

**BEFORE THE
OHIO PUBLIC UTILITY COMMISSION
POWER SITING BOARD**

In the Matter of:

**Public Hearing on
Ohio State University
Combined Heat & Power
Facility**

Case No. 19-1641-EL-BGN

**TESTIMONY OF PATRICIA SHARKEY
ON BEHALF OF THE MIDWEST COGENERATION ASSOCIATION
AND THE HEAT IS POWER ASSOCIATION**

JUNE 30, 2020

My name is Patricia Sharkey. I am testifying here today as the Policy Director of the Midwest Cogeneration Association (“MCA”) and the Executive Director of the Heat is Power Association (“HiP”). MCA is a non-profit trade association dedicated to promoting clean and efficient cogeneration technologies, including “combined heat and power” or “CHP”, in eight Midwest states, including Ohio. HiP is the national trade association representing the “waste heat to power” industry.

On behalf of our members, we appreciate the opportunity to provide testimony to the Power Siting Board in this proceeding today.

We would like to begin by applauding Ohio State University for its bold leadership to reduce Greenhouse Gas emissions across its campuses through the adoption of an updated and comprehensive Climate Action Plan in April 2020.

This Plan is both practical and ambitious. It is designed to optimize carbon reductions now and to reduce them further in the future.

For the Columbus Campus, it does so, in part, by investing in a state-of-the-art CHP system. This system will begin operations with natural gas as its fuel, but it has the flexibility to switch to “greener” fuels, such as hydrogen, as those fuels become technically and economically available at scale.

The Siting Application before the Board today projects a 45% annual reduction in CO2 emissions due to the installation of a CHP system which will both serve the campus' electricity requirements and also capture heat to meet the campus' thermal energy requirements. See Table 9, p. 39 of Application. For the Board's convenience, Table 9 is provided as **Exhibit A** to my testimony today.

The beauty of CHP systems is that they not only generate electricity more efficiently and more reliably than centralized utility generation, they also off-set the need to burn more natural gas to heat buildings and processes.

Importantly, this proposed CHP system will begin reducing the Columbus campus' energy carbon footprint by 45% on day one – not wait for years until greener fuels are available. As shown in Figure 18 in the Climate Action Plan, adding CHP electric and thermal generation to the campus energy plan will immediately and dramatically reduce CO2e emissions by almost 250,000 metric tonnes of CO2e in its first year of operation. See Figure 18, p. 31 of Climate Action Plan. For the Board's convenience, Figure 18 is provided as **Exhibit B** to my testimony today.

Figure 18 also shows this system will continue to out-perform other options year after year all the way through 2050.

This is even true when comparing CHP system CO2e reductions to an increasingly “green grid.”

It is also true even if the CHP system is not switched over to hydrogen or another renewable fuel within the anticipated timeframe.

Why do CHP systems fueled by natural gas result in lower carbon emissions than renewables, such as wind and solar?

It is a combination of reasons.

The first reason is because CHP provides “baseload” electricity while wind and solar are “intermittent” resources. If it relied on wind or solar, the Campus would be required to purchase dirtier centralized grid electricity when the sun doesn't shine or the wind doesn't blow. In contrast, CHP systems operate highly reliably, 24/7 – day in and day out. Indeed, modern CHP systems operate reliably 95-98% of the time.

Second, CHP not only produces cleaner electricity more reliably than intermittent wind and solar, by capturing waste heat, CHP also displaces the need to burn additional gas for thermal energy. Put another way, CHP results in 2 energy outputs for every quantum of fuel consumed. Further, economical renewable thermal energy is currently not

available in the marketplace at the scale needed to serve the Columbus Campus' thermal requirements.

Yes, the grid is expected to become “greener” and cleaner as wind and solar resources increase over the next few decades. But the OSU Plan factors that “greening” into its grid projections and CHP is still the better option for the environment right now.

Further, as mentioned, OSU has designed its CHP system to be “fuel neutral,” that is, to be able to run on hydrogen or renewable fuels once those fuels are available.

Importantly, OSU's Climate Action Plan recognizes there is a “time value” for carbon reductions.

That is, because Greenhouse Gas emissions are cumulative in the atmosphere and the “tipping point” for irreversible climate change is fast approaching, carbon reductions we can make now have more value for the environment than carbon reductions in the future. This point has been written about extensively in the scientific literature. I would direct the Board to a 2017 article titled Time Value of Carbon by Larry Strain for a fuller discussion. <http://www.siegelstrain.com/wp-content/uploads/2017/09/Time-Value-of-Carbon-170530.pdf>

I will close by saying, the University should be applauded for recognizing the urgency to reduce carbon now and fashioning a Climate Action Plan that begins immediately and dramatically ratcheting down carbon emissions with well-established CHP technology.


For more information on CHP technology, I would direct the Board to the following Fact Sheets produced by the Combined Heat and Power Alliance:

- Infrastructure brief and factsheet: <https://chpalliance.org/chp-alliance-releases-a-comprehensive-brief-on-chp-and-infrastructure-plans/>
<https://chpalliance.org/resources/brief-on-chp-and-infrastructure-planning/>
- Emissions factsheet: <https://chpalliance.org/resources/alliance-factsheet-on-chp-and-whp-as-smart-solutions-to-reduce-emissions/>
- Colleges & Universities factsheet: https://chpalliance.org/wp-content/uploads/2020/02/CHP-Colleges-and-Universities-Factsheet_FINAL.pdf

We urge the Power Siting Board to approve OSU's Combined Heat and Power Facility application and thank you for the opportunity to present this testimony.

Date: June 26, 2020

Respectfully Submitted,



Patricia F. Sharkey

On behalf of the
Midwest Cogeneration Association and
Heat is Power Association

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Table 9. Net present value comparison for the CHP vis a vis no CHP case

All \$ figures in million USD			
	No CHP		Midwest CHP/DHC
		\$M	\$M
1. CAPEX	In-building heating/cooling for IRF, Rev1, ASF & EIC ²	27	73 MW CHP (expandable to 100MW), central MW campus chiller, electrical connections
	Existing in building chiller replacements ³	9	
	Steam & condensate Phase IV ⁴	3.8	
	Steam & condensate Phase V ⁵	8.3	New midwest chilled water and heating hot water network, extension into West Campus and connections to Ambulatory, Conversion of existing MW campus buildings and Schottenstein center
	Steam & condensate Phase VI ⁶	11.3	
	McCracken boiler #5 replacement	7.7	
	McCracken boiler #1 replacement	8	11.1
	Future west campus expansion in-building equipment ⁷	46	
	McCracken to lane steam line replacement ⁸	5.1	
TOTAL		\$ 126	\$ 299
2. Annual 30-yr Average Net Operating, Electricity, Fuel Costs & Variable Fee costs		\$ 61	\$ 48
3. Net Present Value to Ohio State ¹ vis-à-vis "No CHP" case 2021 to 2050		Baseline case	\$ 150
3. CO ₂ profile - tons/year ⁹		421,492 Baseline case	231,96745%
% reduction vis-à-vis As Is case			
4. Other Considerations			
Future additional benefits	None	Initiate main campus steam to hot water conversion (save \$ and CO ₂)	
Microgrid – resiliency – islanding	NO	Capital & energy savings on future buildings in west and midwest	
Steam to HHW conversion	NO	WMC and other main campus bldgs	
Location	NO	Major asset to enable HHW switch	
McCracken Retirement	NO	Enables services to west and main	
Etc		Enables future retirement of McCracken	

Note: Items 2 through 8 below indicate the scope of capital expenditures that needs to be done between 2021 and year 2050 if the CHP and the new heating hot water-based district heating and cooling system is not built. With the CHP and the heating hot water-based district heating system, the existing steam and condensate piping listed below will be rendered obsolete and can be abandoned. Furthermore, the new district heating and cooling system will eliminate the need, and the cost, for in-building heating and cooling systems listed below.

¹ Net present value of all cash flows from Ohio State vis-à-vis "no CHP" case using Ohio State's discount rate

² Total cost of installing in-building heating and cooling systems for the buildings that are being designed for construction by Ohio State west of Kenny Road and south of Lane Avenue (Interdisciplinary Research Facility, Rev1 Ventures new building, Ambulatory Services Facility, Energy Innovation Center)

³ Total cost of in-building heating and cooling systems end-of-life replacements in existing Ohio State buildings west of the Olentangy River by year 2050.

⁴ End of life replacement of steam and condensate piping near psychology building

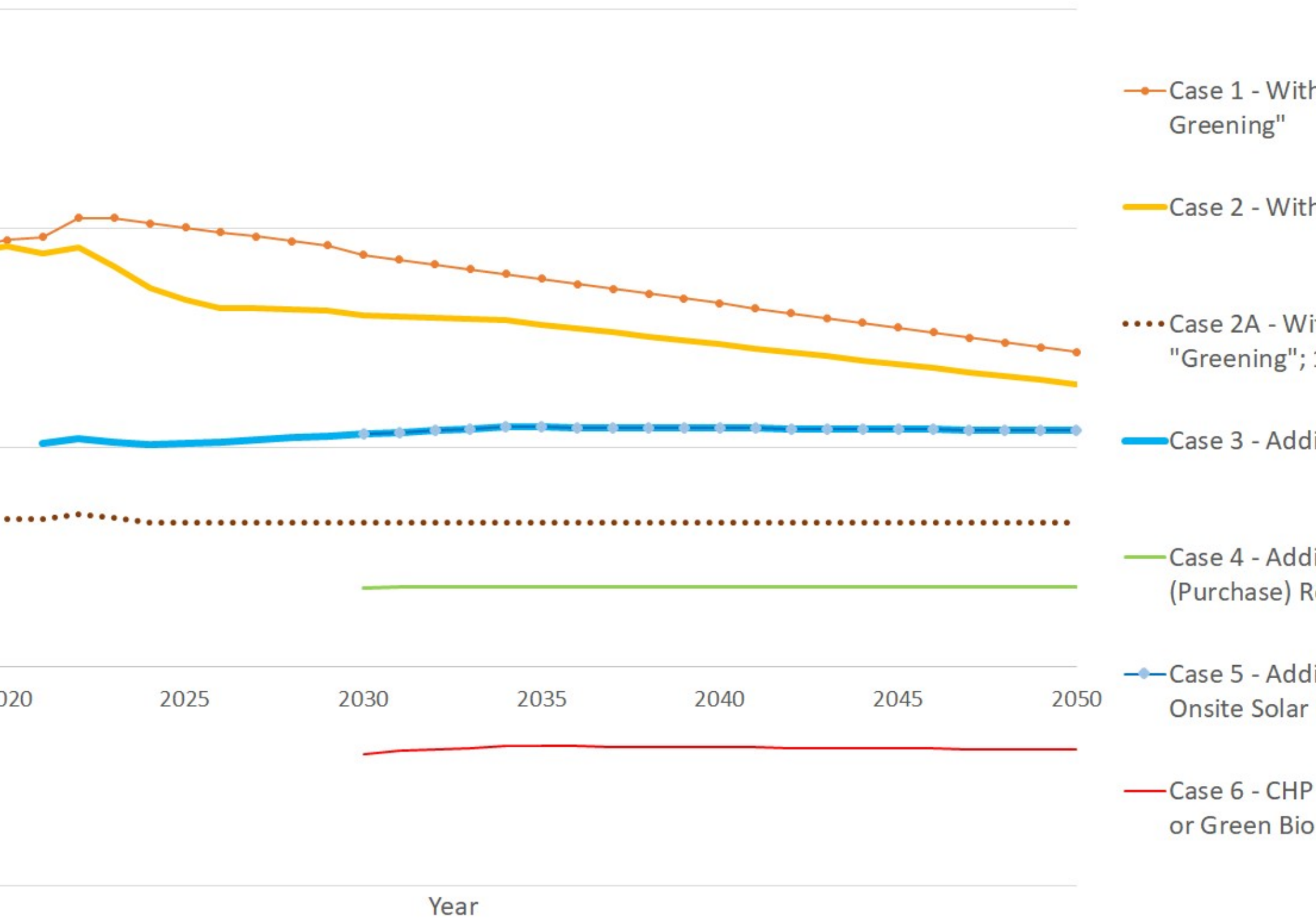
⁵ End of life replacement of steam and condensate piping on the southern part of the campus west side of Olentangy River and east of State Highway 315

⁶ End of life replacement of steam and condensate piping on the central part of the campus west side of Olentangy River and east of State Highway 315

⁷ Total cost of installing in-building heating and cooling systems for the buildings planned to be built by Ohio State in the near future west Olentangy River as part of Framework 2.0 (except those buildings listed in Note 2 above)

⁸ End of life replacement of steam and condensate piping that runs from McCracken to Lane Avenue, east of Ohio Stadium

CO₂ Emissions by Year - Projections for Future Possible Cases



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Summary: Public Comment Testimony of Patricia Sharkey with supporting exhibits.
electronically filed by Ms. Mary E Fischer on behalf of Ohio Power Siting Board