hazardous liquid pipelines. Private sector pipeline operators are responsible for implementing asset-specific safety standards

and protective security measures. TSA's and PHMSA's FY 2021 budget overviews outline the specific details associated with these roles.

Finally, DOE's activities span the full energy sector to take proactive steps that manage risk and strengthen the national energy security infrastructure, as well as with other industry stakeholders to reduce vulnerabilities, disrupt threats, and improve response and recovery. DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) leads these efforts within DOE to secure the Nation's energy infrastructure against all hazards, reduce the risks of and impacts from cyber events and other disruptive events, and assist with restoration activities. In FY 2021, CESER's budget was $156 million, with $11.5 million in program direction.

Q1c. Please describe DOE's specific activities and programs concerning cybersecurity in pipeline systems.

A1c. DOE's Cybersecurity Capability Maturity Model (C2M2), Consequence-informed Cyber-enabled Engineering (CCE) program, and the Cybersecurity for Operational Technology Environments (CyOTE) program offer approaches to assessing cybersecurity vulnerabilities in systems that could be applied to pipeline systems. The approaches can be applied to both industrial controls systems of electric sector systems and oil and natural gas pipelines because of the overlap in systems used across the energy systems. DOE's cyber vulnerability testing program, Cybersecurity Testing for Resilient Industrial Control Systems (CyTRICS), identifies vulnerabilities in digital components in industrial control systems. Digital components that exist within pipeline systems could be tested for vulnerabilities under CyTRICS. Additionally, the Cybersecurity Risk Information Sharing Program (CRISP), a public-private partnership between DOE and the Electricity Information Sharing and Analysis Center (E-ISAC), has been successful in promoting voluntary cybersecurity threat information sharing across electricity, oil, and natural gas sectors – the timely sharing of threat information is priority for the Department. We work on many of these program in close collaboration with TSA and other agencies.

Q2. The Colonial Pipeline may be the most critical mode of shipment for transportation fuels on the East coast, delivering 2.5 million barrels per day of gasoline, diesel, and jet fuel from Houston up to New Jersey. The shutdown of Colonial's system to contain

a cyberattack caused widespread fuel disruptions across the East Coast, leading to long lines at fueling stations and outages at a significant number of stations in multiple states.

Q2a. Please describe DOE's roles and responsibilities with regard to the cyberattack on the Colonial Pipeline and the resulting energy disruption.

A2a. The Department of Energy (DOE) is the Sector Risk Management Agency (SRMA) for the energy sector and the coordinating agency for Emergency Support Function (ESF) #12, under the National Response Framework. These responsibilities are managed by DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER), which supports preparedness and response efforts in the energy sector, across Federal, state, local, territorial, and tribal governments, private industry, trade associations, and non-governmental organizations. Overall, DOE works with interagency and industry partners to ensure the security of the Nation's energy infrastructure from all hazards and to support response efforts to mitigate impacts from disruptions and to enable safe and efficient restoration.

During the disruption of the Colonial Pipeline system in May 2021, where Colonial halted pipeline operations after proactively taking certain systems offline to contain the threat from a ransomware attack, the DOE Energy Response Organization, was activated to coordinate with industry, interagency, and state partners, providing situational awareness, analysis of impacts, and supporting response efforts to mitigate impacts. DOE was in regular contact with Colonial pipeline throughout the incident, including daily calls with Colonial's senior executives, who shared critical information about restorations efforts, challenges, and timelines. DOE also held daily unity of effort calls with electricity and oil and natural gas industry partners, as well as the affected and surrounding states. These discussions helped inform Federal decision-making regarding options to mitigate supply impacts and disruptions and DOE worked closely with the Department of Transportation, Environmental Protection Agency, and Department of Homeland Security to coordinate on regulatory relief to alleviate impacts to consumers. DOE, in collaboration with the Energy Information Administration, also prepared daily

situation reports and analysis to ensure that interagency, congressional, state, and industry partners had the latest relevant information on the situation.

Q2b. Who designated DOE to lead the Federal government response to the Colonial Pipeline disruption?

A2b. DOE is the Sector Risk Management Agency (SRMA) for the energy sector and the coordinating agency for Emergency Support Function (ESF) #12, under the National Response Framework. DOE worked closely with the Colonial Pipeline Company, interagency, state, and industry partners to coordinate the Federal response to the energy disruption caused by the shutdown of the Colonial pipeline system and DOE helped facilitate coordination with the company in line with established partnerships across the industry. Further, the White House designated DOE to lead interagency efforts.

Q2c. Please describe the number, design, and scope of Federal audits or assessments to identify vulnerabilities, including cybersecurity risks, relating to the Colonial Pipeline system.

A2c. DOE offers a range of tools for companies to assess their cybersecurity posture, including the Cybersecurity Capability Maturity Model (C2M2), the Consequence-informed Cyber-enabled Engineering (CCE) program, and the Cybersecurity for Operational Technology Environments (CyOTE) program. These tools offer approaches to assessing cybersecurity vulnerabilities in systems that could be applied to pipeline systems. DOE's cyber vulnerability testing program, Cybersecurity Testing for Resilient Industrial Control Systems (CyTRICS), identifies vulnerabilities in digital components of industrial control systems. Digital components that exist within pipeline systems could be tested and disclosed under CyTRICS. As the Sector Risk Management Agency responsible for pipelines, TSA has released a number of security directives for pipeline security and will continue to engage on this matter. DOE works closely with Colonial Pipeline and other oil and natural gas companies on a number of initiatives. Colonial Pipeline is part of DOE's Operational Technology (OT) Defenders Fellowship and regularly engages with DOE on cyber threat information sharing.

Q2d. Please describe any findings and provide any after action reports relating to the Colonial Pipeline disruption.

A2d. CESER is currently finalizing an after-action report to review internal processes and response procedures following the energy-sector disruptions caused by the Colonial pipeline incident. Key findings from the report will be used to inform DOE's internal continuous improvements process for emergency response.

Q3. China controls between 80-90% of the critical minerals and materials used to manufacture energy-related technologies such as batteries, solar panels, and wind turbines. As you know, the United States has become the world's leading producer of oil and natural gas, which raises concerns about increasing our import dependence on China and the energy security tradeoffs of shifting away from fossil fuels. As you may also know, it is widely reported that Chinese companies rely on forced labor to manufacture renewable energy components.

Q3a. Do you support a prohibition on the use of renewable energy technologies and components manufactured with forced labor?

A3a. The Administration is taking a "whole of government approach" to show strong action against forced labor. On June 24, Secretary of Homeland Security Alejandro N. Mayorkas announced that The Department of Homeland Security's (DHS) U.S. Customs and Border Protection (CBP) issued a Withhold Release Order against Hoshine Silicon Industry Co. Ltd., a company located in China's Xinjiang Uyghur Autonomous Region. The Withhold Release Order instructs personnel at all U.S. ports of entry to immediately begin to detain shipments containing silica-based products made by Hoshine and its subsidiaries. The ban will be enforced by CBP, and incoming shipments from identified firms will only be released if the importer can verify that the materials are not made with slave labor.

Q3b. How will U.S. demand for critical raw materials change over the next decade?

A3b. For energy-related raw materials, such as the lithium-ion battery, rare earth element, and solar photovoltaic supply chains, most studies agree that the demand for the key raw materials that feed these technologies is going to increase several-fold. In the 100-day report, "Building Resilient Supply Chains, Revitalizing American Manufacturing, and

Fostering Broad-Based Growth" in response to Executive Order 14017, we make clear that the rising demand for lithium-ion batteries for Electric Vehicles (EVs), stationary storage, and consumer electronics will result in needs for lithium, nickel, and cobalt above the total amounts of these materials mined in 2019. Independent studies of the demand for renewable energy technologies reach similar conclusions. The International Energy Agency (IEA), in its May 2021 report, "The Role of Critical Minerals in Clean Energy Transitions," predicts a four-fold overall increase in mineral demand by 2040 under the Sustainable Development Scenario aimed at meeting the goals of the Paris Agreement (climate stabilization at "well below 2°C global temperature rise"), and a six-fold increase in demand to achieve net-zero emissions globally by 2050. The World Bank, in its 2020 report, "The Mineral Intensity of the Clean Energy Transition," predicts roughly five-fold increases in demand for lithium, graphite, and cobalt.

Q3c. What steps are you taking to protect the energy security of the U.S. as it relates to critical minerals?

A3c. Energy security in the low-carbon economy is going to require reliable and resilient supply chains for the critical raw materials that will power clean energy technologies. The United States is import-dependent on many of these materials. DOE's strategy for bolstering the critical minerals and materials supply chain is grounded in three pillars: (1) diversify supply in a safe, sustainable, and environmentally just way, (2) develop substitutes and (3) improve reuse and recycling.

These activities are carried out across DOE's R&D program offices. Current DOE investments within the Office of Science (SC), Office of Energy Efficiency and Renewable Energy (EERE), and Office of Fossil Energy and Carbon Management (FECM) support these three pillars across the full lifecycle of critical minerals and materials, from extraction to processing and manufacturing to recycling and reuse. EERE and FECM support Applied RD&D across these topics, while SC provides the necessary fundamental research and world-class user facilities necessary to complete much of the work in this topic area.

DOE is an active partner in interagency efforts to diversify and secure access to these raw materials, including chairing the Federal Consortium for Advance Batteries and working with the National Science and Technology Council Critical Minerals Subcommittee, which coordinates Executive Branch efforts. DOE is an international partner in efforts to build sustainable and resilient supply chains with our allies, such as the Critical Minerals Trilateral group, which now includes five bodies: Australia, Canada, the EU, Japan, and the United States.

Q3d. Do you support the permitting of more U.S. mines to produce critical materials?

A3d. While DOE does not have a direct role in the permitting process for mineral extraction, we continue to execute a comprehensive strategy to responsibly and sustainably obtain and source the critical materials needed to build the manufacturing economy of the future and achieve a net-zero carbon emissions economy by the year 2050. The United States Department of Energy is leading by example. For example, our Advanced Manufacturing Office is launching a demonstration-scale project on the advanced conversion of lithium from the Salton Sea in California into battery-grade materials. In addition, the Office of Energy Efficiency and Renewable Energy helped develop the June 2021 National Blueprint for Lithium Batteries that lays out a holistic approach focused on the development of a sustainable, domestic supply chain for lithium, cobalt, nickel, and graphite. The blueprint envisions a full value critical materials supply chain, from upstream raw materials production to midstream processing to end-of-life recycling. These efforts will also have the added benefit of supporting domestic production of electric vehicles, further creating and bringing jobs back to the United States.

In addition to the National Blueprint, the recently released report "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth," in response to Executive Order 14017," includes important recommendations regarding the extraction and processing of critical minerals, including the establishment of a federal working group and other stakeholders, to identify potential sites where critical minerals could be sustainably and responsibly produced and processed in the

United States while adhering to the highest environmental, labor, community engagement, and sustainability standards.

Q3e. Do you support the permitting of U.S. facilities to process critical materials?

A3e. DOE does not have a direct role in the permitting of mineral processing facilities, but as I stated to Senator Lisa Murkowski, when it comes to critical materials supply chains, we should do it in a responsible and sustainable manner. The success of developing more robust domestic critical materials supply chains greatly depends on Congress' commitment to the Department of Energy's Research and Development mission.

Q4. The Strategic Petroleum Reserve (SPR) is among the nation's most valuable energy security assets, and represents the world's largest government-owned stockpile of oil. In response to changing market and supply conditions, and to address the building backlog of maintenance requirements for the SPR, Congress required DOE to complete a long-range strategic review of the SPR and authorized an investment of up to $2 billion as part of an SPR modernization program. Congress also directed a series of drawdowns that could reduce the SPR's inventory from its current level of 628 million barrels (MMbbl) to close to 500 MMbbl within the next few years.

Q4a. What is the current balance of the Energy Security and Infrastructure Modernization Fund and how much spending authority has been granted to DOE?

A4a. Through previous sales the SPR has received $971M of the $1.42B authorized via appropriations acts by Congress. $961M has been obligated to date. The sale to raise the final $450M is complete as of June 30, 2021, and final payments were received from purchasers by July 20, 2021.

Q4b. What is the total estimated cost of the Life Extension II program, and what is the schedule date of completion?

A4b. The total project cost for Life Extension 2 (LE2) - the capital construction necessary to sustain existing sites for an additional 20-25 years - is $1.42B. LE2 is projected to be completed by the end of fiscal year 2025.

Q4c. As the Congressionally directed mandatory drawdowns take place in the years ahead, how will DOE manage the empty caverns and spare capacity? What is the appropriate post-sale configuration for the SPR?

A4c. The Office of Petroleum Reserves is completing a Post-Sale Configuration Study that is now in Departmental review and should be available to Congress in the coming months.

Q4d. What potential upgrades could DOE perform on the SPR to improve its ability to respond to changing crude oil market conditions and the risks of future supply and market interruptions?

A4d. Responding to any supply disruption, the SPR relies on private sector commercial pipelines and marine terminals to distribute crude oil. With the domestic production increases of the past decade and increased Canadian crude flowing to the Gulf Coast region, commercial pipelines are being used much more than they were decades ago when the SPR distribution system was planned. For domestic supply disruption situations, the SPR itself has more than enough capacity to respond but could be limited by a lack of distribution capability to commercial terminals. For international shortages, the situation is slightly different. The current U.S. share of an International Energy Agency collective action is 41.5%. The key here is marine terminal capability/capacity. The SPR is capable of replacing U.S. refinery import demand in all but the most extreme scenarios but could be limited in export capability depending on the availability of marine terminals.

Q5. The current fee model to support Nuclear Regulatory Commission regulatory activities has been identified as a significant barrier to innovation and deployment of advanced nuclear designs. Congress began to take steps to address this in the Nuclear Energy Innovation and Modernization Act, as well as in the Nuclear Energy Innovation Capabilities Act of 2017 (NEICA). In NEICA the Secretary of Energy was directed to establish an "Advanced Nuclear Energy Cost-Share Grant Program" to make grants to applicants for purpose of funding a portion of NRC licensing fees for pre-application and application review.

Q5a. What is the status of that program?

Q5b. What issues, if any, have been identified with its implementation?

Q5c. What are DOE's anticipated funding requirements for that program?

A5abc. Consistent with the direction provided in the Nuclear Energy Innovation Capabilities Act (NEICA) of 2017, the Office of Nuclear Energy (NE) has provided cost-shared, direct support to industry, and has taken related actions to reduce the regulatory risks associated with advanced reactor design, development, and demonstration.

For example, as described in NEICA 2017, the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) entered into a Memorandum of Understanding (MOU) to coordinate DOE and NRC technical readiness and to ensure that each agency has sufficient technical expertise and knowledge on advanced nuclear reactor technologies and nuclear energy innovation. Pursuant to this MOU, signed in October 2019 with subsequent addenda, NE coordinates with NRC and industry to address and resolve key regulatory framework and technical challenges that directly impact the "critical path" to advanced reactor design, development, demonstration, and deployment.

Further, NE established the Industry Funding Opportunity Announcement (FOA) in fiscal year (FY) 2017. An important element of this program offers regulatory assistance cost-shared grants to industry to help resolve design regulatory issues, regulatory review of licensing topical reports or papers, and other pre-application efforts focused on obtaining certification and licensing approvals for advanced reactor designs and capabilities. Since the inception of the program, NE has awarded nine regulatory assistance grants totaling $5.7 million (M) in government funding. These grants have ranged from developing a report on advanced fuel qualification methodology for a metal-cooled advanced reactor design to providing NRC a basis for determining the requirements for licensing advanced fuels for use in a gas-cooled fast reactor. The innovative Industry FOA will enter its fifth and final year in FY 2022, and awards are funded through multiple NE programs and when appropriate, through shared funding from other DOE organizations, e.g., the Office of Energy Efficiency and Renewable Energy.

In addition, NE also provides cost-shared, direct funding to industry for licensing activities, through partnerships established through the Advanced Reactor Demonstration Program (ARDP). Specifically, the ARDP Risk Reduction awards provide funding to support early interactions with the NRC to identify the highest priority regulatory

challenges that need to be addressed to enable demonstration of a diverse set of advanced reactor designs. ARDP Demonstration awards support development and submittal of construction permit and operating license applications and also support NRC review and approval of license applications and supporting documents to enable demonstration of two advanced reactor concepts that could have a significant impact on the energy market within this decade. NE requested $50M in FY 2022 to continue support for ongoing Risk Reduction awards and $245M for the Demonstration awards. No significant, specific issues have been identified in the execution of these support activities.

In its FY 2022 request, NE requests funds to continue the above activities. For example, within the Advanced Small Modular Reactor (SMR) Research, Development, and Demonstration (RD&D) subprogram of the Reactor Concepts RD&D program, NE requests $115M to support cost-shared industry partnership awards that have high potential to accelerate the development of both emerging and more mature SMR designs and supporting regulatory development and licensing support activities will be part of this scope. Further, to expand the number of participants in advanced nuclear reactor and technology development and licensing, the FY 2022 budget request includes funds for targeted R&D to further advance SMRs via competitive awards to universities, with an emphasis on supporting historically black colleges and universities (HBCU) and other minority serving institutions (MSI), and institutions in historically disadvantaged communities.

As it plans and executes these efforts, NE will ensure that industry and university partners are not duplicating project efforts or scope.

Q6. The Energy Information Administration (EIA) has a responsibility to assist policymakers and the Administration to analyze and disseminate independent and impartial energy information "to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment," as it notes in its mission statement.

Q6a. What role did EIA serve in the Administration's development of the Nationally Determined Contribution, submitted to the United Nations Framework Convention on Climate Change earlier this year?

A6a. The Administration did not directly engage EIA in development of the Nationally Determined Contribution, submitted to the United Nations Framework Convention on Climate Change earlier this year. EIA data, accessible on the EIA website, are widely used throughout the government.

Q6b. Will DOE leadership ensure our requests for EIA modeling of scenarios sufficient to meet the goals of the NDC are addressed fully and in a timely manner, including as side cases in the next Annual Energy Outlook? (This includes the May 27, 2021 written request from Rep. McMorris Rodgers and Sen. Barrasso.)

A6b. EIA recognizes the limitations to running deep decarbonization scenarios consistent with the NDC in the current version of its National Energy Modeling System (NEMS).

Although EIA has regularly undertaken significant NEMS model development, it has not been able to invest sufficiently in NEMS to fully model deep decarbonization or net-zero emissions scenarios, which would require the model to better represent biofuels; carbon capture, transport, and sequestration; advanced electrification; and hydrogen deployment. In response to a request in the Committee Report accompanying the Consolidated Appropriations Act of 2021, EIA is preparing a report to the Appropriations committees in Congress that will identify the resources necessary to run such scenarios in NEMS. In addition, EIA has undertaken a project to assess its energy modeling capabilities and develop a plan to modernize and integrate the modeling platforms and tools used to produce its flagship energy outlooks and forecasts.

Although EIA does not currently have the capability to model all the scenarios related to the NDC, it is committed to providing as much data and analysis as it can.

To that end, EIA plans to:

- Use its *Annual Energy Outlook 2021* (*AEO2021*) Reference case to update an EIA paper published in March 2020 titled *Alternative Policies – Carbon Fees* that applied three levels of carbon fees to the projections in its *AEO2020*. Modeling carbon fees can provide a proxy for several types of policy.

- Publish a report on how including electric utilities' integrated resource plans—which often include more optimistic clean energy goals—affect *AEO2021* Reference case projections.

- Analyze several alternative scenarios as a part of the *AEO2022*, which could include a permanent extension of federal efficiency rebates and renewable tax credits; state requirements for zero-emissions vehicles and goals for moving away from internal combustion engine vehicles; carbon fee cases; and the implications of increasing or decreasing the retirement rate of the nuclear power fleet.

Q7. You ultimately are responsible for all programs and management across the DOE enterprise, including the National Nuclear Security Administration. In point of fact, all employees and contractors of the Department derive their legal authority to carry out Departmental functions from you, as the Secretary, under the Department of Energy Organization Act. Put another way, you exercise ultimate authority, direction, and control of employees and contractors, as the Secretary of Energy.

Q7a. To help the Committee identify what you need to fully carry out your responsibilities—and what you need to be held fully accountable for Departmental missions—please describe the importance of having staff to manage the Department and to act on your behalf.

A7a. DOE has a broad mission to ensure America's security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions. The mission is accomplished by approximately 13,000 Federal employees and 90,000 contractor employees who work at the National Laboratories and various sites and facilities. Human capital assets are vital to the mission of the Department of Energy (DOE or "Department"). The Department recognizes the importance of recruiting and retaining a high-quality talent pool of staff to carry out its mission. In addition to effectively appointing, training, and leveraging the Department's human capital, the Department is designed and organized to ensure this staff is deployed in the most efficient manner possible. The current delegation structure at the Department is designed to promote the efficient flow-down of authority provided to me under the Department's organizational statutes and applicable federal law. Each program office

within DOE is tasked with carrying out discrete portions of the Department's mission of advancing the national, economic, and energy security of the United States through scientific and technological innovations and the environmental cleanup of the national nuclear weapons complex.

Q7b. Describe the role of mission-support staff to perform Department-wide functions, including General Counsel, Chief Financial Officer, Chief Information Officer, Intelligence and Counter Intelligence, Congressional and Intergovernmental Affairs, Independent Oversight, and whether these offices have the ability to be proponents or advocates of your policies and authority across the Department. And if these offices do not have this ability, what are the specific reasons why not?

A7b. Each of the mission-support offices, including the ones you listed, have missions to support our program offices across the DOE complex.

The General Counsel is charged by the Secretary of Energy with the authority to determine the authoritative position of the Department on any question of law. The Office of the General Counsel provides legal advice, counsel, and support to the Secretary, the Deputy Secretary, and program offices throughout DOE to further the Department's mission of advancing the national, economic, and energy security of the United States through scientific and technological innovation and the environmental cleanup of the national nuclear weapons complex.

The Chief Financial Officer delivers timely, accurate, and reliable decision support across the DOE enterprise, thus assuring the effective management and financial integrity of DOE programs, activities, and resources. That office develops, implements, and monitors Department-wide plans, policies, procedures, and systems in the areas of budget administration and appropriations, program analysis and evaluation, finance and accounting, internal controls, corporate financial systems, and strategic planning.

The Chief Information Officer leads the Department's Information Technology (IT) reform initiatives in an increasingly complex and hostile cyber landscape. That office leverages existing information technology and expertise to maximize mission accomplishment and reduce costs; identifies and fosters new and emerging IT to maximize mission accomplishment and reduce costs; provides Departmental governance,

policy, and oversight processes to ensure secure, efficient, and cost-effective use of IT resources; and ensures acceptable risk-based cybersecurity by enhancing enterprise situational awareness, developing near real-time risk management, and combating advanced persistent threats.

The Office of Intelligence and Counterintelligence is responsible for all intelligence and counterintelligence activities throughout the DOE complex and protects vital national security information and technologies.

The Office of Congressional and Intergovernmental Affairs provides guidance on legislative and policy issues, informing constituencies on energy matters, and serves as a liaison between the Department, Congress, State, local, and Tribal governments, as well as other Federal agencies and stakeholder groups.

The Office of Enterprise Assessments (in your question referred to as "Independent Oversight") performs independent assessments for DOE senior leadership that report on whether national security material and information assets are appropriately protected and whether Departmental operations provide for the safety of its employees and the public. That office also implements the Department's congressionally-authorized contractor enforcement programs for security and safety on behalf of the Secretary.

These offices and the Department's other program support offices generally have the ability to be proponents or advocates of my policies and authority across the Department.

Q7c. To the extent that these Department-wide functions cannot be proponents of your policies and authority across the Department, can you identify any Cabinet level agency that has similar restrictions on department-wide mission support staff?

A7c. It is not under the Department's purview to comment on the authorizing statutes of other departments.

Q7d. To the extent the NNSA Act has provisions that restrict functional proponents of your policies, describe how this inhibits your management and harms your accountability to the President and to Congress.

A7d. Congress, in passing the NNSA Act, made a decision to create a semi-autonomous organization within DOE with the NNSA Administrator reporting to the Secretary of Energy. Congress can revisit this structure as it so desires, but as it stands, I am confident in my ability to oversee NNSA as it fulfills its missions.

Q7e. Describe why removing statutory impediments to your ability to exercise full management of the Department could strengthen the ability of you and your Under Secretaries to carry out and oversee their operational responsibilities under the DOE Organization Act.

A7e. I currently have sufficient authorities in place to manage the Department of Energy, including the NNSA.

Q7f. Describe how integrating mission-support personnel could more fully help you to carry out your responsibilities for the nuclear deterrent, nuclear nonproliferation, and the DOE-wide scientific and technological operations that support these missions.

A7f. My responsibilities for the nuclear deterrent, nuclear nonproliferation, naval propulsion, and the scientific and technological operations that support these missions are a top priority. I recognize the need for a specialized cadre of professionals to support the nuclear security mission, including support functions which further the mission of the NNSA, to ensure appropriate staffing, legislative, public and intergovernmental affairs, budget formulation, specialized legal advice, contracting, and security, both physical and cyber. Congress made NNSA semi-autonomous so the NNSA Administrator, under my direction, has maximum flexibility to manage the nuclear security program.

Q8. The Department's role to maintain the nation's nuclear deterrent is its most vital mission. Recent reviews have found the structure of the NNSA has sometimes isolated DOE's work from the needed Cabinet level leadership. Can you commit to us that you will be working to ensure appropriate Secretarial leadership and management support to enhance this vital mission?

A8. I have oversight authority over the National Nuclear Security Administration (NNSA) and am responsible for what happens at NNSA. I am committed to maintaining a good working relationship with NNSA to maximize the success of NNSA programs and best leverage the different skills sets across the Department.

Q9. The Committee appreciates the efforts by the Department of Energy Office of Science's Isotope Program to identify new means of producing actinium-225 (Ac-225), given the success the radioactive component has for treating a growing number of various forms of cancer.

Q9a. Given the rapidly increasing demand within the medical and research community, please provide an update on the current supply of natural occurring Ac-225 (as a result of thorium-229 decay) and plans to expand its production to meet increasing demand in the years ahead given the promising medical advancements attributed to this isotope.

A9a. The Department of Energy's Isotope Program (DOE IP) provides domestic capabilities to fill gaps in international supply chains of critical isotopes for the Nation and produces isotopes otherwise not available world-wide. For example, Ac-225 has shown stunning success in the treatment of metastasized cancers. The DOE IP is the world-leader in developing innovative production routes for Ac-225 to meet the growing demand, as DOE IP has only a finite supply of Ac-225 resulting from thorium decay. DOE IP supports routine production of Ac-225 using two proton accelerators to meet the demand of increasing clinical trials, and is developing three other production routes: small cyclotron, electron accelerator, and production of new thorium-229 in a reactor. The DOE IP believes that all production paths will be needed to meet national demand for clinical trials and applications. The availability of chemical processing infrastructure is limiting the production of Ac-225; to address this the DOE IP is developing additional chemical processing capabilities at multiple sites to ramp up Ac-225 production.

Q9b. The Committee is aware of DOE's plans for expanded production of accelerator produced Act-225 but it has been brought to our attention that this product is not viable for use in pharmaceutical development. Please explain how DOE is addressing this issue.

A9b. Research has shown that accelerator-produced material performs similarly to the thorium-decay material. The DOE IP has submitted Drug Master Files (DMFs) for cGMP production to the FDA. Interest in accelerator-produced material for pharmaceutical development is quickly increasing and the DOE Isotope Program is providing the accelerator-produced material in support of clinical trials, as well as developing other production routes.

Q9c. Finally, explain the procurement process for how the supply of Ac-225 is allocated to the private and research sectors.

A9c. Demand projections are collected by multiple mechanisms, including: stakeholder meetings, customer surveys, federal agency surveys, website interactions, individual interactions, user meetings, and marketing outreach at professional societies. The DOE IP makes strategic investments to increase supply to meet demand. Occasionally, a situation arises when there is no means to increase availability of an isotope through a production pathway due to non-available feedstock material worldwide, such as Ac-225 from thorium decay. In this case, customer requests are scored by weighted factors, with higher scores given to long-time existing and domestic customers that are currently supporting clinical trials.

Q10. In mid-January, DOE announced the establishment of a "Division of Minerals Sustainability." According to DOE, the division was created to bring an increased focus to securing a U.S. critical minerals supply chain that will ensure the U.S. energy and manufacturing sectors ensure that the domestic critical minerals supply chain is cleaner, more resilient, and more secure. The Division of Minerals Sustainability reports to the DOE Fossil Energy Office's Clean Coal and Carbon Management. Our understanding is that the Division of Minerals Sustainability is intended to "provide the oversight, management, and direction necessary for DOE's R&D and applied engineering work with the technologies that will extract, process, use, and dispose of critical minerals and rare earths from raw mining materials" (according to OE, https://www.energy.gov/articles/department-energy-launches-minerals-sustainability-division-enable-ongoing-transformation).

Q10a. What actions have been taken since this announcement in terms of standing up the Division of Minerals Sustainability, including resource allocation, responsibilities, etc.?

A10a. The Office of Fossil Energy and Carbon Management (FECM) Minerals Sustainability Division (MSD) was founded to evaluate and address technical and nontechnical challenges that must be met to enable secure, diverse, resilient domestic supply chains for critical minerals (CM), while taking advantage of the significant potential supply of CMs from unconventional and secondary sources. Success requires collaboration with the other Department of Energy (DOE) Offices (Office of Energy Efficiency and Renewable Energy, Advanced Research Projects Agency-Energy (ARPA-E), and Office of Science

(SC)), as well as other agencies (e.g., Department of Interior (DOI), Department of Defense (DOD)) and the generation of innovative approaches that link upstream activities, mid-stream refining, and downstream customization that can strengthen a domestic supply chain. The MSD is working with the other offices within DOE, particularly EERE and SC through the Critical Minerals and Materials (CMM) Crosscut, to address the entire supply chain; FE's particular focus within the MSD is on producing CM, rare earth elements (REE), and carbon ore products from unconventional and secondary feedstocks (i.e., coal and industrial by-products, including coal refuse, clay/sandstone over/under-burden, ash, acid mine drainage, produced water and industrial by-products from steel, cement, and refining industries).

To date, the MSD has conducted a series of regional workshops throughout the U.S. to capture technical challenges from stakeholders—industry, universities, research institutions and DOE National Laboratories across the three technical pillars. This information has been integrated into the MSD Multi-Year Program Plan, identifying mission areas, performance metrics/milestones and goals, and was released in October.

The MSD has also begun the implementation of a strategy to develop the infrastructure needed to enable industry to extract, process and refine critical minerals, including REEs. This strategy builds off the successful small-scale projects that have produced CM/REE. Included in this strategy:

- Pilots-advance facilities to produce large quantities of high purity, commercial grade REE and other CMs, which will form next stage development to broadly enable extraction of REEs and other CMs through metallization as required for end-users.
- Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) Initiative is structured to bring together coalitions to assess and inventory regional resources, identify opportunities, address technical and nontechnical challenges, and establish regional Innovation Centers that will catalyze growth through a regional approach.

• Transformational technologies for individually separated highly purified, individual CMs/REEs, including reduction to metals and alloying.

• Carbon ore products focused on the development of existing and new technologies to turn coal waste and refuse into synthetic graphite and to deploy these technologies in economically distressed power plant and coal communities.

Q10b. Is the DOE committed to prioritizing the Division of Minerals Sustainability as part of its approach with respect to securing a U.S. critical minerals supply chain?

A10b. DOE is addressing the full range of options to secure our CM supply chains with research, development, demonstration, and deployment (RDD&D) through the Critical Minerals and Materials (CMM) crosscut. DOE's strategy is to address challenges and opportunities throughout the entire supply chain.

The FECM MSD is one of several DOE Offices that are addressing CM/REE RDD&D. The MSD is collaborating with other DOE Offices, including ARPA-E, SC, EERE, Office of Nuclear Energy (NE) and Office of Technology Transitions (OTT). These Offices support DOE's three technical priorities: (1) diversifying supply, (2) developing substitutes. and (3) recycling and reuse.

DOE is committed to RDD&D being conducted throughout the entire supply chain with an aim to bring innovative processes and technologies across all supply chain stages for key technologies, including batteries, rare earth magnets, and catalysts. The FY 2022 DOE Budget Request includes funding that will support environmentally sound domestic extraction of mineral substances, including rare earth elements, gallium, germanium, cobalt, manganese, zinc, nickel, lithium, tellurium, and other minerals used in the production of batteries, magnets, and other components necessary for clean energy technologies.

QUESTIONS FROM THE HONORABLE CATHY MCMORRIS RODGERS (R-WA)

Q1. Currently, there are policy discussions to expand the National Science Foundation research grantmaking into more engineering and technology development like the National Labs' work. But NSF does not have a robust program to protect against malign interests—or a counterintelligence program.

Q1a. Given this and the unmatched scientific and engineering expertise and capabilities at DOE and its National Labs, isn't DOE better equipped to advance innovations and technical advantages, when it comes to China?

A1a. Both the Department of Energy (DOE) and the National Science Foundation (NSF) fulfill vital and essential roles in advancing America's security and prosperity through transformative advances in science. NSF is focused on advancing the frontiers of science in a wide range of scientific areas through support for researchers at their home institutions. Along with funding researchers at institutions across the country, DOE's primary mission focus is on both discovery and deployment through world class-scientific tools at our network of seventeen National Laboratories across the country. An approach that leverages the complementary strengths of both agencies will be best suited to advancing innovations and maintaining America's leadership in science and technology.

DOE has always taken threats to its scientific enterprise seriously and has a long history of balancing openness with security due to the classified nature of some of the work conducted by our National Labs. Over the past several years the Department has taken a series of actions to address risks to research security while maintaining an open, collaborative, and world-leading enterprise. These include the development of a Science and Technology Risk Matrix to identify and manage risks associated with critical and emerging technologies that do not otherwise have control mechanisms, such as export controls. DOE uses the risk matrix to guide and manage foreign engagements and foreign national vetting and access to the National Labs. In addition, DOE Order 486.1 prohibits DOE employees and contractors from participating in foreign government sponsored or affiliated activities from Countries of Risk which is based on consideration of, but not limited to, the Office of Director of National Intelligence WorldWide Threat Assessment,

the National Counterintelligence Strategy, and in consultation with the Under Secretary for Nuclear Security and the Office of Intelligence and Counterintelligence.

The Department benefits tremendously from the unique capabilities and authorities of our Office of Intelligence and Counterintelligence (OICI). As a member of the U.S. Intelligence Community, OICI is a vital resource that supports research security efforts undertaken by DOE and our National Labs.

The United States must take a whole-of-government approach to ensure the security and integrity of our research enterprise. DOE, NSF, and the National Institutes of Health (NIH) are agency co-chairs on the White House-led National Science and Technology Council Subcommittee on Research Security. Coordinated efforts are currently underway to implement National Security Presidential Memorandum-33 on United States Government Supported Research and Development National Security Policy.

Q2. Please provide a progress report on the implementation of the Energy Act of 2020. In the report, please identify each section of the legislation implicating DOE and provide a description of the work plan, and any resource constraints affecting implementation.

A2. **Title I – Efficiency**

DOE is undertaking the following actions to implement section 1011 of the Energy Act of 2020 related to the Weatherization Assistance Program (WAP):

- DOE issued a funding opportunity announcement in December of 2021 to implement section 414D, Financial Assistance for Enhancement and Innovation. DOE has set aside $18.6 million for this opportunity from FY21 funds.
- DOE plans to propose regulations in FY22 to implement the statutory changes enacted in section 1011, including the provisions to modernize the definition of "weatherization" as provided in section 1101(b), to include the consideration of weatherization's non-energy benefits as provided in section 1101(c) and to amend the reweatherization date as provided in section 1101(h).

DOE is undertaking the following actions to implement other sections of the Act including:

- The President's FY22 Budget request calls for additional funding to help improve efficiency and lower energy costs for schools (Section 1001) via the EERE Building Technologies Office (BTO).
- DOE's is prioritizing activities related to R&D program focused on building-to-grid integration and grid-interactive efficient buildings.
- DOE's BTO published an early assessment request for information (RFI) undertaking an early assessment review for amended energy conservation standards for ceiling fans to determine whether to amend applicable energy conservation standards for this product.
- DOE'S BTO is developing a report to Congress on the benefits of electrochromic glass on energy consumption and occupant comfort in buildings.

Title II - Nuclear

The Department of Energy has been implementing many of the Title II - Nuclear programs called out in the Energy Act of 2020 and views its implementation as important to ensure nuclear energy is a key element in meeting our aggressive climate goals. The Department has followed through on the direction under this title including continuing with the Advanced Reactor Demonstration Program, continuing planning for the Versatile Test Reactor, and implementing the Integrated Energy System subprogram within the Office of Nuclear Energy. In addition, the Department worked to implement to the maximum extent possible, the 20% nuclear energy research and development funding for the Nuclear Energy University Program. The President's budget for fiscal year 2022 requests funding to start new programs, such as the High-Assay, Low Enriched Uranium (HALEU) Availability subprogram (section 2001), and International Nuclear Energy Cooperation has been restored as a standalone program. The Department is working to implement other aspects of Title II and we look forward to continuing this process.

Title III - Renewable Energy and Storage

The Department's FY22 budget request and recent activities are aligned with the Energy Act of 2020. The FY22 budget request proposes strong growth in funding across the Department's renewable power offices, with significant increases for solar, wind, geothermal and waterpower R&D directly in line with sections 3001-3004 of the Energy Act. There is an enhanced emphasis on supporting all elements of the technology development cycle, from concept design to demonstration and deployment, as well as ensuring renewable generation is integrated into the grid in a way that maintains or increases overall reliability and resilience. This includes increased support to state and local governments and communities to plan and operate clean, reliable power systems, as well as support to ensure secure supply chains and well-paid, stable jobs in communities across the U.S.

These efforts are closely aligned with the Energy Act of 2020. Examples of specific programs include:

- EERE's Solar Energy Technologies Office (SETO) requested $100M to grow domestic solar manufacturing through the solar Manufacturing and Competitiveness subprogram (Section 3004).
- EERE's Wind Energy Technologies Office (WETO) and SETO are demonstrating the ability and robustness wind and solar energy in providing critical grid services, such as frequency regulation, load following, and contingency reserves (Section 3003 and Section 3004).
- EERE's Water Power Technologies Office (WPTO) requested additional funding for HydroWIRES to increase the flexibility of hydropower through operational improvements, supporting development and testing of innovative pumped storage hydropower technologies, and investing in the environmental systems to keep the fleet online (Section 3001).
- EERE's Geothermal Technologies Office (GTO) request includes prioritization of the successful Frontier Observatory in Research in Geothermal Energy (FORGE) program (Section 3002).

- EERE is developing a grid integration research and development (Section 8004) plan to coordinate RD&D activities on integrating renewable energy and electric vehicles onto the grid.
- The Department's Grid Modernization Initiative has been and will continue to coordinate (Section 8006) grid modernization effort with a variety of relevant entities including utilities, states, national laboratories, vendors, etc. through activities such as workshops and a project peer reviews.
- EERE (SETO) requested $15M to apply concentrating solar-thermal technologies to the industrial sector for production of solar-derived industrial products, chemicals, and fuels (Section 3004).
- EERE (SETO) requested $20M to increase participation of underrepresented groups in the solar industry through a national career accelerator to train and diversify the solar and clean energy workforce and build pathways for career placement and advancement in both solar installation and manufacturing (Section 3004).
- EERE (WETO) is exploring the potential for, and technical viability of, airborne wind energy technologies, which convert wind energy into electricity using tethered flying devices (Section 3003).
- EERE (WETO and SETO) has established a project team and obligated funding to support the development of a Wind and Solar Energy Technology Materials Physical Property Database, which will identify the type, quantity, country of origin, source, significant uses, projected availability, and physical properties of materials used in wind and solar (Section 3003 and Section 3004).
- EERE (WETO) has made investments in projects already underway to focus on blade recycling, including technology development efforts to recycle fiberglass for use by the automotive industry. WETO also plans to focus future endeavors on recycling critical materials as they become more predominant in the growing offshore wind industry (Section 3003).
- EERE (GTO) through the FY21 and planned FY22 Amplify initiative invested in a portfolio of enhanced geothermal systems (EGS) demonstration projects located at the margins of existing geothermal production fields where teams will add new, low-

cost, clean EGS power to the grid from wells that would otherwise sit idle (Section 3002).

- EERE's (GTO) planned FY22 effort "Community Geothermal Heating & Cooling Technical Assistance & Deployment" will provide technical assistance funds to competitively selected geographic coalitions to demonstrate and deploy community-scale geothermal systems. The effort will target urban centers, rural areas, energy communities, and remote communities where geothermal has high technical and economic potential and can reduce dependence on fossil fuels (such as natural gas and heating oil) (Section 3002).
- EERE (GTO) has proposed and started scoping a new effort, GEODE (Geothermal Energy from Oil and gas Demonstrated Engineering), that will be designed to leverage oil & gas subsurface assets, transfer technologies, and expertise to help address geothermal challenges while providing clean energy employment opportunities for communities adversely impacted by the fossil energy sector decline (Section 3002).
- In FY21, EERE (GTO) is partnering with the Federal Energy Management Program to conduct suitability screenings for the installation of geothermal heating and cooling systems at Department of Defense, National Park Service, and DOE National Lab facilities. This screening will inform proposed FY22 field validation work at one or more promising Federal sites (Section 3002).
- EERE (WPTO) is evaluating how best to implement the amended language on including entities that serve inadequate electric service to expand the eligibility for the EPAct 2005 Section 242 Hydro Incentive Program (Section 3005) and is conducting a technical analysis of the terms to determine metrics. WPTO also plans to request inputs from stakeholders through an RFI.
- EERE (WPTO) is developing technical assistance to support hydropower developers to consider microgrids and storage, and through the Energy Transition Initiative Partnership Project to support remote and isolated communities to develop technology-neutral approaches in microgrids and includes system configurations with storage (Section 3202).

- EERE (WPTO) is examining opportunities for research and development in advanced technologies for non-power sector applications, including applications with respect to the maritime transportation and associated maritime energy infrastructure needs, as well as in enabling missions at sea in the Arctic. The report is being developed in coordination with other EERE offices and will coordinate with other respective agencies on identifying gaps and opportunities in R&D (Section 3001).
- Building on the Powering the Blue Economy effort, with new authorization explicitly providing for expanded microgrid, desalination, and ocean observing work, EERE (WPTO) is increasing its activities to support how marine energy can meet the power needs in the blue economy, including in hybrid energy configurations (Section 3001).

These examples serve to highlight the alignment of the Department's FY22 budget request and ongoing activities with the Energy Act of 2020. The Energy Act of 2020 also specified a number of requested studies. The Department is developing these studies expeditiously.

The Department continues to ramp its efforts on energy storage. The Energy Storage Grand Challenge, for example, has already led to numerous funding opportunities and awards (here). The Department's FY22 budget request also includes significant new funding for storage. Consistent with the Energy Act of 2020, and among other areas, this funding will support: the Energy Storage Grand Challenge to evaluate, validate, and demonstrate a wide range of new storage technologies; full construction of the Grid Storage Launchpad to consolidate existing materials research and new characterization and testing capabilities focused on grid-scale energy storage; and technical support to a diversity of external stakeholders.

Title IV – Carbon Management; Title V – Carbon Removal

Titles IV and V, Carbon Management and Carbon Removal authorizes RD&D programs for a suite of initiatives to commercialize Carbon Capture, Utilization and Storage, carbon removal from the atmosphere, and hydrogen technologies. The Office of Fossil Energy and Carbon Management (FECM) FY22 budget request would provide funding to enable near-term work to develop and deploy technologies for the power and industrial

sectors. These investments will be critical to meet our climate goals of 50% emissions reductions by 2030, 100% clean electricity by 2035, and net zero carbon emissions by 2050. Carbon dioxide removal will be an important tool to achieve economy-wide net zero emissions by 2050. The goal is to enable the commercialization of clean energy innovations that will activate job creation, benefit climate vulnerable communities, and yield a more geographically diverse and impactful research portfolio. Major priorities of the FECM budget request include:

- Accelerate Carbon-Neutral Hydrogen (H2): Develop technologies that leverage the natural gas infrastructure for H2 production, transportation, storage, and use coupled to carbon management. Hydrogen offers an emissions free fuel for power generation, industrial applications, and the transportation sector.
- Develop Low-Carbon Supply Chains for Industries: Develop novel approaches to recycle carbon oxide emissions, principally carbon dioxide (CO2), into value-added products such as cement, concrete, steel, chemicals, and fuels using systems-based carbon management approaches.
- Advance Carbon Dioxide Removal: Research, develop, and demonstrate CDR technologies and approaches by investing in Direct Air Capture (DAC) and mineral carbonation projects.
- Demonstrate and Deploy Point Source Carbon Capture and Storage: RDD&D for CCS in the power and industrial sectors to enable wider, strategic commercial deployment to meet net-zero emissions goals by 2050.

FY22 objectives and planned activities for carbon removal approaches across DOE offices include:

Crosscut Objectives:

- ***Capturing Carbon Emissions Directly from the Air and Ocean:*** Conduct RDD&D on CDR technologies and systems. These approaches include, but are not limited to BECCS, DAC, biological approaches, geologic/enhanced mineralization, soil carbon sequestration, afforestation/re-forestation, DOC, enhanced ocean alkalinity, and coastal blue carbon.

- ***Remove Carbon Emissions Directly from the Air and Ocean:*** Conduct RDD&D on CDR technologies and systems.
- ***Enable Low-Cost and Scalable CDR Infrastructure:*** Identify and address critical barriers to reducing the costs and energy requirements for CDR systems through targeted research investments. Promote and demonstrate the strategic deployment of diverse CDR systems and strategies.
- ***Address Resource and Sustainability Requirements:*** Assess availability of primary energy, water, and other inputs to ensure holistic, sustainable, low and negative-life-cycle emissions pathways, and ensure the stewardship of our communities, natural resources, and the environment. For demonstration and deployment projects, coupling carbon accounting through life cycle and techno-economic analyses are critical to assessing the net amount and timescale of carbon removal alongside associated costs.

Program 'Action Areas': The Department of Energy (DOE) Program offices Energy Efficiency and Renewable Energy (EERE), Fossil Energy and Carbon Management (FECM), Science (SC), and Advanced Research Projects Agency-Energy (ARPA-E) will:

1. ***Strengthen Cross-DOE Coordination and Collaboration:*** Ensure an integrated approach including clearly defined "swim lanes" and "relay points," integrated systems analysis, workshops and Principal Investigator meetings, community/stakeholder engagement, and data/information sharing.
2. ***Support Fundamental and Applied R&D and Technology Transfer:*** Establish the foundational scientific infrastructure, knowledge base, innovation, and technology transfer to enable DOE to meet program goals.
3. ***Conduct Systems Analysis:*** Conduct life cycle, resource, regional, and techno-economic analyses to guide the portfolio and strategy.
4. ***Promote Safety Sharing:*** Share best practices and resources and make safety a priority in our activities and projects.
5. ***Coordinate on Workforce/STEM and Diversity, Equity, and Inclusion:*** Collaborate on best practices and accelerate progress towards common goals.

In addition, the Energy Act authorized a number of demonstration projects across a variety of technology areas. The FY22 budget requests funding for a new Office of Clean Energy Demonstrations (OCED), which would initiate and manage a multi-year series of competitive solicitations. It would work to accelerate the maturation of near- and mid-term clean energy technologies and systems to achieve rapid commercial adoption and increased availability. OCED's approach would be informed by existing clean energy innovation initiatives across DOE's diverse program and functional offices, sites and associated National Laboratories. OCED would issue initial competitive solicitations for commercial-scale energy storage demonstrations, and issue at least one technology neutral commercial-scale demonstration solicitation per year focused on a crosscutting energy challenge.

FY22 Request:

- Continue development of transformational DAC materials and components, and feasibility studies of current DAC systems.
- Continue National Laboratory RDD&D on mineralization and enhanced weathering concepts.
- Continue evaluation of coal-waste biomass co-feeding concepts with CCUS at existing facilities.

Title VI – Industrial and Manufacturing Technologies. Title VI of the Energy Act of 2020 encourages the development and commercialization of technologies that increase the technological and economic competitiveness of U.S. industry and manufacturing and decrease the emissions of non-power industrial sectors.

In the FY22 budget, DOE has created a new **Decarbonizing Industry Crosscut** that will engage multiple offices across DOE to foster innovations and enable scale up of cost-competitive, low-emissions technologies, consistent with Energy Act direction. The Crosscut leverages research, development, demonstration, and deployment across the pillars of industrial decarbonization: energy efficiency; electrification; low-carbon fuels, feedstocks, and energy sources; and carbon capture, utilization, and storage (CCUS).

Given the technologies and systems interdependencies across the decarbonization pillars, crosscut activities will be an enabling piece of DOE's portfolio of solutions to address Congressional direction. Aggregated funding for decarbonizing industry across ARPA-E, EERE, FECM, LPO, and Science totaled $565 million in FY211. The FY22 budget requests $1,386.7 million for the decarbonizing industry crosscut.[2]

In the FY22 budget, the Advanced Manufacturing Office (AMO) has adopted a new budget structure to better align with Congressional direction. The historical subprogram structure through FY21 had been based on operational categories—R&D Project, R&D Consortia, and Technical Partnerships. The FY22 Budget includes a new structure across four technical subprograms: Materials, Manufacturing Innovations, Energy Systems, and Manufacturing Enterprise. Through the new budget structure, AMO is addressing both industrial decarbonization and manufacturing innovation need to decarbonize other sectors. AMO is also providing technical assistance for manufacturers to reduce their energy use intensity, adopt smart energy management programs, incorporate resilience into their operating systems, and provide targets for energy efficiency, productivity, waste reduction, and water use reduction practices.[3]

Title VII – Critical Minerals. Title VII of the Energy Act directs DOE to carry out an R&D program to develop advanced separation technologies for the extraction and recovery of rare earth elements (REEs) and other critical materials from coal and coal byproducts. It also directs DOE to conduct an RDD&CA program on the development of alternatives to, recycling of, and efficient production and use of critical materials, and directs DOE and EIA to develop analytical and forecasting tools to evaluate critical minerals markets.

The FY22 budget creates a **Critical Minerals and Materials** crosscut to elevate, coordinate, and augment DOE's activities across the three pillars that ground DOE's strategy for bolstering the critical minerals and materials supply chain: diversify supply in

[2] Congressional Budget Justification, Volume 2, p 245
[3] Congressional Budget Justification, Volume 3 Part 1, p 379-382.

a safe, sustainable, and environmentally just way, develop substitutes, and improve reuse and recycling. Current DOE investments in SC, EERE, and FECM support these three pillars across the full lifecycle of critical minerals and materials, from extraction to processing and manufacturing to recycling and reuse. Funding the critical minerals and materials crosscut totaled $146.4 million in FY21. The FY22 budget requests $233.25 million.

The Office of Fossil Energy and Carbon Management (FECM) has created a new Mineral Sustainability subprogram to coordinate FECM critical minerals and materials activities and implement the Energy Act provisions related to recovery of REEs and critical materials from coal waste and industrial by-products.

Title VIII – Grid Modernization

Key priorities and changes within the proposed FY22 budget for DOE's Office of Electricity (OE) are aligned with the Energy Act of 2020, including:

- Expanding Transmission Capacity and Advanced Grid Architectures: pursue electricity-related policy issues by carrying out statutory and executive requirements, while also providing policy design and analysis expertise to Federal, State, Tribal, territorial, and regional entities.
- Transmission Reliability and Resilience - ensuring the reliability and resilience of the U.S. electric grid through R&D on measurement and control of the electricity system, assessing evolving system needs, identifying pathways to achieve an equitable transition to decarbonization and electrification, and risk assessment to address challenges across integrated energy systems.
- Resilient Distribution Systems - develops transformative technologies, tools, and techniques to enable industry to modernize the distribution portion of the electric delivery system. The FY22 request supports a competitive award process to harness emerging sources of energy for balance, reliability, and control: EVs, connected homes and buildings, increasing distributed solar, and energy storage.

- Energy Delivery Grid Operations Technology - a new program in OE in FY22 that will support a public–private partnership to develop national-scale energy planning and real-time situational awareness capabilities by focusing on developing large, networked communication and data infrastructures across multiple utility boundaries. The EDGOT technology portfolio will enable assessment of risks and uncertainty, evaluation and identification of effective mitigation strategies, and support of more informed infrastructure planning and investment decisions by both public and private sectors, thereby enhancing U.S. energy and economic security.
- The department has identified the steering committee and begun development of draft voluntary pathways for grid modernization (Section 8008).
- Office of Electricity is working with EERE to develop a statement of work with the national academies for studying and evaluating net metering (Section 8015).

Title IX – DOE Innovation. Title IX of the Energy Act contains a number of provisions aimed at supporting innovation at DOE.

The Act authorizes the Office of Technology Transitions and establishes a Chief Commercialization Officer to focus on commercializing technologies that advance the missions of DOE. The mission of OTT is to expand the commercial and public impact of the research investments of DOE. OTT enhances the public return on investment from DOE's technology portfolio, including the National Laboratories, through a suite of outcome-oriented activities that will enable climate change mitigation, job creation, and commercialization of DOE technology. Internally, OTT works to fill gaps in the RDD&D continuum, providing specialized tools, training, analysis, and programs to improve the successful transition of technology from proof of concept to prototype to demonstration. Externally, OTT supports development of a robust ecosystem for energy entrepreneurs and technology start-ups and seeds public-private partnerships with a diverse set of actors. OTT also supports Lab Partnering Service to encourage partnerships between the national laboratories and public and private sector entities, as authorized under the

Energy Act.[4] The FY22 budget request $19.47 million for OTT, an increase of $1.831 million above FY21 enacted levels.[5]

Title IX of the Act also authorizes the Established Program to Stimulate Competitive Research (EPSCoR) program to broaden support and provide grants for science and engineering research in applied energy, environmental management, and basic science. The EPSCoR program funds research in states and territories with historically lower levels of Federal academic research funding. The FY22 budget request includes $25 million in EPSCoR funding from the Office of Basic Energy Sciences. The request also initiates a new activity, Reaching a New Energy Sciences Workforce (RENEW), for targeted efforts to increase participation and retention of underrepresented groups in research activities. RENEW leverages DOE's national laboratories, user facilities, and other research infrastructure to provide undergraduate and graduate training opportunities for students and academic institutions not currently well represented in the U.S. science and technology ecosystem, including students in EPSCoR jurisdictions. The FY22 budget request includes $30 million for RENEW across DOE programs.

Q3. Please provide a progress report on DOE's coordination with the Environmental Protection Agency relating to implementation of the USE IT Act, enacted in the Consolidated Appropriations Act of 2021.

A3. The Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) have worked collaboratively for many years on research, development, and deployment of carbon capture, utilization, and sequestration (CCUS) technologies, which are critically important to meet the Biden Administration's mission to achieve net-zero emissions economy-wide by 2050. DOE, EPA, and other agencies recently collaborated on the Council on Environmental Quality (CEQ) Report to Congress on Carbon Capture, Utilization, and Sequestration required by the Utilizing Significant Emissions with Innovative Technologies Act (USE IT Act) (CEQ-CCUS-Permitting-Report.pdf (whitehouse.gov)). EPA staff have contacted DOE staff to discuss the report on deep saline formations. EPA plans to coordinate with DOE on the content of the report which

[4] https://www.energy.gov/technologytransitions/lab-partnering-service
[5] Congressional Budget Justification, Volume 2, p 199.

will leverage technical information and reports developed by DOE and the National Energy Technology Laboratory (NETL). DOE plans to work with EPA on future National Academies of Science (NAS) studies focusing on CCUS.

Q4. Please provide an update on DOE's work to replace policies established in the suspended Executive Order "*Securing the United States Bulk-Power System,"* including specific timelines for implementing new policies to strengthen protections against high-risk electric equipment transactions by foreign adversaries.

A4. The Biden Administration is committed to ensuring America's national security and economic prosperity by maintaining a secure electric grid. The bulk-power system is vital to the Nation's energy security, national defense, emergency services, critical infrastructure, and economy.

The 90-day suspension of Executive Order (E.O.) 13920, *Securing the United States Bulk-Power System* per President Biden's Executive Order 13990, *Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Change Crisis* (E.O. 13990), provided the Federal Government the opportunity to reassess current and ongoing efforts to secure our Nation's energy infrastructure, as well as to recalibrate in light of recent events such as the cyberattack on SolarWinds software.

The Administration has crafted and set forth refreshed initiatives to safeguard U.S. critical infrastructure from persistent and sophisticated threats. As one of modern technology's greatest innovations, the complexities of the U.S. electricity system must be managed through multiple, coordinated efforts that reflect a whole of government approach undertaken in collaboration with industry and stakeholders.

The recently issued E.O. 14017, *America's Supply Chains*, directed the Department of Energy (DOE) to identify and make recommendations to address risks in the supply chain for high-capacity batteries, and to review and make recommendations to improve supply chains for the energy sector industrial base. The 12-month report mandated in E.O. 14017 will include a section addressing cyber risks to the supply chains for digital components and data in energy sector systems, including the bulk power system.

The Department emphasized its commitment to the security of the electric grid by launching a 100-day initiative with the Cybersecurity and Infrastructure Security Agency to enhance the cybersecurity of electric utilities' industrial control systems.

Additionally, on April 20, 2021, the Department released a Request for Information (RFI), *Ensuring the Continued Security of United States Critical Electric Infrastructure*, to seek input from electric utilities, energy companies, academia, research laboratories, government agencies, and other stakeholders regarding supply chain security in U.S. energy systems as we examine recommendations per E.O. 13990. The public comment period for the RFI closed on June 7, 2021. DOE simultaneously revoked the December 2020 Prohibition Order to create a stable policy environment while recommendations for a potential replacement of E.O. 13920 are being considered.

DOE is currently working closely with the Office of Management and Budget to prepare recommendations for next steps based on the RFI responses. The Department is committed to ensuring industry expertise and experience are incorporated into a broader, more comprehensive supply chain cybersecurity plan for the U.S. bulk power system.

QUESTIONS FROM THE HONORABLE MICHAEL C. BURGESS (R-TX)

Nuclear Security

Q1. The Department of Energy (DOE) is charged with the critical mission of maintaining and managing our nation's nuclear weapons stockpile. Will you commit to working with this Committee to ensure the DOE can effectively achieve this important mission, including budget management?

A1. Yes, I will work with this Committee to ensure DOE effectively achieves its critical mission of maintaining and managing our nation's nuclear weapons stockpile.

Nord Stream 2

Q2. On May 18th, it was reported that President Biden had decided to lift sanctions on the company currently constructing the Nord Stream 2 pipeline. Are these reports accurate?

A2. In line with President Biden's commitment to rebuild U.S. relations with our European allies and partners, the Secretary of State has determined it is in the U.S. national interest to waive sanctions on Nord Stream 2 AG, its corporate officers, and its CEO.

Q3. In his confirmation hearing, Secretary of State Antony Blinken committed to Congress that he would do everything in his power to see that the pipeline not be completed.

Q3a. Can you explain why the administration is pivoting 180 degrees away from its initial position?

A3a. The Department of Energy defers to the Department of State for clarification on the Secretary of State's Remarks.

Q3b. Were you involved in this decision?

A3b. No.

Q4. Section 1242 of the 2021 National Defense Authorization Act includes a "national interest waiver" for these sanctions. How is allowing the completion of the Nord Stream 2 pipeline in America's national interest?

A4. The Department of Energy defers to the Department of State on this question given this matter falls primarily under their jurisdictional purview.

Energy Infrastructure

Q5. How do you plan to address cyber threats against our nation's energy sector today and in the future?

A5. The Department of Energy's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) is leading efforts focused on addressing the growing landscape of threats to the energy sector, including cyber threats.

Our priorities include strengthening supply chain security of critical energy equipment, ensuring that cybersecurity is built into DOE tools and technologies, building the future energy cyber workforce, and promoting energy security planning at the industry and state, local, tribal, and territorial (SLTT) levels so those communities have the resources they need to prepare for and respond to significant energy disruptions, including from cyber-attacks.

And finally, if an incident does occur, CESER is ready to support the energy sector's efforts to restore the energy system efficiently and effectively. This was evidenced during the Colonial Pipeline incident in May 2021. CESER activated the Department's response team and deployed responders to provide situational awareness, exchange information with state emergency responders and policymakers, and implement Federal authorities with interagency partners to facilitate a safe and secure restoration of critical energy assets across the country.

Q6. You recently stated that "pipes are the best" for transporting various energy products. Under your leadership, will the DOE prioritize quick permitting of interstate pipelines?

A6. The permitting of interstate pipelines is a process led by the Federal Energy Regulatory Commission, an independent regulatory agency. Given their independent status, I am unable to assist in prioritization of projects under their purview.

Energy Efficiency

Q7. Under the previous administration, it was found that 60 percent of the DOE's rules represent about 96 percent of potential energy savings. Is it reasonable to expect the that DOE focuses only on those standards that save the most energy?

A7. DOE is statutorily obligated to periodically review the potential for energy savings for all products under its authority. The Energy Policy and Conservation Act (EPCA), as amended, includes seven factors for determining whether a standard is economically justified based on whether the standard's benefits exceed its burdens. These seven statutory factors include:

- The economic impact of the standard on manufacturers and consumers of the products subject to the standard;
- The savings in operating costs throughout the estimated average life of the covered products in the type (or class) compared to an increase in the price, initial charges, or maintenance expenses for the covered products that are likely to result from the standard;
- The total projected amount of energy (or as applicable, water) savings likely to result directly from the standard;
- Any lessening of the utility or the performance of the covered products likely to result from the standard;
- The impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the standard;
- The need for national energy and water conservation; and
- Other factors the Secretary of Energy (Secretary) considers relevant.

DOE's analysis includes an evaluation of potential costs, benefits, and technological feasibility and there are historical examples where the Department determined that amended standards were not justified or feasible. DOE already has the capacity and obligation to evaluate whether a standard results in significant conservation of energy and is technologically feasible and economically justified. DOE may determine not to amend standards early in the standards setting process if warranted.

In some cases, relatively small energy savings can be achieved at a very small cost and still reduce consumer's energy bills, which is consistent with the Department's statutory mission. Additionally, some appliance standards have a greater impact on improving grid resiliency, which is not necessarily reflected in a total energy savings estimate but is

nevertheless an important goal for the Department.

An evaluation of the total energy savings of previous rules must also include the historical context of the appliance standards program and the implementation of energy conservation standard regulations over time. For some products, the initial rulemaking(s) capture lower-hanging fruit in terms of efficiency improvement and yield much higher savings. However, future rulemakings for the same product may be more incremental in terms of their energy savings benefits as the product moves along its cost-efficiency curve. A significant fraction of the historical energy savings originate from such initial rulemakings for several products. It may not be practical to expect such a large fraction of savings to come from a small number of rules in the future.

DOE has historically welcomed a variety of approaches for establishing new or amended energy conservation standards, including consensus agreements and negotiated rulemakings with direct final rules. Such approaches provided transparency, flexibility, and certainty to all parties involved. The input and collaboration of multiple stakeholders during such consensus and negotiated rulemakings reduced the burden on the Department. In some cases, such negotiations were directly between stakeholders without DOE involvement, the results of which were presented to DOE for codification. As such, not all rulemakings required the same effort on the part of the Department.

Q8. Will you commit that consumer choice will be a priority when creating efficiency standards for appliances, lightbulbs, and other products?

A8. DOE is statutorily obligated to consider product utility and performance-related features in its analyses. EPCA, as amended, includes seven factors for determining whether a new or amended standard is technologically feasible and economically justified, and should be adopted by the Department. One of these statutory factors DOE must consider includes whether any lessening of the utility or the performance of the covered products is likely to result from a potential standard. (42 U.S.C. 6295(o)(2)(B)(i)(IV))

When determining the technological feasibility of energy-efficient technology options, DOE considers whether there might be any adverse impacts on product utility or availability of certain features. If significant adverse impacts are identified with a given technology option, that option is screened out from further analysis, and any potential standard level based on that technology option is eliminated from consideration. Therefore, DOE does not set energy efficiency standards that eliminate certain features from products, preserving consumer choice.

Additionally, EPCA includes a provision for the establishment of separate equipment/product classes and separate standards based on performance-related features (e.g., the type of energy used, capacity, or other important performance-related features). Separate equipment classes maintain consumer choice. In deciding whether a performance-related feature justifies a different standard, DOE must consider such factors as the utility of the feature to the consumer and other factors DOE determines are appropriate. (42 U.S.C. 6295(q)(1)) For example, DOE sets separate energy conservation standards for top-loading clothes washers and front-loading clothes washers, preserving this product choice for consumers. 10 CFR 430.32(g).

Q9. Many energy efficient products take up more time to use or are less effective; with the DOE consider these factors when redefining or creating energy efficiency standards?

A9. As noted in Question 8, DOE is already statutorily obligated to consider whether a potential standard would harm product utility or a performance-related feature. (42 U.S.C. 6295(o)(2)(B)(i)(IV)) Technology options that have a significant negative impact on utility, including reduced effectiveness, are screened out from the analysis.

When determining whether a potential standard level is technologically feasible and economically justified, DOE considers impacts on product utility and might conclude that a potential standard is not justified. For example, in the 2016 Final Rule for consumer dishwashers,[6] DOE noted that there was uncertainty regarding whether products would be able to maintain consumer utility with the potential standard levels under consideration. As a result, DOE concluded that amended energy conservation standards

[6] 81 FR 90072, https://www.regulations.gov/document/EERE-2014-BT-STD-0021-0033.

would not be economically justified and determined not to amend consumer dishwasher energy conservation standards.

QUESTIONS FROM THE HONORABLE ROBERT E. LATTA (R-OH)

Q1. Secretary Granholm, I am proud to have First Solar in my district, the only American-headquartered company among the top 10 largest solar panel manufacturers. First Solar has achieved this success via innovation, R&D, and its dedicated workforce. Their competition, almost exclusively Chinese, rely on Chinese government subsidies, forced labor, and questionable environmental practices to supply cheap panels both in the United States and across the globe.

Q1a. If the country is on a path to a clean energy future, what is the threat to America's energy security as we depend on a manufacturing supply chain from an adversarial country like China that can be hostile to our future?

A1a. America's energy security depends on resilient, diverse, and secure supply chains, which are also crucial for ensuring overall economic prosperity and national security. These manufacturing supply chains include raw materials, processed materials, subcomponents, final products, and end-of-life material recovery or reuse. Reliance on foreign sources for any of these supply chain steps may introduce risk to the entire supply chain, in particular when located in a country that poses a national security risk or has lower environmental or social safeguards than those in the U.S. This risk is evident in the supply of critical minerals and raw materials that are used in technologies necessary for the decarbonization of the U.S. energy system. In 2020, imports made up more than one-half of the U.S. apparent consumption for 46 nonfuel mineral commodities, and the United States was 100% net import reliant for 17 of those. Of the 35 minerals or mineral material groups identified as "critical minerals" published in the Federal Register on May 18, 2018 (83 FR 23295), 14 of the 17 mineral commodities with 100% net import reliance were listed as critical minerals, and 14 additional critical mineral commodities had a net import reliance greater than 50% of apparent consumption. Further downstream in the supply chain, reliance on foreign suppliers for subcomponents and final products in the energy sector introduces the risk of not having the technologies necessary to ensure a sustainable and economically viable low-carbon energy future. Reliance on foreign sources also means that U.S. companies will not be able to benefit from domestic and global market growth, potentially impacting their long-term financial viability.

DOE's FY22 Budget Request supports efforts to reduce risk at all stages of the manufacturing supply chains that are crucial to energy security. The Critical Materials Crosscut supports the elevation, coordination, and augmentation of activities by the Office of Science (SC), Office of Energy Efficiency and Renewable Energy (EERE), and Office of Fossil Energy and Carbon Management (FECM), which fall within the three pillars that ground DOE's strategy for bolstering the critical minerals and materials supply chain: (1) diversify supply in a safe, sustainable, and environmentally just way, (2) develop substitutes and (3) improve reuse and recycling. The Advanced Manufacturing Office focuses on applied research, development, and demonstration (RD&D) in crosscutting, platform technologies to reduce manufacturing energy intensity and carbon emissions within existing manufacturing processes and promote the development and growth of manufacturing in multiple emerging energy fields. AMO actively partners with industry to help ensure that new energy technologies invented in the U.S. ultimately result in the manufacture of products in the U.S. in support of the Administration's priority to deliver an equitable, clean energy future for all Americans. DOE also chairs the Federal Consortium for Advanced Batteries, which released the National Blueprint for Lithium-Ion Batteries in June 2021. This blueprint lays out the vision, goals, and objectives necessary for the United States and its partners to establish a secure battery materials and technology supply chain that supports long-term U.S. economic competitiveness and equitable job creation, enables decarbonization, advances social justice, and meets national security requirements. In FY22, DOE will also complete a comprehensive analysis of supply chains across the energy industrial base sector, as provided by Executive Order (EO) 14017, "America's Supply Chains," issued on Feb 24, 2021.

The rapid deployment of renewables and distributed energy resources onto the power grid presents challenges to energy security, including cybersecurity. From the information technology and operation technology risk management perspective, we need to move from a cybersecurity approach that focuses principally on utility companies to one that includes endpoint device manufacturers and third-party system integrators and incorporates vigorous testing, validation, and certification. For supply chain security, we

need to build robust domestic manufacturing and redundant global supply chains for renewable equipment, such as solar panels and inverters.

Q1b. What is the Biden Administration doing to combat these unfair business practices by Chinese solar manufacturers?

A1b. The Energy Department seeks to improve the competitive position of U.S. solar manufacturers by supporting relevant research and development, including in new materials and technologies where the manufacturing and supply chain is likely to expand domestically, and by funding efforts that aim to reduce barriers to domestic commercial success to reduce reliance on Chinese manufacturers.

Q1c. In your opinion, what is the best strategy to help companies like First Solar not only remain a top 10 global manufacturer but grow and remain competitive?

A1c. Solar power is a tight-margin business where companies need to innovate rapidly to remain competitive. DOE is supporting continued innovation in a portfolio of advanced technologies to support innovation across the U.S. solar industry, including support for technologies and approaches that have the potential to lead to a new, U.S.-based, PV supply chain.

Q1d. How can we assist clean energy manufacturers, up and down the value chain, thrive in the United States?

A1d. DOE Advanced Manufacturing Office (AMO) supports the R&D of technologies that will improve energy productivity and make manufacturing operations more affordable by pioneering new materials, processes, and information technologies. These efforts include reducing risks and vulnerabilities related to industrial uses of critical materials, water, and cyber-physical systems, including an emphasis on sustainable approaches to reuse, recycle, remanufacture and reprocess materials and products. AMO also helps drive wide-scale adoption of these new technologies and energy management practices by supporting voluntary technology partnerships and training to further enhance the value from federal funding. AMO investments save the Nation energy and money while reducing emissions, industrial waste, water usage, and the life cycle energy of manufactured goods. Through AMO's work, the Nation's diverse resources are harnessed

as a strategic advantage, and cutting-edge products can be efficiently, productively, and competitively manufactured here in the United States. To increase domestic sources of critical materials used in solar manufacturing, the Critical Materials Institute (CMI), a DOE Energy Innovation Hub led by Ames Laboratory, in partnership with First Solar is investigating bio-based recovery methods of tellurium from mine wastes. CMI and Rio Tinto are also working together to investigate the recovery of by-products from copper mining, including tellurium. Tellurium is a critical material used in thin-film solar panels. To facilitate recycling of PV modules, the University of Pittsburgh, University of California-Irvine, National Renewable Energy Laboratory (NREL), and First Solar worked on a project to develop a RE-SOLAR design framework that integrates device simulations, life-cycle assessment methods, and techno-economic analysis into a multi-attribute design framework for realizing efficient, green and low-cost solar cells that will enable enhanced recycling.

Q2. On clean energy, I think it is important to note that you cannot have a serious discussion about addressing climate change without including nuclear power. The United States has fallen behind in the competitive development of nuclear energy, and now relies heavily on foreign sources of uranium. In order to avoid threats to our nuclear supply chain, we need to build up our domestic uranium mining, production and conversion. In last year's Omnibus, Congress appropriated $75 million for DOE's Uranium Reserve Program. Earlier this year, I reintroduced H.R. 1351, the Nuclear Prosperity and Security Act, a bill that would authorize the establishment and operation of the uranium reserve.

Q2a. Would you commit to working with us on this legislation to make sure we protect ourselves from any market disruptions and support strategic fuel cycle capabilities in the U.S.?

A2a. The Department will work with Congress on legislation to support strategic fuel cycle capabilities including domestic mining and conversion to and address potential market disruptions.

Q3. Appliance standards are set in a two-step process—a test procedure is established and an energy conservation standard is set. While it seems reasonable to first establish the test procedure and then the conservation standard, it hasn't always worked this way in the past. Sometimes test procedures were not set before working on the conservation standards.

Q3a. Do you agree that it is important for transparency and predictability to understand how to test a product before setting the conservation standard?

A3a. DOE agrees that it is important to understand how to test a product before setting the conservation standard. To allow manufacturers and other stakeholders to better assess the effects of the proposed standard levels, it is DOE's practice to finalize test procedures before the notice of proposed rulemaking (NOPR) on energy conservation standards. In this sequence, DOE identifies any necessary modifications to established test procedures before initiating the standards proposal process. In so doing, DOE considers all stakeholder comments for needed test procedure modifications. DOE believes that preliminary standards-related work and data gathering can commence in concert with the test procedure proceeding, as long as any anticipated test procedure changes are identified and evaluated in time for them to be factored into the energy conservation standards proposal.

QUESTIONS FROM THE HONORABLE DAVID B MCKINLEY (R-WV)

Coal & Natural Gas in U.S. Energy Mix

Q1. Secretary Granholm, you have said that oil, natural gas and coal will still be part of the U.S. energy mix moving forward. In fact at your confirmation hearing you said to Sen. Daines (R-MT) that *"if we're going to get to net zero carbon emission by 2050, we can't do it without coal, oil, gas being part of the mix."*

Coal and natural gas are critical to delivering reliable and resilient electricity to consumers across the country. According to EIA, natural gas and coal generated the bulk of U.S. electricity (59%) in 2020. Advancing technologies such as carbon capture will ensure that we can utilize these fossil energy resources with zero or even NET NEGATIVE carbon emissions.

Q1a. Do you believe that coal should remain part of the U.S. energy mix moving forward?

A1a. Yes, the Department of Energy (DOE) is investing in technologies and approaches and deploying regional initiatives to both forward the deployment of CCUS on existing fossil plants and provide resources and expertise in the transition to a net-zero carbon economy in coal and fossil-based power plant communities. In order to reach 100% clean electricity by 2035 and to achieve a net-zero carbon economy by 2050, Carbon Capture, Utilization and Storage (CCUS) will play a critical role. There is a long history of federal research, development, demonstration, and deployment (RDD&D) investment in technologies to reduce emissions from power plants and industrial sources. Significant progress and past investment, in collaboration with universities, national labs, and the private sector have proven successful in reducing emissions of sulfur dioxide, nitrogen oxide, particulate matter, and mercury. Novel technologies and business models will enable low-cost CCUS to improve the environmental performance of power plants, hydrogen production, and industrial systems across America; support secure, long-term, regional carbon storage; and provide feedstocks for valuable new products. Overall, CCUS has many potential benefits and can be a cost competitive option for managing carbon relative to other low-carbon sources of electricity and products.

Q1b. Do you believe that natural gas should remain part of the U.S. energy mix moving forward?

A1b. Natural gas plays an important role in our energy supply, and the EIA's latest long-term projections in the Reference Case in Annual Energy Outlook 2021 show that natural gas production and consumption are set to increase through 2050. The U.S. has become a major global exporter of liquified natural gas (LNG), with U.S. LNG exports set to increase throughout this decade.

We have seen benefits from the increased use of natural gas from both an energy security and comparative emissions perspective. But these benefits have to be weighed against the long-term cost of natural gas, which is still a fossil fuel that requires its carbon footprint to be carefully managed. DOE is focused on helping assure a leak-tight natural gas supply chain and want to see the U.S. natural gas system as a model of transparency regarding its environmental profile – a profile that we know needs to be improved.

DOE Budget Request

Q2. Secretary Granholm, during your confirmation hearing, you stated that *"if we're going to get to net zero carbon emission by 2050, we can't do it without coal, oil, gas being part of the mix."* However, the Biden administration zeroed out funding for DOE's Coal FIRST program which is critical to developing a near-zero carbon emission coal-fired power plant of the future. Further, the Coal FIRST program is critical to advancing CCUS and hydrogen production technologies and if co-fired with biomass, Coal FIRST would be net-negative carbon emissions.

Q2a. If the administration is committed to lowering carbon emissions around the world and developing a hydrogen economy, why did it propose to stop funding for critical research and development that would develop coal plants that utilize coal for power generation with net-zero and net-negative carbon emissions?

A2a. The Administration is committed to eliminating carbon emissions in the United States and supporting other countries in the deployment of advanced power, hydrogen, and Carbon Capture, Utilization and Storage (CCUS) technologies. The Department of Energy (DOE) plans to invest in technologies, power plant designs, and approaches and deploy regional initiatives to help in the transition to a net-zero carbon economy in coal and fossil-based power plant communities. These approaches, such as co-firing fossil

fuels with sustainably sourced waste biomass, coupled to carbon capture, in addition to mineral and carbon extraction from coal and coal waste, using safe and sustainable technologies, will leverage both regional resources and existing labor forces to achieve a clean energy economy.

Q3. Secretary Granholm, during your confirmation hearing, you stated that *"if we're going to get to net zero carbon emission by 2050, we can't do it without coal, oil, gas being part of the mix."* However, the Biden administration zeroed out funding for DOE's STEP program which would enable the future deployment of efficient, clean, and cost-competitive coal power plants. Started during the Obama administration, STEP also brings great benefits to gas and solar generation. Coal still generates roughly 20 percent of the electricity in the United States.

Q3a. If the Biden administration is committed to reducing carbon emissions at home and around the world, why did it propose to stop funding DOE's R&D efforts to develop an efficient, clean, cost-competitive coal power plant?

A3a. The Supercritical Transformational Electric Power (STEP) program is fully funded via prior year appropriations. STEP focuses on the deployment of efficient, clean, and cost-competitive coal power plants, with completion of the simple cycle demonstration by October 2022. Congress has been apprised of schedule and cost changes to the STEP program and is supportive of the Office of Fossil Energy and Carbon Management (FECM) recommendations and the program is continuing to make progress.

The Department of Energy (DOE) is committed to initiatives that decarbonize the electricity sector by 2035. DOE has been proactive in developing net-zero power technologies based on co-firing fossil fuels sustainably sourced biomass waste with greater than 95% carbon capture coupled to reliable and dedicated storage.

Q4. In DOE's budget request, it proposes to move the Office of Petroleum Reserves to the CESER Office. Has this move already occurred? What was the motivation behind this change?

A4. As reflected in the FY 2022 budget request, the Department of Energy's (DOE) Office of Cybersecurity, Energy Security, and Emergency Response (CESER) will manage all of DOE's emergency response functions and authorities to facilitate energy sector emergency response efforts. This includes moving the Office of Petroleum Reserves

(OPR) from the Office of Fossil Energy and Carbon Management (FECM) to CESER. The change reflects DOE's efforts to streamline and strengthen the Department's emergency response functions and authorities.

The CESER team has the experience and expertise required to manage OPR and utilize its resources when needed. Further, CESER's cybersecurity expertise will be leveraged to strengthen the cyber portfolio of the strategic reserve through efforts such as cyber threat detection technologies and testing of critical components.

The realignment has not yet occurred, but CESER and FECM are working closely to ensure it happens in a coordinated and seamless fashion.

Critical Minerals/EVs

Q5. We must be honest with the American people as to where the raw materials to make electric vehicle and utility scale batteries come from. Critical minerals like cobalt, lithium, copper, manganese and nickel are critical components of these batteries. Unfortunately, the United States is almost 100 percent reliant on foreign sources for these materials.

Critical minerals like cobalt are being mined in places like the Congo by children. They are also being mined in places like China which is well known for exploiting its citizens and forcing them to work without labor protections.

Q5a. The Biden administration and DOE have made environmental justice a priority. Does exploiting children and using forced labor to mine minerals needed for EVs align with the administration's environmental justice goals?

A5a. Exploitation of children does not align with the goals of this Administration. Further, in late June, the Biden-Harris administration issued a Withhold Release Order on U.S. imports of a key solar panel material from a Chinese-based company over forced labor allegations.[7]

[7] FACT SHEET: New U.S. Government Actions on Forced Labor in Xingiang: https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/24/fact-sheet-new-u-s-government-actions-on-forced-labor-in-xinjiang/

Q5b. The U.S. domestic mining industry is among the most heavily regulated industries in the world – promoting safety of its workers and protection of the environment. What is DOE doing to promote a domestic CM/REE mining and processing industry?

A5b. The Department of Energy (DOE) addresses a domestic CM/REE mining and processing industry through the Critical Minerals and Materials Crosscut. DOE supports the elevation, coordination, and augmentation of existing activities, as well as the development of new activities, within the pillars that ground DOE's strategy for bolstering critical minerals and materials supply chains: diversify supply in a safe, sustainable, and environmentally just way, develop substitutes, improve reuse and recycling, systems analysis and Demonstrations. Current DOE investments within the Advanced Research Program Agency-Energy (ARPA-E), Office of Science (SC), Office of Energy Efficiency and Renewable Energy (EERE), Office of Fossil Energy and Carbon Management (FECM), Office of Nuclear Energy (NE) and Office of Technology Transitions (OTT) support these pillars in a variety of areas, from extraction to processing and manufacturing to recycling and reuse.

DOE is committed to RDD&D being conducted throughout the entire supply chain with an aim to bring innovative processes and technologies across all supply chain stages for key technologies, including batteries, rare earth magnets, and catalysts. As such, the FY22 DOE budget request includes funding that will support environmentally sustainable domestic extraction of critical minerals (CM), including rare earth elements (REE), gallium, germanium, cobalt, manganese, zinc, nickel, lithium, tellurium, and other minerals used in the production of batteries, magnets, and other components necessary for clean energy technologies. Additionally, in response to President Biden's Executive Order on America's Supply Chains, DOE recently released its "National Blueprint for Lithium Batteries", which lays out the Agency's plan to have a fully-secure lithium battery supply chain by 2030.

DOE's FECM has begun implementing a strategy that develops the infrastructure needed to enable a domestic critical minerals extraction industry from unconventional and secondary sources, such as coal ash and mine tailings. This strategy builds off successful

small-scale projects that have demonstrated the ability produced CM/REE from such sources. Included in this strategy: 1) Mobile modular facilities to produce high purity, commercial grade REE and other CMs, which will form next stage development to broadly enable extraction of REEs and other CMs through metallization as required for end-users; 2) the Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) Initiative, which is structured to bring together coalitions to assess and inventory regional resources, identify opportunities, address technical and nontechnical challenges, and establish regional Innovation Centers that will catalyze growth through a regional approach; and 3) Transformational technologies for individually-separated, highly-purified CMs/REEs, including reduction to metals and alloying.

Q5c. President Biden's budget calls for electrifying the federal vehicle fleet. Will DOE and the administration commit to ensuring that all components, including the EV batteries, are 100 percent made in the USA using 100 percent domestic sourcing of raw materials?

A5c. DOE's Office of Energy Efficiency and Renewable Energy (EERE) helped develop the June 2021 National Blueprint for Lithium Batteries that lays out a holistic approach focused on the development of a sustainable, domestic supply chain for lithium, cobalt, nickel, and graphite. The blueprint envisions a full value critical materials supply chain, from upstream raw materials production to midstream processing to end-of-life recycling. These efforts will also have the added benefit of supporting domestic production of electric vehicles, further creating and bringing jobs back to the United States.

The Biden Administration recently released the report "Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth" in response to Executive Order 14017, which includes important recommendations regarding the extraction and processing of critical minerals, including the establishment of a federal working group and other stakeholders, to identify potential sites where critical minerals could be sustainably and responsibly produced and processed in the United States while adhering to the highest environmental, labor, community engagement, and sustainability standards.

For battery materials where the United States does not have strong deposits suited for economic extraction, the best pathway to getting a stable material supply in the near term is through allies and trading partners with responsible environmental and labor standards, and in the long-term by capturing and recycling the supply of materials in end-of-life batteries from EVs and storage.

Q6. What impact would an all-electric or even 50 percent vehicle fleet in the U.S. have on stability of the electric grid and cost of electricity?

A6. A DOE-Vehicles Technologies Office (VTO) study focused on sufficient resources in the U.S. bulk power grid to provide the electricity for charging a growing Electric Vehicle (EV) fleet concluded that 2028 resource adequacy is likely to be sufficient for high EV penetration assumptions. Furthermore, EV resource adequacy can be doubled with managed charging strategies. In this same study, the production cost implications due to the additional load varied from 3% to 23% depending on conditions and location, although it also noted that capacity expansion in anticipation of additional load may mitigate a cost increase, particularly, if the additional generation is renewable generation resources.

Q7. With increased renewable penetration that would come with the Biden administration's climate goals, how would increased amounts of intermittent electricity balance with more EV's plugging into the grid?

A7. DOE's Office of Energy Efficiency and Renewable Energy (EERE) and the Office of Electricity (OE) are actively conducting research programs such as the Grid Modernization Laboratory Consortium and Energy Storage Grand Challenge that are seeking to address how a grid with increased amounts of renewable generation can provide a reliable and resilient power grid. While meeting the changing needs of a fully electrified transportation sector would require an increase in the generation and transmission of electricity, electric vehicles are also a potential grid asset that can improve overall grid efficiencies, resilience, and reliability. Therefore DOE is also continuing to conduct RD&D on advanced Smart Charge Management technologies, integration of distributed energy resources into high power charging facility architectures, and bi-directional power flow technologies. These technologies will allow electric

vehicles and their supporting charging infrastructure to provide some grid services, depending on the time of day and season, complementing large-scale or grid-scale energy storage capabilities with the capacity and duration to provide instantaneous voltage support, frequency regulation, black start capabilities, and emergency power. Coupling these capabilities with the advanced sensing and control methodologies being developed and deployed for the evolving smart grid will provide benefits to consumers, charging network operators, grid services aggregators, and grid operators.

Q8. If peak demand for charging EVs is at night, how would the grid support this additional demand with increased intermittent sources of electricity?

A8. As stated above, DOE is working to address challenges associated with future grid scenarios, including increased renewable generation and additional load from EVs.

Price of Electricity

Q9. According to EIA, the price of electricity in the US has slightly increased in recent years, even as we have had more renewables on the grid. (https://www.eia.gov/todayinenergy/detail.php?id=46276)

Q9a. The administration claims that more renewables on the grid will lower electricity rates for consumers. Would DOE please provide an analysis to support the administration's claim?

A9a. Average electricity retail rates in real dollars have remained relatively steady for the past decade. Residential rates in real dollars according to EIA's Short Term Energy Outlook[8] have fallen by nearly 4% from 2010 to 2020.

Retail electricity rates are driven by several factors like capital expenditures, electricity demand, and fuel and purchased power costs. For instance, the tripling of electric sector capital expenditures from 2000-2015, mostly for transmission and distribution expenditures along with slow growth in electricity demand put upward pressure on rates

[8] https://www.eia.gov/outlooks/steo/realprices/

which were balanced by downward pressure from declines in fuel and purchased power costs.[9]

Going forward, preliminary LBNL analysis of more recent FERC Form 1 data indicates that factors including capital expenditures and lack of load growth will tend to drive retail electricity rates more than fuel and purchased power costs.

Capital expenditures and flat load levels are driving electricity rates more than fuel and power costs. Fuel and power costs are declining primarily due to natural gas. Therefore low-cost renewables play an important role.

Q9b. Can you provide some real-world examples of higher renewable penetrations resulting in lower electricity rates and overall lower electricity bills?

A9b. Examples of utilities with high renewables and declining rates (in nominal dollars)

- Kaua'i Island Utility Cooperative: 67% renewable power in 2020 up from 8% in 2010[10]. (36 cents/kWh to 34 cents/kWh 2010-2019 based on EIA-861 data)
- Kodiak Electric Association: 99% renewable since 2014 whereas in 2007 20% of power was from diesel generators[11] (17 cents/kWh to 16 cents/kWh 2010-2019 based on EIA-861 data)

Renewable purchases by utilities have led to lower rates.[12,13]

- "These contracts [three wind power contracts totaling ~600 MW] were based on extraordinary pricing opportunities that will provide substantial savings for our customers." – Public Service Company of Oklahoma, 2014
- "The expansion [1,050 MW of new wind capacity] is planned to be built at no net cost to the company's customers and will help stabilize electric rates over the long term by providing a rate reduction totaling $10 million per year by

[9] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf
[10] https://website.kiuc.coop/renewables
[11] https://www.ktoo.org/2017/09/15/kodiak-almost-100-percent-renewable-power-took-sci-fi-tech-get/
[14] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf
[14] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf

2017, commencing with a $3.3 million reduction in 2015." – MidAmerican Energy, 2013[14]

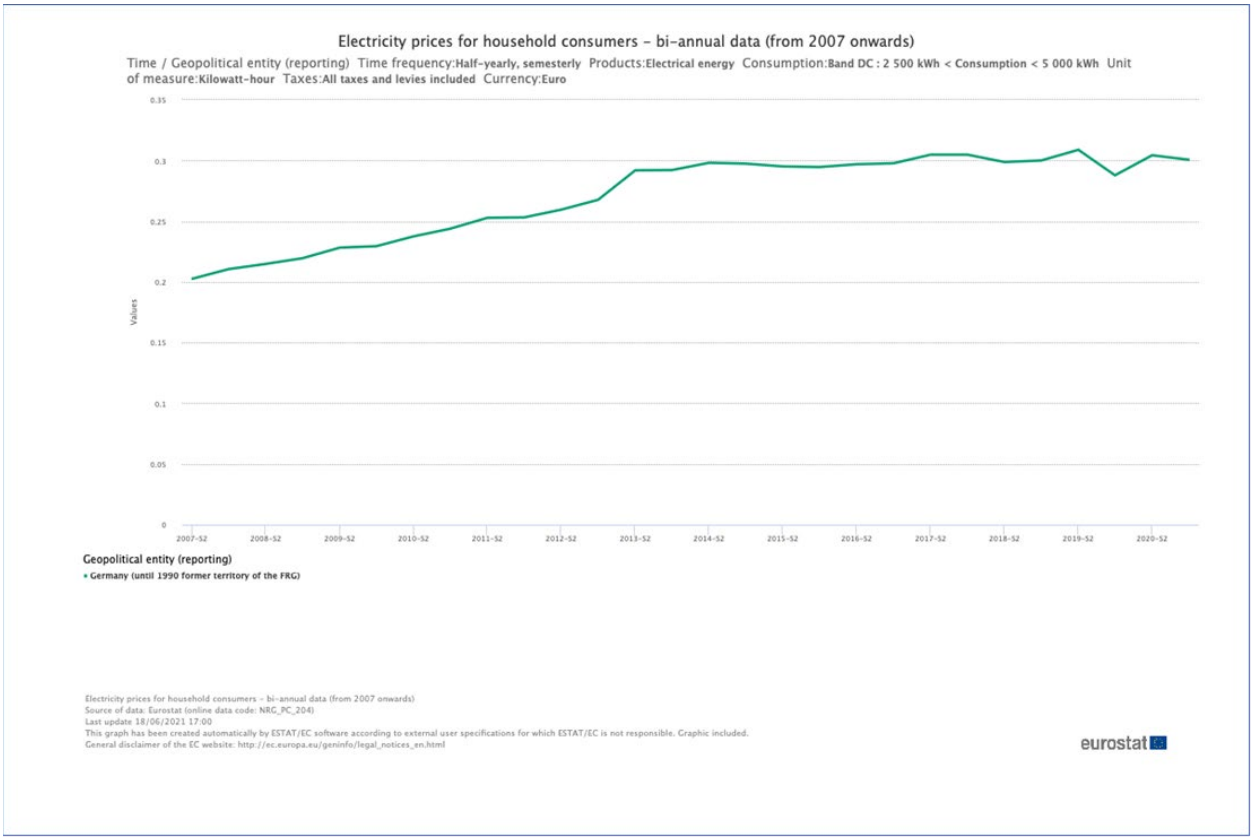
- "The delivered price of energy from the wind facility is expected to be below the Company's projected avoided costs…with the resulting energy savings flowing directly to the Company's customers." – Alabama Public Service Commission describing Alabama Power's wind power purchase, 2011[15]
- "The contract will save ratepayers $100 million on a net-present-value basis over its 25-year term under a base-case natural gas price scenario." – Colorado Public Utilities Commission describing Xcel Energy's wind power purchase, 2011[16]
- "[Wind energy power purchase agreements] decrease our exposure to natural gas, provide a hedge against any future global warming legislation, and help us give our customers lower, more stable prices." – Empire District Electric Company, 2008[17]
- "Xcel Energy regards wind as a hedge against potentially volatile gas prices," Xcel Energy CEO Ben Fowke said. "And even with today's low natural gas prices, we are able to procure or build wind that is equal to or below what we could buy a 10- to 20-year strip of natural gas for."[18]

Q9c. What has happened to Germany's electricity rates as their renewable generation has increased over the last 20 years?

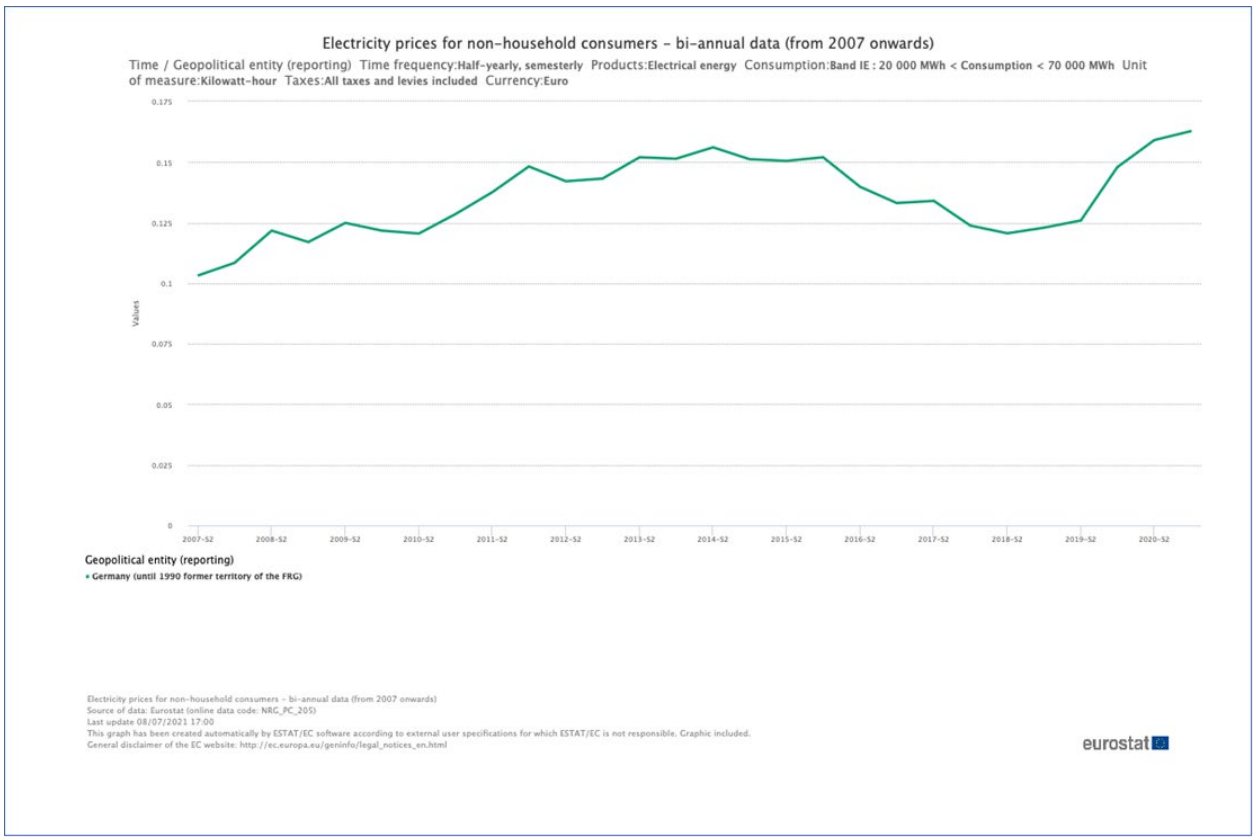
A9c. Germany's share of renewable electricity by generation has reached nearly 50%. Electricity rates have flattened in recent years as the costs of procuring renewable electricity have become cheaper.[19] In real terms, after inflation, German household

[14] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf
[15] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf
[16] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf
[17] https://eta-publications.lbl.gov/sites/default/files/lbnl-1007261.pdf
[18] https://cleangridalliance.org/blog/74/what-midwestern-electric-utilities-are-saying-about-clean-energy
[19] https://ec.europa.eu/eurostat/databrowser/view/NRG_PC_204__custom_1133951/default/line?lang=en

electricity rates have likely declined in recent years since the German consumer price index has been steadily rising.[20]



[20]https://www.destatis.de/EN/Press/2021/07/PE21_334_611.html;jsessionid=96965A02D90AE5D4E2641637E6C63DBE.live732



Office of Fossil Energy

Q10. A recent press release highlighting Dr. Shuchi Talati's participation in a Global CCS Institute webinar lists Dr. Talati's title as Chief of Staff in the Office of Fossil Energy and Carbon Management.

Q10a. Did DOE change the name of the Office of Fossil Energy to the Office of Fossil Energy and Carbon Management?

A10a. Yes, the former Office of Fossil Energy is now the Office of Fossil Energy and Carbon Management.

Q10b. If so, when did that name change become official?

A10b. The name change became official on July 4, 2021.

Q10c. Would you provide any and all documentation on this name change?

A10c. Yes, attached is the documentation for the name change.

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Coal-to-Products

Q11. At a recent meeting of the National Coal Council, Jennifer Wilcox from the Office of Fossil Energy and Carbon Management, stated that the office would "Absolutely not" pursue research and development into coal to products – specifically using "newly mined carbon ore."

Q11a. What is the difference in cost between using coal waste and using raw coal, newly mined carbon ore, to make products? Please submit a cost analysis of the two.

A11a. Currently, mined coals could be a potential feedstock if the environmental, social, and safety criteria were fully evaluated ensuring that using these coals to make products is truly beneficial. The difference between using coal waste verses using raw coal is strongly dependent on the type and value of the final product, coal rank (type) from either refuse piles or newly mined sources, and the variability in composition of waste piles, which are currently poorly characterized. Broadly speaking, freshly mined coal provides a clean and easy-to-process feedstock. It is relatively homogenous and existing mining techniques are available to improve the quality and homogeneity prior to upcycling the carbon. This ultimately reduces the processing cost. The cost of mining fresh coal varies by region, but costs are as low as $4-5/ton for sub-bituminous coal.

Refuse piles on the other hand can vary in quality, consistency, and composition, making it harder to separate the carbon portion of the coal for upcycling. The quality of these materials varies and is dependent factors such as the period in history when the coal was mined, the mining method (longwall, room and pillar, surface, etc.) and whether it was processed in a preparation plant. Coal wastes from different periods and types are sometimes mixed in the same refuse pile, making those piles very heterogenous. However, the cost to "remine" refuse piles can be lower or comparable than fresh mining operations since it is typically disposed of close to the surface. The cost of reclaiming waste coal in Pennsylvania is reported to be in the $5 to $8 per ton range, and additional costs may be incurred to fully remediate the land.

However, there is also an inherent value in remediating coal waste piles that has not yet been incorporated into these cost comparisons. The Department of Energy (DOE) is currently determining the valuation of remediation, but these analyses are not yet complete. These values also do not yet take into consideration that waste composition is variable.

Q11b. Will DOE pursue the successes of the previous administration by promoting R&D into coal-to-products using newly mined coal?

A11b. The Minerals Sustainability Division (MSD) within the Office of Fossil Energy and Carbon Management (FECM) has been committed to funding research for development of existing and new technologies to enable domestic manufacturing of carbon products through its Carbon Ore Processing Program. These include the use carbon ore for the production of graphite needed for the projected increase in demand for batteries for electronic vehicles (EV), and coal-derived quantum dots to be used in solar cells for clean energy production and photo catalysis for clean air and health protection. The predominant focus is to use coal refuse and waste from legacy and abandoned mine land, as production of carbon products from coal waste has the potential to create a mineral processing workforce while removing environmentally adverse materials that might disproportionately harm residents of fossil fuel communities. However, both thermal and metallurgical coal are currently mined to support the U.S. energy and steel industries. Therefore, through concurrent operations, such newly mined coal could also source the carbon ore required for the production of carbon products for the advanced technologies supported by FECM and the MSD.

Q11c. Will DOE specifically exclude “newly mined carbon ore” from its current coal-to-products research and development program? If so, why?

A11c. No, DOE does not exclude newly mined coal from its current coal-to-products research and development program assuming that an evaluation of the environmental, social, and safety criteria show a net benefit in using coal to make products. The FECM MSD Carbon Ore Processing Program is committed to furthering efforts for the development of existing and new technologies and identifying projected markets for everyday and high

value carbon products generated predominantly from coal waste and refuse. Newly mined carbon ore that is associated with coal mines currently in operation where extraction is in support of other industrial activities may be an additional source for the production of carbon ore products toward this goal.

LNG Exports

Q12. According to a report released by the National Energy Technology Laboratory, Russian natural gas exported to Europe has a lifecycle greenhouse gas emissions profile that's 41% higher than U.S. LNG exported to Europe. Global demand for natural gas is expected to increase by 40% or more by 2050.

Q12a. What specific actions is DOE doing to promote U.S. LNG exports?

A12a. The Department of Energy (DOE)/National Energy Technology Laboratory (NETL) Study, Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States: 2019 Update compared the lifecycle emission of U.S. liquified natural gas (LNG) against other sources of LNG and natural gas as well as regional coal in importing markets around the world. The study concluded the global warming potential (greenhouse gas (GHG) emissions) on a 20-year timeframe are estimated to be 29% higher for Russian natural gas exported to Europe via pipeline than U.S. LNG exported to Europe and that using regional coal resources could contribute as much as 41% higher GHG emissions than utilizing U.S. LNG exported to Europe for reliable baseload power production. Overall, the study concluded that the use of U.S. LNG exports for power production in European and Asian markets will not increase GHG emissions from a life cycle perspective, when compared to regional coal extraction and consumption for power production.

DOE leadership has consistently raised the global energy security benefits of U.S. LNG, as well as its comparative emissions benefits in displacing higher emitting fuels. But those benefits must be balanced against the need to carefully manage the greenhouse gas emissions associated with LNG as the U.S. and other countries move toward a net zero future. The ultimate success of U.S. LNG exports, though, will be based on how well it can compete on the global market, both from a cost and environmental performance perspective.

Q13. West Virginians have benefitted from the safe extraction of clean natural gas. By allowing West Virginia's natural gas to be sold around the world, we can ensure a growing market and continued job growth for our state. Further, increased use of U.S. natural gas around the world is critical to lowering global CO2 emissions.

In the previous administration, DOE's Office of Regulation, Analysis and Engagement in the Office of Oil and Gas did great work to ensure that LNG export authorizations were processed in a timely manner.

Q13a. Does DOE have any pending applications for LNG export authorizations?

A13a. Since January 20, 2021, the Office of Regulation, Analysis, and Engagement in the Department of Energy's (DOE) Office of Fossil Energy and Carbon Management (FECM) has concluded review of five applications submitted under Section 3(c) of the Natural Gas Act (NGA) for long-term authorization of liquified natural gas (LNG) exports to countries with which the United States has a free trade agreement (FTA). DOE's process for reviewing applications to export LNG to non-free trade agreement (non-FTA) countries under Section 3(a) of the NGA remains unchanged where DOE acts as a cooperating agency to the Federal Energy Regulatory Commission (FERC) in the LNG terminal siting, construction, and operation review under the National Environmental Policy Act (NEPA), and then takes final action after the FERC process concludes. At present, DOE is reviewing two non-FTA applications for additional volume from existing projects that have concluded their FERC review, and two applications from projects in Mexico. There are also five active non-FTA applications still undergoing FERC review.

Since January 20, 2021, DOE has also reviewed and approved one application submitted under the rule for small scale natural gas exports to non-FTA counties.

Q13b. If so, will these LNG export authorizations be processed in a timely manner consistent with the previous administration? This is critical to giving the LNG export industry regulatory certainty.

A13b. Pending LNG export applications, submitted under Section 3(a) of the NGA, are subject to the process outline in the prior answer, and also subject to review under Executive

Order 14008, Tacking the Climate Crisis at Home and Abroad, that requires federal permitting decisions to consider the effects of greenhouse gas emissions and climate change.

Coal FIRST

Q14. DOE's Coal FIRST Initiative supports the development of 21st century electricity and hydrogen energy plants that have net-zero carbon or even net-negative carbon emissions. These plants will be fueled by coal, natural gas, biomass, and waste plastics and incorporate carbon capture, utilization and storage (CCUS) technologies. The Coal FIRST Initiative also recognizes the importance of hydrogen production from coal, biomass, and waste plastics. A hydrogen economy is gaining global attention as part of a technology-based approach for reducing global carbon emissions.

Q14a. Why hasn't DOE been more aggressive to promote the Coal FIRST technology solutions to lower global CO2 emissions?

A14a. The Department of Energy (DOE) continues to support technology solutions to reach 100% clean electricity by 2035. Several technology approaches under the 21st Century Power Plants Initiative are developing power generation technologies that will be highly efficient with fuel flexibility to achieve net zero carbon dioxide emissions. Such a plant would be modular in design, economically competitive, and provide grid stability. The plant will produce both power and hydrogen while achieving net negative carbon emission by utilizing regionally-sourced sustainable biomass waste from farms and forests as well as by reclaiming waste coal mines residues.

Q14b. Does this administration plan to continue the Trump administration's Coal FIRST research and development program?

A14b. The current administration is committed to supporting technologies and design studies to support advanced power systems that help achieve net-zero carbon emissions.

NETL R&D

Q15. Can you please provide an update on how the COVID-19 pandemic has affected NETL's R&D operations? And how and when NETL plans to return employees to work?

A15. The COVID-19 pandemic has delayed research and development (R&D) through the limited on-site operations and maximizing telework when only time critical on-site operations were permitted, including some construction projects. However, during maximum telework, on-site critical work has been permitted on a case-by-case basis and the National Energy Technology Laboratory (NETL) had been successful meeting the R&D mission and meeting critical milestones. In full alignment with DOE's re-entry plan, NETL plans to return employees to the workplace in accordance with that re-entry plan. Currently, NETL's Return to the Workplace plan is in alignment with DOE's Workplace Safety Plan, which limits on-site presence to 25% based upon building occupancy and to on-site mission critical work.

Q16. What can Congress do to ensure that NETL has the tools it needs to advance and lower the price carbon capture, utilization and storage (CCUS) technology?

A16. Congress can continue to support foundational laboratory capabilities (people and facilities) in Geological & Environmental Systems (GES), Materials Engineering & Manufacturing (MEM), Energy Conversion Engineering (ECE), Computational Science & Engineering (CSE) and Strategic Systems Analysis & Engineering (SSAE) which will allow the National Energy Technology Laboratory (NETL) to accelerate the development and maturation of technologies contributing to carbon capture, utilization and storage (CCUS) activities for the power and industrial sectors.

Specifically, current, and future support for high performance computing, NETL's proposed Direct Air Capture (DAC) Center, and Center for Sustainable Fuels and Chemicals will allow for impactful solutions to combat climate change.

Q17. When it comes to R&D into direct air capture (DAC), how much of this R&D is dependent on advances in CCUS technology?

A17. Direct air capture (DAC) research and development (R&D) is not necessarily dependent upon carbon capture, utilization, and storage (CCUS) technology, but it can leverage its development. For example, some materials such as solid sorbents that are developed in the carbon capture program may have potential for DAC applications. However, operating conditions and process designs will be different for point sources versus

atmospheric capture of carbon dioxide (CO_2), thus requiring application specific development. DAC technologies will also need to find a way to either use or store the CO_2. Once the CO_2 is captured, DAC technologies can take advantage of R&D conducted in the utilization and storage programs, similar to point source CO_2 capture, to either convert the CO_2 into products that durably store it, or outright store the CO_2 in geologic formations. Additionally, DAC R&D can leverage other capabilities such as high-performance computing, advanced manufacturing, and test facilities such as the National Carbon Capture Center (NCCC) to advance its development and performance.

Q18. Can you please provide an update on the R&D that is happening at NETL that would ensure a domestic supply chain of critical minerals/rare earth elements from coal, coal waste and acid mine drainage? Has DOE/NETL consulted with the Department of Defense on this effort to support a domestic supply chain of CM/REEs?

A18. Work performed by and funded through the National Energy Technology Laboratory (NETL) is part of a larger Department of Energy (DOE) approach on critical mineral (CM) supply chains with research, development, demonstration, and deployment (RDD&D) through the Critical Minerals and Materials (CMM) crosscut. DOE's strategy is to address challenges and opportunities throughout the entire supply chain. The Office of Fossil Energy and Carbon Management (FECM) is the DOE Office that focuses on critical minerals and rare earth elements (CM/REE) from coal, coal waste, and acid mine drainage. NETL is helping to implement FECM's CM/REE strategy, which includes assessment of the potential coal-related resources in regions throughout the country, the development of transformational beneficiation technologies, and instigation of CM/REE pilot facilities.

More specifically, FECM and NETL are working together to address supply chains, in part, through Funding Opportunity Announcement (FOA) DE-FOA-0002404, Advanced Processing of Rare Earth Elements and Critical Minerals for Industrial and Manufacturing Applications, which seeks research and development (R&D) projects that will focus on innovative midstream processing technologies for the purification, recovery, individual separation and reduction to metals of high purity REEs and other CM from coal, coal by-products or alternate non-coal-based feedstock materials. The

innovative midstream separation, purification and reduction to metal processes are required to be environmentally benign and sustainable and have the potential for reduced capital costs and operating expenses in comparison to commercially available processes.

NETL has also been working on expanding an embedded database to include CMs and expected supply chains, as well as REEs from coal regions and coal wastes.

In addition to RDD&D being conducted at DOE/NETL and the greater DOE CMM Crosscut, DOE is collaborating with other Federal agencies as a "whole government approach" to ensure a stable, long-term supply of CM. DOE is one of many Federal agencies working together collectively to quickly assess the quantity amount of critical mineral resources available domestically within our country.

DOE and the Department of Defense (DoD) are both contributing to the National Science & Technology Council (NTSC) Critical Minerals Subcommittee (CMS). NSTC CMS has membership of more than a dozen agencies with a purpose to:

- Ensure the U.S. has access to mineral resources needed for scientific, technological, economic, or military applications.
- Review, analyze, and develop policies, procedures, and plans that affect the supply of critical and strategic minerals; assess implications for the mineral supply chain; and evaluate potential strategies for risk mitigation.
- Implement and update the methodology developed by the subcommittee for assessing potential mineral criticality using the newest available data.

Aside from the NSTC, DOE-FECM and NETL have been in contact with the DoD on the effort to grow secure, diverse, and resilient supply chains for critical minerals and rare earth elements. DOE and DoD have been actively engaging stakeholders through industrial workshops, providing subject matter experts (SME) for proposal evaluations, providing technical comments on other funding opportunities, and sharing market analyses. Outreach efforts include multiple discussions with the Defense Advanced Research Projects Agency (DARPA) and the Air Force Research Laboratory (AFRL). DOE and DoD have been and will continue to keep each agency informed on technology

advancements through Annual Project Review Meetings and addition briefing opportunities with the DoD's Defense Logistics Agency (DLA) concerning critical needs for components as batteries and synthetic graphite, though these conversations are still at the early stages.

Q19. In January, NETL's project at WVU's Water Research Institute to extract REEs from coal resources exceeded its REE extraction and purity goals. Can you please provide an update on this project?

A19. In 2016, the West Virginia Water Research Institute (WVWRI) at West Virginia University (WVU) began research, which led to the commissioning of a bench-scale/ pilot plant on the WVU's campus to recover rare earth elements (REE) and other critical minerals (CM) from acid mine drainage (AMD) from coal-based sources in the Appalachian Basins. In 2020, WVWRI's effort was extended to additionally co-produce CM. The bench-scale/ pilot demonstrated that nearly 100% of the REE content within AMD could be extracted, and as demonstrated to date, with production of a high-grade (over 90% purity) mixed rare earth oxide (MREO) concentrate product results. The bench-scale/ pilot also provided the information needed to design a flowsheet for a continuous REE recovery process and resulted in the issuance of one U.S. patent and one active provisional patent. Based on the lessons learned from the bench-scale/ pilot, WVWRI is partnering with the West Virginia Department of Environmental Protection's (WVDEP) Office of Special Reclamation to design and build a larger, field-scale pilot plant at an AMD treatment plant near Mount Storm, WV. The U.S. Department of Energy provided $5 million in federal funding for the field-scale pilot, which is expected to be commissioned in the fall of 2021. The new pilot plant plans to produce one ton per year of REE, plus one ton per year each of cobalt (Co) and nickel (Ni) are planned to be produced. If economically feasible, the plant may also produce 27 tons per year of manganese (Mn). Among the rare earth elements expected to be extracted are neodymium (Nd) and praseodymium (Pr), which are both used in the production of extremely powerful magnets. Cobalt is used in the production of batteries, as well as in the production of samarium-cobalt (SmCo) magnets which have higher temperature ratings and higher coercivity in comparison to NdPr magnet materials. Mn and Ni are used to produce steel and high-performance alloys. WVWRI is currently addressing

further refining their AMD-produced, high purity, MREO concentrates to high purity individual or binary rare earth metals (REM). Technology developed by WVWRI for remediating AMD from coal-based sources is considered transferable to other mine drainage sites as the platinum, gold, silver, and potentially copper mines in the Western U.S. If successful, the WVWRI pilot plant will advance the United States toward developing a secure domestic supply chain for the REEs and other CM that are needed to manufacture high-tech consumer devices, as well as advanced products for renewable energy, medical and defense applications.

Q20. What is NETL's vision for the future of coal for use in power generation and the impact of commercialized CCUS technologies on the use of coal for power generation?

A20. DOE-FECM (including NETL) focuses on the research, development, and demonstration of CCUS. DOE-FECM has contributed to the successful demonstration of CCUS on coal at the Petra Nova facility in Texas through the Clean Coal Power Initiative. This administration additionally supports the Section 45Q tax credit and its expansion for industry to use in efforts to deploy CCUS.

NETL Infrastructure – Appropriations - Joule

Q21. Recently, my office submitted a letter to the House Appropriations Committee asking to include $50 million for NETL's infrastructure in the Energy and Water Development Appropriations report for FY22. Specifically, the letter stated:

NETL Infrastructure – the agreement provides $50,000,000 for NETL Infrastructure, and the Department is director to prioritize funds for Joule, the design and construction of a sensitive compartmented information facility, the Computational Science and Engineering Center, site-wide upgrades for safety, and addressing and avoiding deferred maintenance.

Q21a. What are the consequences if Congress does not appropriate this additional funding?

A21a. The FY 2021 Enacted appropriation level for NETL Infrastructure is $55 million. This funding supports the fixed costs of NETL's laboratory footprint in three geographic locations: Morgantown, WV; Pittsburgh, PA; and Albany, OR. Among its priorities, NETL utilizes these funds to maintain the lease of its high-performance computer, Joule.

With FY 2021 funds, NETL entered into a contract for the construction of a Computational Science and Engineering (CSE) Center, a new building at the Morgantown, WV campus that includes a Visualization Center, collaboration space including three 10-to-20-person meeting rooms, office space for 50 computational researchers and computer technicians, and a server hall to house future generations of Joule (NETL's high-performance computer) and NETL's enterprise computing servers and related equipment. Additionally, this funding was utilized for projects to reduce NETL's deferred maintenance on infrastructure. For example, upgrades were funded for electrical substations, aging water lines and numerous research laboratories and other buildings. This funding also provides NETL with full security services at its three sites and in FY 2021 was also used for the construction of a new security building in Morgantown, WV.

The FY 2022 President's Budget Request includes $78 million for the NETL Infrastructure line. In addition to the priorities described above, the FY 2022 Request also includes $25 million for the design and construction of a Direct Air Capture (DAC) Center to be located at NETL. This DAC Center will be utilized to lead agency-wide research, development, demonstration, and deployment (RDD&D) projects to advance the development and commercialization of technologies to remove carbon from the air on a significant scale. Research focus will be on process design, including modeling, analytics, and simulation, with an emphasis on modular design and materials manufacturability. The DAC Center will accelerate the development and deployment of DAC technologies by offering a research facility for prototyping and qualifying DAC technologies. The FY 2022 Budget also requested funding for information technology (IT) development, modernization, and enhancement (DME) investment.

If Congress does not appropriate adequate funding for NETL Infrastructure, the impact to NETL's research, and the Office of Fossil Energy and Carbon Management's mission, would be significant. NETL's supercomputing capability enables researchers to simulate phenomena that are difficult or even impossible to otherwise measure and observe and reduces the cost and time of technology development at every stage by speeding up the discovery of new materials, increasing the reliability and performance of novel devices,

and reducing the risk inherent in scaling-up processes. NETL utilizes Joule in more than 60 percent of its research and demand for time on the supercomputer is greater than its capacity. Investments in high-performance computing and a modern visualization capability are essential to maintaining computational science capabilities that are integral to the overall success of NETL initiatives.

Not being able to fund the DAC Center would also impact universities, research institutions and U.S. businesses developing DAC technologies. Typically, these institutions would not have the resources or experience to construct, operate, and comprehensively analyze the results of DAC tests at this scale on their own. Furthermore, not being able to fund the DAC facility would restrict the DOE and other agencies' mission of reducing/controlling greenhouse gas emissions by removing a key steppingstone between bench scale and commercial scale technology development.

Inadequate funding for NETL Infrastructure could also increase risks around cyber security and ultimately physical safety of the NETL campuses.

Q21b. What is the current status of NETL's supercomputer and what is NETL's plan for moving forward for the supercomputer?

A21b. The current Joule 2.0 lease expires November 30, 2021. NETL has an option to unilaterally extend this lease for 12 months and is also negotiating with the lessor for a 24-month extension option. NETL has begun developing the requirements for the planned procurement of Joule 3.0. Given the anticipated timing of construction of NETL's Computational Science and Engineering Center (CSEC), which will house Joule 3.0, NETL expects to exercise a lease extension on Joule 2.0 such that the CSEC data hall will be ready to accept delivery of Joule 3.0. Staging the Joule 3.0 procurement in this manner will avoid down time in transitioning from Joule 2.0 to Joule 3.0 and will enable research to continue uninterrupted.

NETL SCIF

Q22. The continuity of operations for DOE and the continuity of government is critical during times of crisis.

Q22a. What is the status and schedule for completion of the SCIF at NETL's Morgantown site?

A22a. The completion of the sensitive compartmented information facility (SCIF) at the National Energy Technology Laboratory is currently estimated to be March 2022. Delays are mainly due to the challenging supply chain delays for major pieces of equipment, which have all been on order with anticipated receipt of major components in December. Of note, several major phases of construction are completed, including installation of shielded doors and a perimeter wall. Next steps include completing the interior buildout of the offices, telecom room, and conference room.

NETL Campuses/Locations

Q23. Does DOE have any plans to consolidate or close any of NETL's locations and campuses?

A23. No, DOE does not have any plans to consolidate nor close any of NETL's locations and campuses. The strategic facilities plan for NETL includes continued upgrades and maintenance projects related to the 3 campuses and the strategic staffing plan includes onboarding and recruiting staff across all 3 campuses.

White House Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization

Q24. NETL Director Dr. Brian Anderson and his team are doing great work advancing research and development on fossil energy. As you know, NETL Director Dr. Anderson was recently appointed executive director of the White House Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization. In addition to starting this group, the administration announced $109.5 million for research projects designed to revive economies, remediate environmental issues and support energy workers in communities ravaged by shutdowns of coal mines and coal-fired power plants.

Q24a. Can you assure me that this $109.5 million will not come from already appropriated dollars directed at fossil energy research and development?

A24a. In FY 21, the Interagency Working Group on Coal and Power Plant Communities is leveraging existing funding authorities and appropriations across the full IWG member

agencies. This includes working with the existing DOE appropriations. Among existing appropriations in FY21, the IWG identified a number of current funding opportunities that have the potential to have economic revitalization impacts in impacted coal and power plant communities. These include some of the Fossil Energy R&D appropriations. Specifically, regarding the $109.5M announced in April, Fossil Energy Research & Development funding will be used for $79.5M, including $60M for engineering designs to install carbon capture and storage technology for power and industrial plants. Additionally, $19.5M are being used to fund awards for critical mineral extraction from coal and associated waste streams.

Q25. The White House Interagency Working Group's initial report to the President on empowering workers through revitalizing energy communities states that DOE will "immediately begin accepting applications for $75 million in available funding to develop customized engineering designs to install carbon capture and storage (CCS) technology for power plants and industrial facilities."

Q25a. Are fossil energy plants including coal, natural gas and other hydrocarbons eligible to apply for the $75 million in available funding?

A25a. This funding opportunity announcement (FOA) includes eligibility for technologies and front-end engineering design (FEED) studies that apply carbon capture and storage to natural gas power plants and industrial sources. The FOA included three areas of interest (AOI):

- AOI-1. Carbon Capture Research and Development: Bench-Scale Testing of Highly Efficient Components and Processes for Natural Gas Combined Cycle (NGCC) Plants
- AOI-2. Engineering-Scale Testing of Transformational Post-Combustion Carbon Capture Technologies for Industrial Carbon Capture. This AOI focuses primarily on the process emissions from industrial systems.
- AOI-3. Front-End Engineering Design (FEED) Studies for Carbon Capture Systems for Industrial and Natural Gas Systems. The FEED studies for industrial systems include both process emissions and combustion emissions that result from fossil fuels or other carbon-containing feedstocks.

Further, this FOA is aligned with and responsive to FY 2021 appropriations direction.

Q26. The White House Interagency Working Group's initial report to the President on empowering workers through revitalizing energy communities calls on DOE to Immediately stand-up an interim staffing team within the department to manage the day-to-day activities of the working group.

Q26a. Who is on this team?

A26a. NETL has drawn upon federal and contactor resources at the lab to populate the staffing of the day-to-day activities. These activities are augmented by engaging senior staff at 11 federal agencies, including DOE and the White House, to bring a coordinated approach to the IWG mission.

Q26b. Who will this team report to and in what office?

A26b. This team reports directly to Dr. Brian Anderson. The IWG team, through Executive Director Anderson, reports to the Secretary of Energy and the IWG Co-Chairs Brian Deese and Gina McCarthy.

Q26c. Is this a new team hired by DOE or will existing employees be taking on additional responsibilities?

A26c. Most team members will be reassigned from other positions at NETL. There may be additional hiring of staff depending on the requirements and personnel availability.

Q26d. If new staff is being hired, where are the funds coming from?

A26d. To this point, NETL has funded the activities of the Interagency Working Group from its NETL Research and Operations budget line. It has been an expedient manner to enable the Working Group to begin working immediately on its critical mission while the Department identifies the ultimate source of funding for this activity.

Justice40

Q27. On April 30, 2021, Shalanda Baker, Deputy Director for Energy Justice, released a departmental memo outlining DOE's new Justice40 online dashboard and its implementation.

Q27a. Would you please provide a copy of this memo?

A27a. Attached please find the referenced memorandum. Please note that since the release of this memorandum, the Justice40 Dashboard has been renamed the "Energy Justice Dashboard (BETA)."

Justice40 Dashboard Memo 043021.pdf

Q27b. How much money did DOE spend on developing and implementing this dashboard? Where did the funds come from – out of what account?

A27b. ED spent $233,000 building out the Energy Justice Dashboard (BETA) and maintenance of the system for 6 months. The $233,000 does not include any staffing costs associated with developing the content of that Dashboard. ED has only one Program Direction account and the money came from that account.

Q27c. Would you provide my office with a briefing on this dashboard and how DOE is implementing the administration's Justice40 agenda?

A27c. Yes, the Department can provide your office with a briefing on the Justice40 Initiative.

Q28. According to the White House, the Justice40 Initiative has a goal of "delivering 40 percent of the overall benefits of relevant federal investments to disadvantaged communities and tracks performance toward that goal through the establishment of an Environmental Justice Scorecard."

Q28a. Can you please provide a copy of the environmental justice scorecard? How is "environmental justice" quantified and measured?

A28a. The Environmental Justice Scorecard is an initiative in progress and, as such, a copy of the document is unable to be shared at this time.

Q28b. What is the criteria for determining a "disadvantaged community"? Would certain communities in Appalachia meet this determination?

A28b. Yes, certain communities in Appalachia would meet the disadvantage community criteria. On July 20, 2021, the Acting Director of the Office of Management and Budget, the Chair of the Council on Environmental Quality, and National Climate Advisor released the Interim Implementation Guidance for the Justice40 Initiative.[21] This guidance included an Interim Definition of Disadvantaged Communities. Community was defined as "either a group of individuals living in geographic proximity to one another, or a geographically dispersed set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions." Regarding the definition for disadvantaged, agencies were encouraged to "consider appropriate data, indices, and screening tools to determine whether a specific community is disadvantaged based on a combination of variables that may include" low income, high and/or persistent poverty, high unemployment and underemployment, and others. The guidance also stated that "geographic areas within Tribal jurisdictions should be included" in definitions. Any geographic location or group of people that meet the criteria set forth in the Interim Implementation Guidance for "community" and "disadvantaged" would be considered for inclusion in the Justice40 initiative. Certain criteria listed in the Guidance that would apply to communities in Appalachia include disproportionate environmental stressor burden and high cumulative impacts, limited water and sanitation access and affordability, jobs lost through the energy transition, and access to health care.

White House Environmental Justice Advisory Council's Interim Report

Q29. Starting on page 57, the White House Environmental Justice Advisory Council's Interim Report lists examples of projects that will NOT benefit a community.

Q29a. As an example, the report lists "Fossil fuel procurement, development, infrastructure repair that would in any way extend lifespan or production capacity, transmission system investments to facilitate fossil-fired generation or any related subsidy." How would investments in fossil-fired power generation assets NOT help out-of-work coal miners in West Virginia?

[21] M-21-28 (whitehouse.gov)

A29a. This report was authored by the White House Environmental Justice Advisory Council (WHEJAC), and DOE was not involved in its review. Responsible RDD&D of CCUS is a priority of FECM and this administration.

Q29b. As an example, the report lists "Carbon capture and storage (CCS) or carbon capture, utilization, and storage (CCUS)." CCUS is critical to lowering carbon emissions, ensuring a stable grid by ensuring the use of coal and natural gas for power generation – providing jobs and livelihoods to coal miners and gas workers across the county. How would promoting CCUS NOT help communities?

A29b. We must be vigilant in ensuring frontline community well-being is prioritized in our decision-making. FECM is committed to working closely with DOE's Environmental Justice and Energy Jobs teams to ensure that all work and engagement is approached holistically as we pivot to demonstration and deployment for these critical technologies that FECM focuses on.

Q29c. As an example, the report lists "Pipeline creation, expansion, or maintenance." Pipelines are the safest way to transport energy. Further increased pipeline infrastructure projects around the country mean more American jobs and economic benefits. How would promoting pipelines around the country NOT improve communities?

A29c. When evaluating pipeline creation, expansion, or maintenance, it is important to look at the entire cycle, including upstream and downstream as well as resource extraction.

Q29d. The report specifically states that "research and development" would not benefit communities around the country. Given that DOE's mission is supported by its research and development efforts, does DOE support the White House Environmental Justice Advisory Council's Interim Report?

A29d. DOE is committed to executing the Justice40 Initiative, an ambitious program to deliver 40% of climate and clean energy investment benefits to underserved and overburdened communities. The President's vision for the Justice40 Initiative is spelled out under Executive Order 14008, which also establishes the White House Environmental Justice Advisory Council (WHEJAC). DOE is currently reviewing the WHEJAC's report on the Justice40 Initiative and, consistent with the President's vision, will work to ensure that everything we do—from research and development to deployment of clean energy technology—provides substantial benefits to disadvantaged communities.

DOE's Lease of Ford Mustang Mach-E

Q30. In a recent interview with WDIV Detroit, Secretary Granholm said that the department recently acquired a Ford Mustang Mach-E.

Q30a. What was the motivation behind this recent acquisition and given the department's current fleet of vehicles (that transported Secretaries Perry and Brouillette) and the rising national debt, why did DOE make this acquisition?

A30a. The four-year lease for the 2017 Cadillac CT6 AWD that transported previous DOE Secretaries was coming to an end. The Department leased the 2021 Ford Mach-E as a less expensive, zero emission option.

Q30b. How much is DOE paying for this vehicle? What funds were used to acquire this vehicle? Out of what account?

A30b. In 2021, the cost to lease the Ford Mach-E is $1,229 a month ($14,748 a year), while the cost to lease the Cadillac CT6 was $1,250 a month ($15,000 a year), providing the Department with an annual cost savings of $252. The funds used came from the appropriation for Other Defense Activities, which provides funding for Environment, Health, Safety, and Security, including protection of DOE Headquarters facilities and protection of the Secretary.

Q30c. Given the economic hardship that many Americans are currently dealing with from the pandemic and with a starting price around $43,000, does Secretary Granholm regret this frivolous acquisition that is nothing more than a PR stunt?

A30c. In addition to the lease cost savings to the government, the Ford Mach-E is more efficient than the Cadillac CT6. The Ford Mustang Mach-E has a combined MPGe of 90 (96 City and 84 Highway) compared to the Cadillac CT6, which had a combined MPG of 21 (18 City and 21 Highway). It is anticipated this will save DOE an average of $800 annually on fuel costs.

Materials Recycling Facilities

Q31. In FY19, Congress requested DOE to conduct an analysis and provide a report to Congress regarding the recycling of aluminum and Materials Recycling Facilities. DOE began work on that report in the previous administration.

Q31a. What is the status of this report? When can you expect a finished product?

A31a. This report, entitled "Industrial Decarbonization Roadmap," is completed and will be available following all required reviews.

QUESTIONS FROM THE HONORABLE BILL JOHNSON (R-OH)

Q1. Madam Secretary, I recently spearheaded a bipartisan, bicameral letter to you in support of the High Assay, Low Enriched Uranium demonstration program in Piketon, Ohio. We fully favor expanding this vital HALEU capability, to meet the needs of the U.S. advanced reactor community, and to prevent foreign countries from cornering this market.

Q1a. Do you agree that DOE should build out additional enrichment capacity in Piketon to assure a U.S. source of this essential material?

A1a. The FY 2022 budget request seeks sufficient funding to continue to operate the HALEU enrichment demonstration facility in Piketon, Ohio, under a cost share agreement with industry, at the planned demonstration production levels. The FY 2022 budget request also seeks funds to make available small quantities of HALEU from limited DOE uranium inventories. It is understood that the amounts from these sources are not sufficient to meet the initial core requirements for the demonstration reactors selected under the Department's Advanced Reactor Demonstration Program. We believe the current budget request is sufficient to sustain the HALEU demonstration in the short term. A request for information was issued and will inform the Department on actions it could take to promote a sustainable commercial HALEU supply for the long term. The Department of Energy is committed to evaluating alternatives for meeting U.S. HALEU needs.

QUESTIONS FROM THE HONORABLE JEFF DUNCAN (R-SC)

Dedicated DOE Nuclear Waste Management Office

Q1. As I referenced during the hearing, eight organizations requested in a May 3, 2021 letter that you establish an office within DOE that will be dedicated to nuclear waste management and report directly to you.

Q1a. As you look to develop a strategic approach to addressing spent nuclear fuel and high-level radioactive waste, do you intend to elevate the Department's focus and prioritization of this issue through such an office?

A1a. The Department is still considering what would be the best organizational arrangement to address spent nuclear fuel and high-level radioactive waste issues through a strategic approach.

Q1b. What steps do you intend to take to facilitate necessary engagement with external stakeholders on nuclear waste management?

A1b. As a first step, the Department issued a Request For Information (RFI) to obtain information from state and local governments, Tribal Nations and other stakeholders on siting a federal interim storage facility for spent nuclear fuel using a consent-based approach. The Department also plans to issue a Funding Opportunity Notice.

Q1c. What level of funding would DOE need to establish and maintain such an office?

A1c. The Department has not developed budget profiles for establishing and maintaining such an office.

Q1d. Can the new funding provided by Congress under the Consolidated Appropriations Act of 2021 facilitate establishment of such an office?

A1d. If Departmental considerations for the best organizational arrangement to address spent nuclear fuel and high-level radioactive waste determine that an office reorganization is appropriate; Congressional appropriations will support the formation and operation of that office.

Q1e. What skills and expertise would you seek in filling a position to lead such an office?

A1e. As with any head of a Departmental office, good managerial skills would be an important skill as well as subject matter expertise, which in this case would include spent nuclear fuel and consent-based siting.

Nuclear Waste Management Program Funding

Q2. The Blue Ribbon Commission on America's Nuclear Future (BRC) recommended "access to utility waste disposal fees for their intended purpose" as further explained in its January 2012 Report to the Secretary of Energy.

Q2a. Do you agree with that specific recommendation?

A2a. I believe the Nuclear Waste Fund should be available for DOE's nuclear waste management activities.

Q2b. How would such access facilitate the work of DOE to develop and maintain a national integrated nuclear waste management program?

A2b. Regardless of the Blue Ribbon Commission on America's Nuclear Future and previously published strategies, to succeed, a waste management organization must have the resources requested to implement an effective program.

Q2c. Do you recommend that Congress take actions necessary to provide sustainable annual access to the Nuclear Waste Fund to develop and support a national integrated nuclear waste management program?

A2c. I look forward to working with Congress to ensure that funds are available to develop and support a national integrated nuclear waste management program.

QUESTIONS FROM THE HONORABLE DEBBIE LESKO (R-AZ)

Q1. Why are we using taxpayer dollars to increase use of solar panels, wind turbines, and electric vehicles, that deliver benefits to China's economy, when we haven't fully secured our own critical minerals supply chain?

A1. Rapid growth of renewable energy and electric vehicles is key to achieve the Administration's goals to combat the threats from Climate Change and achieve significant economic benefits for the Nation. At the same time, the Department of Energy (DOE) is committed to developing and improving technologies that will enable secure, diverse, and resilient, supply chains for critical minerals (CM), including rare earth elements (REE). Current DOE investments within the Advanced Research Program Agency-Energy (ARPA-E), Office of Science (SC), Office of Energy Efficiency and Renewable Energy (EERE), Office of Fossil Energy and Carbon Management (FECM), Office of Nuclear Energy (NE) and Office of Technology Transitions (OTT) support DOE's pillars across the full lifecycle of Critical Minerals and Materials (CMM), from extraction to processing and manufacturing to recycling and reuse. EERE and FECM support Applied research, development, and demonstration (RD&D) across these topics, while SC provides the necessary fundamental research and world-class user facilities necessary to complete much of the work in this topic area.

Specifically, research, development, demonstration, and deployment (RDD&D) is conducted throughout the entire supply chain with an aim to bring innovative processes and technologies across all supply chain stages for key technologies, including batteries, rare earth magnets, and catalysts:

- Upstream unconventional/secondary technology and technique development from resource characterization and prediction, including novel extraction from sources such as geothermal and produced water brines, acid mine drainage and refuse. Research includes determination of the properties of materials and molecules at length scales ranging from electronic to atomic and microstructural scales, and on advancing geoscience and separation science to enhance the extraction.

- Midstream technology development for environmentally sustainable, efficient, and cost-effective extraction, processing, refining of resources to diversify domestic CM resources. This includes advancing geoscience and separation science as well as refinement technologies to enhance the extraction and processing of critical elements to enable value-added manufacturing.
- Technology and manufacturing process RD&D in areas such as low (less than 5%) /no-cobalt/more Earth abundant, ethically sourced, secure lithium battery cathode materials; next-generation, domestically secure lithium anodes and electrolytes; magnets with reduced or eliminated rare earth materials for electric drive motors; electric drive motors that do not use critical materials; and catalytic convertors with reduced or eliminated platinum group metals. This also includes transformation of carbon ore to synthetic graphite and graphene for battery anodes.
- Recycling collection, transportation, and process RD&D, including for lithium batteries and neodymium magnets.
- Fundamental materials science, including integration of the related fields of synthesis, characterization, predictive theory/modeling, and data science to advance understanding of the role of REEs, platinum group metals and other critical elements in the determination of the properties of functional materials such as magnets and catalysts.

Q2. You recently said regarding the Colonial Pipeline cyber-attack that "If you drove an electric car, this cyber-attack would not be affecting you, clearly." Do you believe that putting all of our eggs in one basket, by shifting to complete electrification of our energy sector, makes us safer from cyberthreats?

A2. It's critical that the federal government address effective cybersecurity measures for all energy infrastructure, including the electric grid and oil and natural gas pipelines. The Department of Energy (DOE) works closely with the electricity and oil and natural gas sectors to bolster the cybersecurity of the Nation's critical energy infrastructure. Legacy architecture will continue to be part of our interconnected energy infrastructure, and thus a priority for DOE cybersecurity efforts.

Additionally, the introduction of a large amount of new technology, in the form of distributed energy resources and renewables, into the grid presents a strategic opportunity for government and industry to proactively and collectively focus on designing secure systems and technologies before they are developed and deployed.

DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) continues to partner with the Office of Energy Efficiency and Renewable Energy, Office of Electricity, and several of our national laboratories such as the National Renewable Energy Laboratory to engage with energy stakeholders in order to ensure that cybersecurity is built into new technologies being developed for the energy sector.

Q3. Congress has tasked The Department of Energy to work on R&D for minerals and mineral processing. Does the Administration have a plan to increase mining of critical minerals in the U.S.?

A3. DOE coordinates closely with resources management and science agencies as part of a whole-of-government approach to ensuring resilient and secure supply chains for rare earth elements and other critical minerals used in clean energy technologies. DOE coordinates with the Department of the Interior (U.S. Geological Survey) co-chair of the National Science and Technology Council (NSTC) Critical Minerals Subcommittee (CMS) on this approach. In this capacity, DOE helps lead interagency efforts to improve processes for critical mineral extraction, separation, purification, and alloying, as well efforts to reduce the need for primary mineral extraction, such as developing critical minerals recycling and reprocessing technologies, and technological alternatives to critical minerals. DOE's request includes funding for several activities focused on the separation and processing of critical minerals from both primary mining ores and secondary sources such as recycled materials and mine wastes. Within DOE's Advanced Manufacturing Office, the request includes funding to support validation and verification of improved upstream extraction and midstream separation and processing technologies of critical materials. It also supports FY21 Congressional direction for a Lithium Research Center to convert lithium chloride to lithium hydroxide and lithium-ion (Li-ion) extraction from unconventional sources and continues funding for other high priority critical materials R&D in an integrated and coordinated program executed through annual

operating plans, laboratory calls, and competitive funding opportunity announcements. The requested funding will also enable DOE to leverage the efforts of the CMI and other DOE programs to develop a Critical Minerals Consortium of government, industry, and academic stakeholders, per the Energy Act of 2020.

In March 2021, the DOE Geothermal Technologies Officer (GTO) launched the American-Made Geothermal Lithium Extraction Prize, which will fast-track efforts to identify, develop, and test innovative technical solutions to economically extract lithium from geothermal brines. In FY22, DOE GTO plans to build on this Prize through funding additional research and technologies that separate lithium or other critical minerals from geothermal brines. The focus of this effort will be a better understanding of the resources, environment, and operations of geothermal power generation sites with potential mineral coproduction.

DOE GTO is also partnering with the U.S. Geological Survey (USGS) Earth Mapping Resources Initiative (Earth MRI) and USGS 3D Elevation Program (3DEP) on the Geoscience Data Acquisition for Western Nevada (GeoDAWN) initiative to conduct airborne geophysical and lidar surveys to collect information on undiscovered geothermal, critical mineral, and groundwater resources in the western Great Basin and the Walker Lane region. USGS and DOE plan to continue this partnership going forward and hopefully extend it to other areas of the U.S. where geothermal and mineral assessments are needed.