November 22, 2019

The Honorable Frank Pallone, Jr.
Chairman
Committee on Energy & Commerce
2125 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Pallone,

The Combined Heat and Power Alliance (the Alliance)[1] appreciates the opportunity to respond to the Energy and Commerce Committee Climate Questionnaire as the Committee engages in a process to develop comprehensive climate legislation to support its plan to achieve a one hundred percent clean economy by 2050. The Alliance is a coalition of businesses, labor, contractors, non-profit organizations and educational institutions who share the vision that Combined Heat and Power (CHP) and Waste Heat to Power (WHP) can reduce emissions, enhance grid reliability, reduce energy costs, and make America's manufacturers and other businesses more competitive.

The Alliance urges the Committee to recommend policies that will encourage additional deployment of CHP and WHP systems. While CHP and WHP technologies are commercially available and are successfully used in a variety of sectors, barriers exist that prevent additional deployment, thereby preventing additional emissions reductions and other benefits.

As a coalition of numerous groups with a common vision, the Alliance has provided answers only to those questions that are applicable to our group.

Sincerely,

David Gardiner
Executive Director
Combined Heat and Power Alliance

[1] The Combined Heat and Power Alliance was known as the Alliance for Industrial Efficiency until September 2019.

Response of the Combined Heat and Power Alliance to the Energy and Commerce Committee Climate Questionnaire

1. **What are the key policy, regulatory, and market considerations that should inform the development of comprehensive climate legislation? Please provide specifics.**

Benefits of CHP

Additional deployment of combined heat and power (CHP)[1] and waste heat to power (WHP)[2] systems should be a goal of any comprehensive climate legislation due to the amount of energy efficiency and reduced emissions that can be achieved, especially in difficult to decarbonize sectors such as industry and commercial buildings. A 2016 United States Department of Energy (DOE) report described CHP as "a commercially-available, clean energy solution that directly addresses a number of national priorities including improving the competitiveness of U.S. manufacturing through reduced costs, increasing energy efficiency, reducing emissions, enhancing our energy infrastructure, improving energy security and resiliency, and growing our economy."[3] By using industrial efficiency, CHP and WHP, manufacturers can cut carbon emissions by 174.5 million short tons in 2030 – equal to the emissions from 46 conventional power plants – while saving businesses $298 billion from avoided electricity purchases.[4]

Increased Efficiency and Reduced Emissions

Conventional electric generation is very inefficient, with roughly two-thirds of fuel inputs lost as wasted heat from the process. Additional energy is lost during transmission from the central power plant to the end user. By generating both heat and electricity from a single fuel source at the point of use, CHP lowers emissions and increases overall fuel efficiency. When electricity and thermal energy are provided separately, overall energy efficiency ranges from 45-55%, but, though efficiencies vary for individual CHP installations, a properly designed CHP system will typically operate with an overall efficiency of 65-85%.[5] Because they combust less fuel to provide the same energy services, CHP systems reduce all types of emissions, including greenhouse gases, criteria pollutants, and hazardous air pollutants. As a consequence, natural gas-fired CHP can produce electricity with about one-quarter of the GHG emissions of an existing coal power plant. WHP, which uses waste heat from industrial processes to generate electricity with no additional fuel and no incremental emissions, reduces emissions and offsets costs associated with purchased power.

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[1] Combined Heat and Power (CHP) uses a single fuel source to generate both heat and electricity. CHP systems have twice the energy efficiency of the average power plant.

[2] Waste Heat to Power (WHP), also known as "bottoming cycle CHP," uses industrial waste heat which would typically be released into the atmosphere and captures it to generate electricity with no additional fuel and no incremental emissions.

[3] United States Department of Energy, "Combined Heat and Power (CHP) Technical Potential in the United States," Mar., 2016, p. 1. https://www.energy.gov/sites/prod/files/2016/04/f30/CHP%20Technical%20Potential%20Study%203-31-2016%20Final.pdf

[4] Alliance for Industrial Efficiency, "State Ranking of Potential Carbon Dioxide Emission Reductions through Industrial Energy Efficiency," Sept. 15, 2016, p. 1. https://chpalliance.org/wp-content/uploads/2016/09/FINAL-AIE-State-Industrial-Efficiency-Ranking-Report_9_15_16.pdf.

[5] United States Department of Energy, "Combined Heat and Power (CHP) Technical Potential in the United States," at 3-4.

According to DOE, the chemicals, petroleum refining, food, paper, and primary metals industrial sectors have the greatest potential for CHP installation, creating a significant opportunity to cut industrial emissions while increasing competitiveness.[6] A 2016 study by the Alliance found that increased deployment of CHP and WHP in the industrial sector alone could reduce carbon dioxide emissions nationally by 32,625,000 short tons annually over a 15-year period.[7] This increased deployment would also result in an annual electricity savings of 183,855,000 MWh.[8]

There is a significant opportunity to capture additional energy and emissions savings through CHP installations. In 2016, the DOE estimated that there was more than 240 GW[9] of CHP technical potential across all facility types.[10] In a joint DOE and United States Environmental Protection Agency (EPA) report, the agencies stated that installing just an additional 40 GW of CHP would eliminate over 150 million metric tons of carbon dioxide emission each year – the equivalent of the emissions of over 25 million cars.[11] CHP and WHP systems are commercially available and immediately deployable, providing an immediate path to lower emissions through increased energy efficiency.[12]

Reduced Emissions: Industry

The industrial sector is a large source of carbon dioxide and other GHG emissions. Much of those emissions result from the energy used to produce heat for the manufacturing production process. Across the globe, industrial heat makes up two-thirds of industrial energy demand and almost one-fifth of total energy consumption.[13] Industrial emissions are concentrated in eight energy-intensive basic material manufacturing sectors – steel, chemicals, cement, pulp and paper, aluminum, and oil refining – which produce more than 77% of global industrial emissions.[14] According to DOE, the chemicals, petroleum refining, food, paper, and primary metals industrial sectors have the greatest potential for CHP installation, creating a significant opportunity to cut industrial emissions while increasing competitiveness.[15] Climate solutions must include approaches to reduce emissions associated with heat production, while also making those industries more competitive.

Utilization of CHP and WHP can help to decarbonize various sectors, including those that have proven difficult to decarbonize, such as industry. When electricity and thermal energy are provided separately, overall energy efficiency ranges from 45-55%, while a properly designed CHP system will

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[6] *Id.*
[7] The Alliance for Industrial Efficiency, "State Ranking of Potential Carbon Dioxide Emission Reductions through Industrial Energy Efficiency," at 10.
[8] *Id.*
[9] 1 GW is equal to 1000 MW.
[10] United States Department of Energy, "Combined Heat and Power (CHP) Technical Potential in the United States," at 21.
[11] United States Department of Energy and United States Environmental Protection Agency, "Combined Heat and Power: A Clean Energy Solution," Aug. 2012, p. 5. https://www.energy.gov/sites/prod/files/2013/11/f4/chp_clean_energy_solution.pdf
[12] *Id.*
[13] International Energy Agency, "Commentary: Clean and efficient heat for industry," Jan. 23, 2018. https://www.iea.org/newsroom/news/2018/january/commentary-clean-and-efficient-heat-for-industry.html.
[14] Imperial College London Grantham Institute for Climate Change, "Reducing CO2 emissions from heavy industry: a review of technologies and considerations for policy makers," Feb. 2012, p. 4. https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/Reducing-CO2-emissions-from-heavy-industry---Grantham-BP-7.pdf.
[15] United States Department of Energy, "Combined Heat and Power (CHP) Technical Potential in the United States," at 14.

typically operate with an overall efficiency of 65-85%.[16] Since CHP and WHP systems use heat that may otherwise be wasted, deployment of these systems can also make businesses more competitive by reducing energy costs while cutting emissions.

Moreover, CHP can provide overall energy and carbon dioxide savings on par with comparably sized solar photovoltaics (PV), wind, Natural Gas Combined Cycle (NGCC), and at a capital cost that is lower than solar and wind and on par with NGCC, according to the DOE and the EPA.[17] As discussed below in the renewable fuels section, fueling CHP and WHP systems with renewable natural gas can help to further reduce emissions.

Reduced Emissions: Commercial Buildings

There is a great opportunity to realize energy and emissions savings by increasing installation of CHP in the commercial sector. In the U.S., CHP installations in commercial facilities make up 58% of CHP sites, but account for only 14% of capacity, which is due to the relatively small size of these facilities compared to industrial facilities.[18] The DOE found that the technical potential for commercial CHP was 75,940 megawatts at more than 240,000 sites across the country.[19] The types of facilities with the greatest capacity potential were commercial office buildings, colleges and universities, hospitals, schools, government buildings, hotels, multifamily buildings, and military.[20]

Resiliency and Reliability

CHP systems can be both a climate mitigation and adaptation solution: CHP systems are distributed energy resources that reduce emissions and also provide electric and thermal energy resiliency and reliability benefits that can be used to adapt to the impacts of severe weather events resulting from climate change.

Distributed energy resources allow energy to be created close to where it is consumed, reducing the use of electric transmission and distribution systems, reducing line loss of electricity and thereby saving money. Distributed energy resources can also provide increased reliability and resiliency, not only for facilities that host such resources, but also for a host facility's surrounding community. Facilities that are critical infrastructure – assets, systems, and networks that, if incapacitated, would have a substantial negative impact on national security, economic security, or public health and safety[21] – are particularly well suited to utilize distributed energy resources as access to energy is a high priority for ensuring that critical facilities can continue to deliver services and assist in recovery.[22] Many critical infrastructure

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[16] United States Department of Energy, "Combined Heat and Power Technology Fact Sheet Series," Nov. 2017. https://www.energy.gov/sites/prod/files/2017/12/f46/CHP%20Overview-120817_compliant_0.pdf

[17] United States Department of Energy and United States Environmental Protection Agency, "Combined Heat and Power: A Clean Energy Solution," at 8.

[18] United States Department of Energy, "Combined Heat and Power (CHP) Technical Potential in the United States," at 7.

[19] *Id.* at 22.

[20] *Id.* at 25.

[21] Uniting and Strengthening America by Providing Appropriate Tools Required to Intercept and Obstruct Terrorism (USA PATRIOT ACT) Act of 2001. Pub. L. 107-56 at Sec. 1016(e). 26 Oct. 2001. https://www.congress.gov/bill/107th-congress/house-bill/3162/text.

[22] United States Department of Energy Better Buildings, "Distributed Generation (DG) for Resilience Planning Guide," January 2019, p. 4.

customers such as hospitals, universities, municipalities, and data centers have successfully deployed CHP and WHP systems, increasing their resiliency against natural disasters, emergencies, or other events that may impact the electric grid. This can mitigate the impacts of an emergency by keeping critical facilities operational until power is restored. In addition to providing power and heat to a host facility to keep the facility operational, such host facility may also be able to provide services to their local community to aid in the recovery effort.

In addition to the general benefits of distributed energy resources, CHP and WHP systems provide further benefits in that they typically run and are maintained continuously, avoiding the need to call a generator into operation that may not have been used recently. These systems also provide a consistent source of heat and power unlike intermittent resources such as wind and solar. In addition, CHP systems frequently run on natural gas delivered directly via pipelines, avoiding the need for a fuel delivery as well as the resulting increased emissions from diesel or oil.[23]

Case studies demonstrate the benefits of CHP systems during severe weather events that result in electric grid service disruption. During and after Superstorm Sandy in the northeast United States, numerous facilities with CHP systems were able to remain operational. For example, South Oaks Hospital in New York was able to provide critical services for two weeks relying solely on its CHP system and admitted displaced patients, offered refrigeration of vital medicines to those who had lost power, and welcomed the local community to recharge phones and electronic devices at its facility.[24] In New Jersey, The College of New Jersey was able to disconnect from the electric grid for a week and the campus continued to operate despite the grid disruption. In addition, the College's equipment was used to assist the state's largest utility in reestablishing service after the grid outage: the utility was able to use the College's equipment to back-feed one of its power lines to bring it back in service.[25] Louisiana State University has also benefitted from a CHP system, the university never lost power during Hurricane Katrina, allowing the school to continue to operate and allow administrative offices of other institutions to relocate to the main campus.[26]

Enabling Solar and Storage in Microgrids

CHP and WHP systems may also be connected to a microgrid, allowing several buildings or facilities to keep the lights on during a grid power outage. When a traditional electric grid has an outage or needs to be repaired, all users of the grid are impacted. A microgrid is a local energy grid that can disconnect from the traditional grid and operate on its own during a traditional grid outage.[27] To function independently, a microgrid requires either battery storage or a form of distributed generation such as

https://betterbuildingsinitiative.energy.gov/sites/default/files/attachments/DG%20for%20Resilience%20Planning%20Guide%20-%20report%20format.pdf.
[23] United States Environmental Protection Agency, "Valuing the Reliability of Combined Heat and Power," Jan. 2007, p. 2. https://www.epa.gov/sites/production/files/2015-07/documents/valuing_the_reliability_of_combined_heat_and_power.pdf.
[24] ICF International, "Combined Heat and Power: Enabling Resilient Energy Infrastructure for Critical Facilities," Mar. 2013, p.13. https://www.energy.gov/sites/prod/files/2013/11/f4/chp_critical_facilities.pdf.
[25] *Id.* at 18.
[26] *Id.* at 24.
[27] United States Department of Energy, "How Microgrids Work," Jun. 17, 2014. https://www.energy.gov/articles/how-microgrids-work.

CHP or WHP. CHP systems provide 39% of the energy in existing microgrids.[28] CHP systems can be paired with renewable resources such as solar as well as battery storage to provide a consistent source of power in a microgrid. Microgrids are used by universities, military installations, municipalities, and public institutions, helping to maintain the reliability of their electric and thermal energy supply and to improve their resiliency against extreme weather and power outages.[29] In some locations, a number of critical facilities such as hospitals, fire and police stations, emergency shelters, and gas stations can be connected and configured to operate in isolation from the larger utility grid, even during extended outages.[30]

New Technologies: Renewable Fuels

Another innovative concept for climate policy design is to incorporate the use of renewable thermal technologies. Many of these technologies are still in nascent stages of development, so advancing a broad range of renewable thermal technologies and allowing markets to determine future development is the best approach in the short-term. Fueling CHP and WHP systems with renewable natural gas can help to further reduce emissions. CHP systems can run on renewable fuels, such as biomass – forest and crop residues, wood waste, or food-processing residue – or biogas – manure biogas, wastewater treatment biogas, or landfill gas. Renewable natural gas (RNG), or biomethane, is a pipeline-quality gas that is fully interchangeable with natural gas and compatible with U.S. pipeline infrastructure and can be used to fuel CHP systems. Over time, CHP systems can evolve and use different types of fuel. A system using natural gas today may run on RNG in the future.

Policy Recommendations

To overcome these barriers and to more fully realize the benefits of CHP, the following policies will support increased CHP deployment which will result in reduced emissions, increased resiliency and reliability of the electric system, and increased economic competitiveness Many pieces of legislation have already been introduced that address these barriers, and many enjoy bipartisan support. The Committee should consider these policies as it develops its recommendations.

Economic and Financial

Federal ITC

First signed into law in 2005 as part of the Energy Policy Act, the federal Investment Tax Credit (ITC) has played, and continues to play, a critical role in driving energy innovation and technological leadership in the United States. The federal ITC has helped to create thousands of jobs, lower electricity prices for families and businesses, reduce carbon emissions, and maintain the country's competitive edge in emerging energy technologies. Section 48 and Section 25D of the ITC provide tax credits that cover renewable energy technologies such as CHP, micro-turbines, solar energy,

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[28] Greentech Media, "US Microgrid Growth Beats Estimates: 2020 Capacity Forecast Now Exceeds 3.7 Gigawatts," Jun. 1, 2016. https://www.greentechmedia.com/articles/read/u-s-microgrid-growth-beats-analyst-estimates-revised-2020-capacity-project#gs.fmnot7GL.

[29] *Id.*

[30] United States Department of Energy, "CHP for Resiliency in Critical Infrastructure," May 2018, p. 3. https://betterbuildingsinitiative.energy.gov/sites/default/files/attachments/CHP_Resiliency.pdf.

geothermal, fuel cells, and distributed wind energy. Increasing, or at the very least maintaining, this tax credit will continue to allow American businesses to realize energy and cost savings, support clean energy jobs, and reduce carbon and other GHG emissions.

While the ITC has helped to support the deployment of CHP systems, WHP systems have not been able to benefit from this policy. Despite the fact that WHP is a zero-emission energy resource, these systems do not currently qualify for the Section 48 ITC. There are key differences between CHP and WHP systems that prevent WHP from accessing the ITC as written: while CHP systems capture waste heat generated in the production of electricity for thermal uses, WHP systems capture waste heat and energy from thermal processes and operations and convert that energy into electricity. The exclusion of WHP systems from the federal ITC puts such projects at a competitive disadvantage. The proposed Waste Heat to Power Investment Tax Credit Act would rectify this problem by allowing an energy tax credit for investments in WHP property.[31]

Loans

Loan programs can also be an effective policy to support additional CHP deployment. For example, the LIFT America Act creates a loan program to support the deployment of distributed energy systems for states, institutions of higher education, and electric utilities as well as a technical assistance and grant program to disseminate information and provide technical assistance to nonprofit and for-profit entities for identifying, evaluating, planning, and designing distributed energy systems.[32] As discussed above, distributed energy systems have significant reliability and resiliency benefits, especially for facilities that are critical infrastructure.

Grants

Federal grants could also help to increase CHP deployment in the United States and such legislation has previously been proposed. The Job Creation through Energy Efficient Manufacturing Act would require DOE to establish a Financing Energy Efficient Manufacturing Program that provides grants for energy efficiency improvement projects in the manufacturing sector.[33] Entities eligible for grants would include state energy offices, nonprofit organizations, electric cooperative groups, or certain entities with a public-private partnership.[34] The grant recipients would then distribute subgrants to nongovernmental, small or medium sized manufacturers located in the state in which the recipient is located to carry out projects that improve the energy efficiency of the manufacturers and develop technologies that reduce electricity or natural gas use by the manufacturers.[35] By improving the efficiency of industrial plants,

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[31] United States. Cong. Senate. Waste Heat to Power Investment Tax Credit Act. 116th Cong. 1st sess. S. 2283. Washington: 2019. https://www.congress.gov/bill/116th-congress/senate-bill/2283?r=2&s=1.
[32] United States. Cong. House of Representatives. Leading Infrastructure for Tomorrow's America Act. 116th Congress. 1st sess. H.R. 2741, Secs. 33303-33304. Washington: 2019. https://www.congress.gov/bill/116th-congress/house-bill/2741/text#toc-H364FAC1BA8D742599CF5C10984A7AF57.
[33] United States. Cong. Senate. Job Creation through Energy Efficient Manufacturing Act. 115th Cong. 1st sess. S. 1687. Washington: 2017. https://www.congress.gov/bill/115th-congress/senate-bill/1687. A similar bill was also introduced in 2018, *see* United States. Cong. House of Representatives. Job Creation through Energy Efficient Manufacturing Act. 115th Cong. 2d sess. H.R. 5042. Washington: 2018. https://www.congress.gov/bill/115th-congress/house-bill/5042/text.
[34] *Id.*
[35] *Id.*

policies such as this Act will reduce carbon and other GHG emissions, reduce energy costs for manufacturers making them more competitive, and create jobs.

Master Limited Partnerships

Historically, tax policies have been able to stimulate investments in both conventional and clean energy projects. However, conventional energy technologies have access to low-cost capital through types of financing mechanisms that are not available to CHP projects. A Master Limited Partnership (MLP) is a business structure that provides tax advantages to the partners in the business, permitting investors to trade shares and thereby allowing energy projects that qualify as MLPs to have lower cost of capital.[36] Congress should adopt bipartisan legislation to allow clean energy projects to qualify as MLPs, as they do not qualify under current law.

New Tax or Credit Systems

To the extent any technology neutral tax credit regimes or economy-wide tax systems such as cap and trade are being considered, it is essential to ensure that the emissions for CHP systems are appropriately calculated. For example, with regard to technology neutral approaches on tax credits, the model in the Clean Energy for America Act calculates the emissions rate for CHP using both electrical and useful thermal energy.[37] If a carbon pricing regime is under consideration, allowance structures must appropriately account for the savings realized by CHP systems.

<u>Regulatory</u>

Standardized interconnection rules can help to establish a clear and uniform process and technical requirements for CHP systems and other on-site generation to connect to the electric grid. Though most states have adopted interconnection standards or guidelines, requirements and implementation are inconsistent between states, and sometimes within states.[38] This lack of uniformity makes it challenging for manufacturers of CHP equipment to design and produce modular packages and may reduce economic incentives for installation.[39] Federal policies could help to make interconnection standards uniform across jurisdictions.

For example, the HEAT Act directs the Department of Energy to establish model rules and procedures for interconnection and its associated costs and procedures for determining fees or rates for supplementary power, backup or standby power, maintenance power, and interruptible power supplied to facilities that operate CHP and WHP systems.[40] This legislation would establish a federal framework to help states develop solutions to meet growing energy demands efficiently and economically through the use of CHP and WHP, strengthening local economies and supporting national energy policy goals.

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[36] United States Department of Energy, "Barriers to Industrial Energy Efficiency," Jun. 2015, p. 98. https://www.energy.gov/sites/prod/files/2015/06/f23/EXEC-2014-005846_5%20Study__0.pdf.
[37] United States. Cong. Senate. Clean Energy for America Act. 116th Cong. 1st sess. S. 1288. Washington: 2019. https://www.congress.gov/bill/116th-congress/senate-bill/1288/text.
[38] United States Department of Energy, "Barriers to Industrial Energy Efficiency," at 106.
[39] *Id.* at 105-106.
[40] United States. Cong. Senate. Heat Efficiency through Applied Technology Act. 116th Cong. 1st sess. S. 2706. Washington: 2019. https://www.congress.gov/bill/116th-congress/senate-bill/2706.

As noted above, CHP systems provide significant emissions reductions: increased deployment of CHP and WHP in the industrial sector alone could reduce carbon dioxide emissions nationally by 32,625,000 short tons annually over a 15-year period.[41] However, these savings typically do not receive economic value from companies considering installation of a CHP system because the savings typically cannot be monetized under existing regulations.[42] Any policies under consideration must appropriately account for the savings realized by CHP systems.

Information

The lack of information regarding the benefits of CHP systems creates another barrier to additional deployment. On-going data collection and publishing of data will allow researchers to track trends in the CHP industry and may help to identify new areas of deployment and build confidence in the market to encourage additional private and public investment. Providing technical assistance to utilities and potential host facilities will prove critical to the additional deployment of CHP systems and resulting reductions in carbon and other GHG emissions.

The DOE's CHP Technical Assistance Partnerships (TAPs) are a crucial resource that provide market analyses, education on the energy and non-energy benefits and applications of CHP to state and local policymakers, regulators, energy end-users, and trade associations, as well as technical assistance to end-users and to help them through the development process from initial CHP screening to installation.[43] Continued authorization of and funding for this program, such as that provided in the CHP Support Act,[44] is essential to increasing understanding and deployment of CHP systems.

2. **Please describe any innovative concepts for climate policy design, including both sector-specific and economywide measures, that you believe the Committee should consider.**

Much of the climate policy developed in the United States to date has not given much attention to decarbonizing thermal loads: promoting significant deployment of CHP in any climate policy will be innovative as an effort to reduce emissions from thermal energy sources. Moreover, though CHP is an existing technology, it can be incorporated into climate policy in new and innovative ways. As described in the answer to question 1, CHP systems can be deployed to improve electric gird resiliency and local reliability and could also run on renewable fuels. Adopting the policies recommended in question 1 will help to increase CHP deployment in the U.S..

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[41] The Alliance for Industrial Efficiency, "State Ranking of Potential Carbon Dioxide Emission Reductions through Industrial Energy Efficiency," at 10.
[42] United States Department of Energy, "Barriers to Industrial Energy Efficiency," at 108.
[43] United States Department of Energy Better Buildings, "CHP Technical Assistance Partnerships (CHP TAPS)." https://betterbuildingssolutioncenter.energy.gov/chp/chp-taps.
[44] United States. Cong. House of Representatives. CHP Support Act. 116th Cong. 1st sess. H.R. 1480. Washington: 2019. https://www.congress.gov/bill/116th-congress/house-bill/1480/text. *See also* United States. Cong. Senate. CHP Support Act of 2019. 116th Cong. 1st sess. S. 2425. Washington: 2019. https://www.congress.gov/bill/116th-congress/senate-bill/2425/text.

3. **If you work in, advise, or are familiar with sectors that are particularly challenging to decarbonize, have you identified any effective (and scalable) solutions that should be included in comprehensive climate legislation?**

As described in the answer to question 1, the industrial and commercial sectors have historically been difficult to decarbonize, particularly with regard to their thermal energy use. Deployment of CHP systems in these sectors provides an opportunity to improve energy efficiency and reduce carbon and other GHG emissions, and adoption of the policy recommendations described in the answer to question 1 will help to achieve these reductions.

4. **If your organization has adopted carbon pollution reduction goals, how have those goals – or your plans to meet those goals – evolved over the last decade?**

Not applicable.

5. **If applicable, what actions has your organization already taken, or do you plan to take, to reduce carbon pollution?**

The Alliance works to promote additional deployment of CHP and WHP systems which will reduce carbon and other GHG emissions. The Alliance has found that many in manufacturing are already prepared for such a move as the private sector has given increased attention to reducing its emissions and increasing energy efficiency: a 2018 study of 160 of the largest manufacturing companies with U.S. facilities found that 79% of these companies had greenhouse gas (GHG) targets, while 43% had energy efficiency (EE) targets.[45]

6. **What have been the challenges or barriers to making meaningful carbon pollution reductions, and how have you responded to those challenges or barriers?**

Though CHP and WHP systems are proven technologies that reduce carbon and other greenhouse gas (GHG) emissions, there are numerous barriers to additional deployment of such systems. The effort to overcome these economic and financial, regulatory, and informational barriers should be supported by comprehensive federal climate legislation.

Economic and Financial Barriers

A 2015 DOE study found that some of the key economic and financial barriers to the accelerated adoption of CHP included internal competition for capital, the "split-incentive" between capital improvement and operation and management budgets, securing low-cost financing due to financial risks, and lack of financing instruments such as Master Limited Partnerships.[46]

[45] Alliance for Industrial Efficiency, "Committed to Savings: Major U.S. Manufacturers Set Public Goals for Energy Efficiency," Jun. 26, 2018. https://chpalliance.org/resources/alliance-report-finds-majority-u-s-manufacturers-make-commitments-save-energy-reduce-emissions/.

[46] United States Department of Energy, "Barriers to Industrial Energy Efficiency," at 95. *See also* United States Department of Energy, "Barriers to Industrial Energy Efficiency: Report to Congress," Jun. 2015, p. 9-10. https://www.energy.gov/sites/prod/files/2015/06/f23/EXEC-2014-005846_6%20Report_signed_0.pdf.

Installation of CHP systems typically requires a significant upfront investment which can eclipse long-term benefits. Insufficient capital and internal competition for capital prevent many facilities from installing CHP systems, even when such a system has an attractive financial return.[47] A company may also be hesitant to make investments outside of its core business and may require an even higher rate of return compared to other, more familiar capital investments.[48] Internal accounting practices that separate plant operation and maintenance budgets from capital improvements, resulting in costs and savings accruing to different budgets, can also make it difficult to demonstrate the financial benefits of a system.[49] Facilities may also have a hard time finding favorable financing for a long-term investment in the facility upgrade.[50]

Regulatory Barriers

Regulatory barriers include utility business models that often fail to value the efficiency and other benefits that CHP and WHP deliver. This may result in rate designs that do not appropriately recognize the value of the services the CHP systems provide to the grid, inconsistent interconnection requirements, and failure to recognize all of the benefits of CHP systems were also acknowledged as barriers by DOE.[51]

In addition to financial and tax barriers, regulatory barriers that impact project economics can also restrict capital outlays for CHP systems. Though CHP and WHP systems can operate independently from the electric grid, many facilities that install such systems still interconnect with the electric grid to provide backup power during scheduled or unscheduled outages. A lack of uniform interconnection rules across jurisdictions can make CHP deployment more difficult.

Informational Barriers

The lack of information regarding CHP systems creates another barrier to additional deployment. Potential users of these systems may not be aware of the benefits in energy efficiency and reduced carbon and GHG emissions that could be realized. Even when benefits are known, a lack of information may make it difficult to demonstrate internally that a CHP system is a wise investment. In addition, financial institutions that could provide financing may be unfamiliar with CHP systems and deny needed capital or increase the cost of capital to mitigate their own risk.

7. **How can the Federal Government assist you in reducing carbon pollution?**

The barriers to additional deployment of CHP and WHP systems described above are not insurmountable and could be ameliorated by federal policies such as those described in the Policy Recommendations section of the answer to question 1, including financial, regulatory, and informational policies.

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[47] *Id.* at 95.
[48] *Id.* at 96.
[49] *Id.* at 97.
[50] *Id.*
[51] *Id.* at 103-104.

8. **Are there any additional comments or feedback you would like to add?**

Not applicable.