COMBINED
HEAT AND POWER
ALLIANCE

March 13, 2020

Maryland General Assembly
Senate Finance Committee
3 East
Miller Senate Office Building
Annapolis, MD 21401

Dear Chair Kelley, Vice Chair Feldman, and Members of the Senate Finance Committee:

There are currently two identical bills before the Maryland state legislature, SB 265 and HB 363, regarding Governor Hogan's Clean and Renewable Energy Standard (CARES). These bills would rework the state's standards for electricity sales to include clean and renewable energy, which includes new combined heat and power (CHP) systems. The Combined Heat and Power Alliance (CHP Alliance) strongly supports this legislation because it appropriately recognizes the immediate benefits that CHP systems provide by reducing greenhouse gas and other emissions and providing electric and thermal energy more efficiently. CHP economic carbon reduction benefits are important when examining hard to decarbonize energy loads like industrial and commercial building thermal requirements.

Although over half of CHP systems in the U.S. use natural gas for fuel, they use less of it to produce the same amount of energy as traditional generation. 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%.[1] 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. Additionally, the fuel reduction aspects are why CHP is often cited as the most efficient source of generating electricity on the planet. Therefore, as long as natural gas is needed to produce electricity, the CHP Alliance encourages the Senate Finance Committee that CHP should be the preferred method of delivery to realize these efficiencies and achieve emissions reductions.

Additional deployment of CHP 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 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,

[1] U.S. Department of Energy, *Combined Heat and Power (CHP) Technical Potential in the United States*, March, 2016, p. 3-4. https://www.energy.gov/sites/prod/files/2016/04/f30/CHP%20Technical%20Potential%20Study%203-31-2016%20Final.pdf.

reducing emissions, enhancing our energy infrastructure, improving energy security and resiliency, and growing our economy."[2]

CHP systems are different from traditional generation methods and are more multifaceted and versatile. Specifically, CHP systems can be outfitted to utilize biomass or biogas for fuel which offers a renewable source of power and a cleaner alternative to fossil fuels. Renewable natural gas (RNG) is natural gas or biomethane produced from existing waste streams and a variety of renewable and sustainable biomass sources, including animal waste, landfills, crop residuals, and food waste. Once processed, RNG is interchangeable with traditional pipeline-quality natural gas. It is carbon neutral, extremely versatile and fully compatible with the U.S. pipeline infrastructure.

Maryland already has several CHP sites that utilize biofuels paired with CHP systems, and it would benefit Maryland's emissions reduction goals to encourage more of these types of CHP systems. However, CHP systems that utilize natural gas should also be encouraged because they can support emergency preparedness infrastructure while being in alignment with Maryland's long-term carbon reduction goals.

As noted above, existing CHP technologies are fully compatible with renewable natural gas, and existing CHP systems will emit lower and lower amounts of GHG as RNG penetrates the natural gas delivery infrastructure. For the longer term, most CHP prime mover manufacturers are developing, and in some cases already field-testing, CHP systems capable of operating on 100% hydrogen – hydrogen that can be generated by excess renewable electricity sources during periods of low demand, where now these resources are often curtailed.

These developments create a pathway for CHP systems to significantly reduce carbon emissions in the near-term and show an economically viable zero-carbon energy generation solution for the future.

As of 2016, Maryland had 2,645 MW of CHP technical potential capacity at 4,920 sites, including at industrial facilities, military installations, office buildings, colleges and universities, hospitals, and schools. The legislation would allow Maryland to tap into this technical potential and reduce its emissions.

Historically, the environmental community has supported CHP as highly efficient and certainly more efficiency than separate heat and power represented by grid electricity and distributed boilers.

Today, the U.S. Environmental Protection Agency website states: *"… EPA's CHP team works with CHP stakeholders to reduce air pollution and water usage associated with electric power generation by increasing the use of CHP. EPA's goal is to remove policy barriers and to*

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

facilitate the development of new projects in the United States and its territories by promoting the economic, environmental, and reliability benefits of CHP."[3]

The U.S. Department of Energy website currently states; *"Combined heat and power (CHP) technologies hold enormous potential to improve the nation's energy security and resiliency. The Department of Energy (DOE) has long championed CHP technologies and is now prepared to harness the full power of CHP to help the nation meet its energy goals."*[4]

The Natural Resources Defense Council in 2013 stated in their report on CHP that; *"Improving the energy efficiency of our manufacturing facilities, buildings, and homes can help us meet our energy challenges affordably. However, seizing greater energy-efficiency opportunities in these sectors will require diverse strategies to meet national and state energy, environmental, and economic goals, including the deployment of better-performing energy-efficient technologies and systems. Combined heat and power (CHP)—an integrated system that simultaneously generates electricity and useful thermal energy (e.g., steam) from a single fuel—is a versatile technology that can generate useful energy more efficiently, and thereby significantly and economically improve energy efficiency and deliver substantial benefits for end-user facilities, utilities, and communities."*[5]

The World Wildlife Fund's 2000 Tellus Institute Study of New England energy markets concluded that; "*The potential for highly efficient cogeneration, or combined-heat-and-power (CHP), in New England is substantial. Cogeneration is a well understood technology with a long history, which now has great potential for economic and environmental benefits in industrial and community energy systems, owing to ongoing technological advances. Instead of producing thermal energy for manufacturing processes on site, at efficiencies of about 70 percent, while purchasing electricity from central station power plants. These generating facilities currently operate at about 30 to 40 percent efficiency, with higher efficiency plants becoming available. With cogeneration, both thermal energy and electricity could be produced on site at overall efficiencies of 85 percent or higher. The "marginal" electricity generation, i.e., the generation obtained from the extra fuel above that need to meet the thermal loads, could range from about 70 to over 90 percent, far higher than that of efficient new power plants. Cogeneration using natural gas in advanced combustion turbines, or fuel cells in the near future (which could also use biomass), would provide very high efficiencies coupled with low carbon fuels. Thus, primary energy consumption, carbon emissions, and pollutant emissions would be dramatically reduced, while satisfying heating, cooling and electricity needs. Cogeneration could also help to mitigate market power, and thereby unjustifiably high electricity prices, which could emerge in some regions under de-regulation when there are too few electricity suppliers dominating the markets."*[6]

[3] https://www.epa.gov/chp/about-chp-partnership
[4] https://betterbuildingssolutioncenter.energy.gov/chp/chp-basics-benefits
[5] https://www.nrdc.org/sites/default/files/combined-heat-power-IP.pdf
[6] https://digital.library.unt.edu/ark:/67531/metadc226625/m2/1/high_res_d/WWFBinaryitem10671.pdf