BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the Self-Generation Incentive Program and Related Issues.	Rulemaking 20-05-012

REPLY COMMENTS OF THE COMBINED HEAT AND POWER ALLIANCE IN RESPONSE TO QUESTIONS FOR ADDITIONAL COMMENT ON RENEWABLE GENERATION FUELS AND TECHNOLOGIES

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The Combined Heat and Power Alliance (CHPA) files these Reply Comments pursuant to the March 2, 2021 Assigned Commissioner's Ruling Requesting Comment regarding the Self-Generation Incentive Program (SGIP) and additional questions on renewable generation fuels and technologies (Assigned Commissioner's Ruling). The CHPA is a national coalition of business, labor, contractor, non-profit organizations, and educational institutions with the common purpose to educate all about Combined Heat and Power (CHP), and how CHP can make manufacturers and other businesses more competitive, reduce energy costs, enhance grid and customer reliability, and reduce emissions.[1]

With these reply comments, CHPA fully endorses the recommendations put forth by the California Clean DG Coalition (CCDC) in their comments filed on March 22, 2021 regarding two questions in this ruling:

1. Remove directed biofuels as an eligible fuel?
2. Remove internal combustion engines from the list of eligible technologies?

Refer to pages 3-12 for the CCDC comments that recommend the California Public Utilities Commission establish clear eligibility criteria and use requirements for directed biogas and allow customers to choose among a variety of technologies, rather than arbitrarily eliminating an entire category of equipment, internal combustion (IC) engines, from SGIP eligibility.

[1] Combined Heat and Power Alliance. "Membership." 2021. https://chpalliance.org/membership/

CCDC Comments:

Introduction and Summary of Position

CHP is an established energy efficiency measure, capable of reliably supplying both electric and thermal energy using a single fuel input, while reducing greenhouse gas (GHG) and other criteria pollutant emissions. It can and should play a vital role in ensuring resiliency during different types of outages. It also affords businesses, industrial operations, healthcare and university campuses, and other mixed-use campuses with a reliable, efficient and environmentally responsible source of energy. These attributes demonstrate that CHP has an important role to play as California transitions to a carbon neutral future.

CHP technologies are able to run on a variety of fuels, including renewable natural gas and other clean fuels that become available. California energy consumers are best served by having access to a variety of CHP technologies and fuel sources that can meet the varying needs and preferences of different users and applications.

CCDC recommends that the California Public Utilities Commission (Commission) allow customers to choose among a variety of technologies, rather than arbitrarily eliminating an entire category of equipment, internal combustion (IC) engines, from SGIP eligibility. Allowing such choice would facilitate the equitable market-based deployment of CHP, while also ensuring the state maximizes the benefits associated with CHP. Accordingly, rather than eliminating IC engines from SGIP eligibility, the Commission should consider use of performance standards to more equitably and reasonably set limits for renewable generating technologies.

CCDC similarly recommends that the Commission not remove directed biogas as an SGIP-eligible fuel, but rather establish clear eligibility criteria and use requirements for directed biogas.

Response to Assigned Commissioner's Ruling

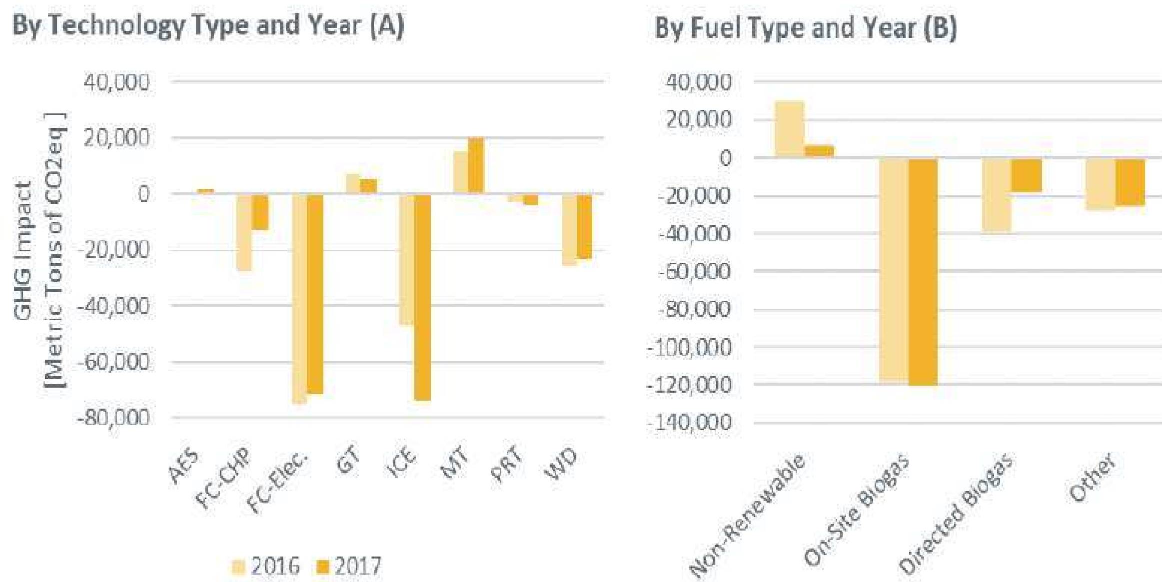
Should the Commission revise SGIP renewable generation technology requirements to:

1. **Remove directed biofuels as an eligible fuel?**

The Commission should establish clear eligibility criteria and use requirements relating to directed biogas, as it generally does not promote the use of on-site generation at the location where the biofuel is produced.[2] The result is that use of directed biogas does not create direct, on-site emissions reductions. SGIP Impact Evaluation reports clearly show that on-site biogas has made some of the strongest contributions towards GHG emission reductions; much of that impact has come from IC engines.

[2] CCDC also notes that due to pricing disparities between fuel used for vehicles and fuel used for power generation, directed biogas sources are presently primarily being used in vehicle applications due to the Low Carbon Fuel Standard incentive structure.

FIGURE ES-3: GREENHOUSE GAS IMPACTS BY TECHNOLOGY TYPE (A) AND YEAR, AND FUEL TYPE (B) AND YEAR



Source: Itron, 2016-2017 Self-Generation Incentive Program Impact Evaluation (September 28, 2018), p. ES-7.

It is also worth noting that in 2017, directed biogas projects resulted in a slight increase in GHG emissions due to biogas contracts expiring.[3] For example, for impact evaluation purposes, Itron assumed that directed biogas projects consume biogas for five years from upfront payment date; after five years directed biogas projects are assumed to consume 100% nonrenewable gas.[4]

If the Commission chooses to allow continued SGIP eligibility for directed biogas, it should establish clear eligibility criteria and requirements for its use to ensure the state obtains the desired GHG emission reduction and other benefits. Appropriate eligibility criteria and use requirements will ensure real, verifiable reductions in GHG (and other pollutant) emissions, which in turn will help the state deliver faster de-carbonization. Such measures will promote the construction of more renewable infrastructure and ensure a more level playing field for new in-state supplies of biogas which, when combined with combustion technologies like IC engines, will continue to

[3] Itron, 2016-2017 Self-Generation Incentive Program Impact Evaluation (September 28, 2018), p. ES-7.
[4] *Id.* at p. 6-14, footnote 2.

contribute to significant reductions in both GHG and criteria pollutant emissions at some of the lowest cost per ton of GHG reduced.[5]

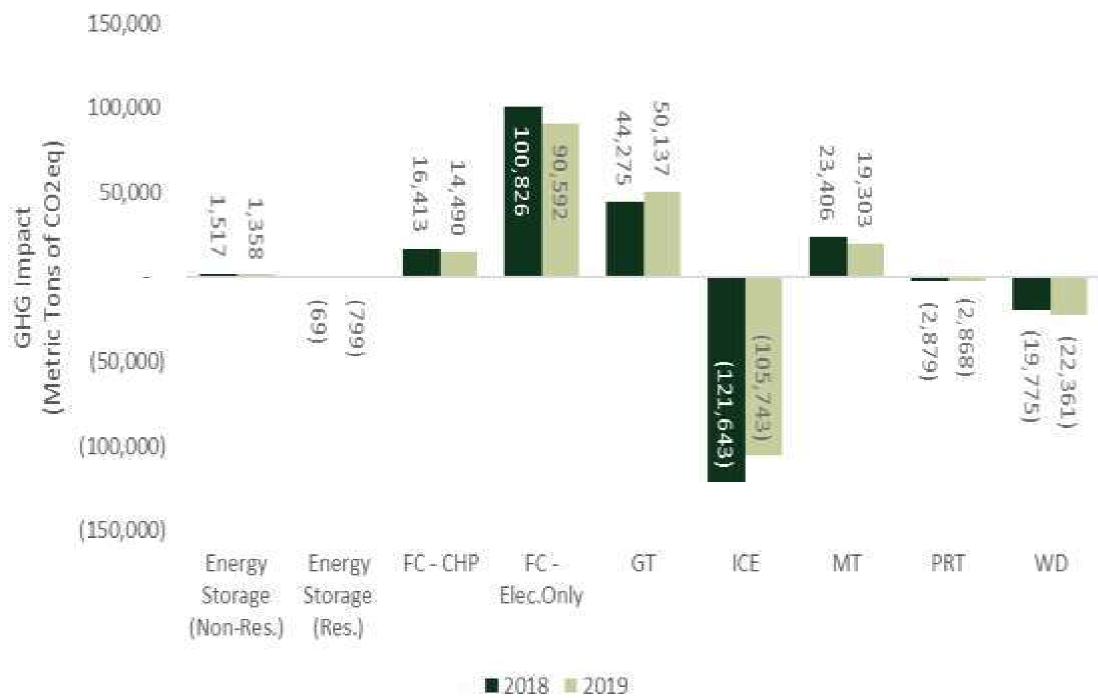
2. Remove internal combustion engines from the list of eligible technologies?

The Commission should not remove IC engines from the list of technologies eligible for SGIP.

California energy consumers are best served by having access to a variety of CHP technologies that can meet the varying needs and preferences of different users and applications. Allowing customers to choose among a variety of technologies is the fairest, market-based approach. Rather than arbitrarily eliminating an entire category of equipment, IC engines, the Commission should use performance standards to more equitably and reasonably set limits for renewable generating technologies. CCDC's response focuses on the benefits of the suite of CHP solutions, including solutions that use IC engines.

Information presented at a November 12, 2020 CPUC SGIP Renewable Generation Workshop clearly shows that IC engines had some of the strongest contributions towards GHG emission reductions in 2018 and 2019. Following is an excerpt from the CPUC's presentation showing draft 2018-2019 SGIP Impact Evaluation Findings[6]:

[5] *See, e.g.*, Itron, 2016-2017 Self-Generation Incentive Program Impact Evaluation (September 28, 2018), Figure ES-4.
[6] Self-Generation Incentive Program Workshop (November 12, 2020), p. 5.



Source: Verdant Associates, November 2020.

Progress is being made with respect to the use of clean fuels. For example, the INNIO Jenbacher IC engine is one of the first systems to run on 100% hydrogen fuel.[7] Other engine and turbine-based CHP manufacturers are also investing in research, development and testing to increase hydrogen blends in their CHP solutions.[8] Elimination of IC engines would unnecessarily slow the state's progress towards meeting its aggressive goals for a lower carbon future.

As stated in the U.S. Environmental Protection Agency (USEPA) Combined Heat and Power Partnership's *Biomass Combined Heat and Power Catalog of Technologies*:

> There are many potential advantages to using biomass instead of fossil fuels for meeting energy needs. Specific benefits depend upon the intended use and fuel source, but often include: greenhouse gas and other air pollutant reductions, energy cost savings, local economic development, waste reduction, and the security of a domestic fuel supply. In addition,

[7] *See*: https://www.innio.com/en/news-media/news/press-release/new-hydrogen-engine-from-innio-ready-for-operation-after-passing-all-tests
[8] *See*: https://www.capstoneturbine.com/news/press-releases/detail/3799/

> biomass is more flexible (e.g., can generate both power and heat) and reliable (as a non-intermittent resource) as an energy option than many other sources of renewable energy.
>
> Biomass fuels are typically used most efficiently and beneficially when generating both power and heat through CHP. CHP, also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source, such as biomass/biogas, natural gas, coal, or oil. CHP provides:
>
> - **Distributed generation** of electrical and/or mechanical power.
> - **Waste-heat recovery** for heating, cooling, or process applications.
> - **Seamless system integration** for a variety of technologies, thermal applications, and fuel types into existing building infrastructure.
>
> CHP is not a single technology, but an integrated energy system that can be modified depending on the needs of the energy end user. The hallmark of all well-designed CHP systems is an increase in the efficiency of fuel use. By using waste heat recovery technology to capture a significant proportion of heat created as a byproduct in electricity generation, CHP systems typically achieve total system efficiencies of 60 to 80 percent for producing electricity and thermal energy. These efficiency gains improve the economics of using biomass fuels, as well as produce other environmental benefits. More than 60 percent of current biomass-powered electricity generation in the United States is in the form of CHP. [9]

CHP solutions using biogas fuel sources, including those with IC engines, provide numerous benefits. As discussed herein, CCDC believes the Commission should allow customers to choose the best solution for their needs among the full suite of CHP technologies and, therefore, that it is more appropriate to focus on performance standards, rather than arbitrarily include or exclude categories of technologies. However, because Question 2 in the Assigned Commissioner's Ruling focuses on IC engines, CCDC provides the following information regarding the benefits of IC engines; many of these or similar benefits are also provided by other CHP technologies:

- IC engines can result in increased efficiency due to the variety of heat recovery sources, thus achieving the highest amount of GHG emission reductions

[9] *See:* https://www.epa.gov/sites/production/files/2015-07/documents/biomass_combined_heat_and_power_catalog_of_technologies_v.1.1.pdf.

- IC engines are robust and reliable

- IC engines can withstand excursions in gas quality, which can be endemic to on-site biogas due to the presence of hydrogen sulfide and siloxanes. If damaged, IC engines can be readily rebuilt, at reasonable cost

- IC engines offer least first-cost, moderate maintenance costs and long equipment life

- IC engines offer substantial diversity with respect to sizes (kW) and suppliers

- IC engines can accommodate a variety of gaseous and liquid fuel blends, including all forms of alternative fuels, such as hydrogen

- IC engines are able to “load follow” power plants that adjust their power output as demand for electricity fluctuates

- IC engines can “Black Start,” i.e., start without the need for an external power network to recover from a shutdown, which means no batteries, capacitors or flywheels are needed to turn on when the grid is not available

- IC engines have unique generation characteristics, either through the use of spinning reserves and inverters or simple synchronous generation, which means they can tolerate much more stress from the grid, localized disturbances, or frequency and voltage deviations than traditional inverters, used on other renewable equipment, can tolerate

- Driven by California Air Resources Board (CARB) emissions requirements and due to CHP configurations and high efficiencies, IC engines emit fewer criteria air pollutants and GHGs then utility scale generators or biogas flares

A comparison of CHP generation technology characteristics from the USEPA Combined Heat and Power Partnership’s *Biomass Combined Heat and Power Catalog of Technologies* can be seen in the following table (emphasis added)[10]:

[10] *See:* https://www.epa.gov/sites/production/files/2015-07/documents/biomass_combined_heat_and_power_catalog_of_technologies_v.1.1.pdf, p. 63.

Table 6-1. Comparison of Prime Mover Technologies Applicable to Biomass

Characteristic	Prime Mover					
	Steam Turbine	Gas/ Combustion Turbine	Micro-turbine	Reciprocating IC Engine	Fuel Cell	Stirling Engine
Size	50 kW to 250 MW	500 kW to 40 MW	30 kW to 250 kW	Smaller than 5 MW	Smaller than 1 MW	Smaller than 200 kW
Fuels	Biomass/ Biogas-fueled boiler for steam	Biogas	Biogas	Biogas	Biogas	Biomass or Biogas
Fuel preparation	None	PM filter needed	PM filter needed	PM filter needed	Sulfur, CO, methane can be issues	None
Sensitivity to fuel moisture	N/A	Yes	Yes	Yes	Yes	No
Electric efficiency (electric, HHV)*	5 to 30%	22 to 36%	22 to 30%	22 to 45%	30 to 63%	5 to 45%
Turn-down ratio	Fair, responds within minutes	Good, responds within a minute	Good, responds quickly	Wide range, responds within seconds	Wide range, slow to respond (minutes)	Wide range, responds within a minute
Operating issues	High reliability, slow start-up, long life, maintenance infrastructure readily available,	High reliability, high-grade heat available, no cooling required, requires gas compressor, maintenance infrastructure readily available	Fast start-up, requires fuel gas compressor	Fast start-up, good load-following, must be cooled when CHP heat is not used, maintenance infrastructure readily available, noisy	Low durability, low noise	Low noise
Field experience	Extensive	Extensive	Extensive	Extensive	Some	Limited
Commercialization status	Numerous models available	Numerous models available	Limited models available	Numerous models available	Commer-cial introduction and demonstr-ation	Commercial introduction and demonstr-ation
Installed cost (as CHP system)	$350 to $750/kW (without boiler)	~ $700 to $2,000/kW	$1,100 to $2,000/kW	$800 to $1,500/kW	$3,000 to $5,000 /kW	Variable $1,000 to $10,000 /kW
Operations and maintenance (O&M) costs	Less than 0.4 ¢/kWh	0.6 to 1.1 ¢/kWh	0.8 to 2.0 ¢/kWh	0.8 to 2.5 ¢/kWh	1 to 4 ¢/kWh	Around 1 ¢/kWh

* Efficiency calculations are based on the higher heating value (HHV) of the fuel, which includes the heat of vaporization of the water in the reaction products.

As stated by the California Energy Commission (CEC):

> Renewables will be an ever-increasing part of California's energy mix; within the next decade a substantial number of energy users will meet a portion of their electricity requirements with solar photovoltaics (PV). As indicated in Table 49, Senate Bill 350 (DeLeon, 2015, Chapter 547) increases the Renewable Portfolio Standard (RPS) to 50% by 2030. However, due to intermittent generation and space limitations, PV can seldom meet the entire electricity load, making room for CHP to supply clean, low GHG electricity when PV electricity is insufficient or unavailable. In addition to providing electricity, CHP systems provide useful thermal energy for on-site needs.[11]

Additionally, due to the diversity of suppliers, generation capacity sizes, sources of heat recovery and smaller footprints, smaller engine and turbine-based CHP systems are well suited for use in markets that do not lend themselves well to various applications, especially those markets and industries that cannot easily install PV. The highlighted market segments in the tables below are those that would be more easily served by an engine or turbine-based solution than many other generation technologies[12]:

[11] California Energy Commission, *A Comprehensive Assessment of Small Combined Heat and Power Technical and Market Potential in California*, CEC-500-2019-030, p. 94, Tables B-2 and B-4.
[12] *Id*.

Table B-2: Technical Potential for 50 kW to 5 MW CHP in California, by Application

Application	Sites	Capacity(MW)
Office Buildings	8,904	1,410
Multi-Family	3,140	629
Schools (k-12)	2,668	430
Other Commercial	2,571	1,492
Other Industrial	2,156	831
Big Box Retail	1,624	292
Hotels	1,546	416
Food Sales	1,358	208
Government	1,130	378
Food Processing	1,115	515
Nursing Homes	813	90
Restaurants	813	74
Chemicals	796	615
Rubber and Plastics	516	117
Colleges/Universities	509	498
Hospitals	398	489

Table B-4: Technical Potential for 10-50 kW Micro-CHP in California, by Application

Application	Sites	Capacity (MW)
Restaurants	33,297	905
Retail Stores	22,105	489
Office Buildings	20,745	400
Laundries	7,675	181
Other Commercial/Institutional	3,619	69
Government	3,736	81
Food Sales	3,483	96
Nursing Homes	2,723	66
Hotels	2,136	54
Airports	1,511	33
Multi-Family	1,398	29
Schools	1,326	38

Many of these market segments are considered to be essential businesses and/or facilities that provide essential services for society at large and thus should have the opportunity to utilize the “right fit” technology to provide for reliability and resiliency. In addition, if affordable volumes of directed biogas were available for use at these types of facilities the benefits to both society and the businesses would be significant.

Conclusion

CHPA appreciates the Commission’s consideration of these reply comments and respectfully requests that the recommendations put forth by the CCDC herein be adopted.

DATED: March 29, 2021

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