

Maryland Energy Administration FY21 CHP Program

Informational Webinar Session

Brandon Bowser, CHP & Energy Resilience Program Manager



Maryland
Energy
Administration



Agenda

- CHP Basics
- Good CHP Candidates
- FY21 MEA CHP Grant Program
- Resilient Maryland Program
- Utility Incentives
- Additional Financing Resources
- Q & A



CHP Basics

What is CHP?
How does it work?
What are the benefits?



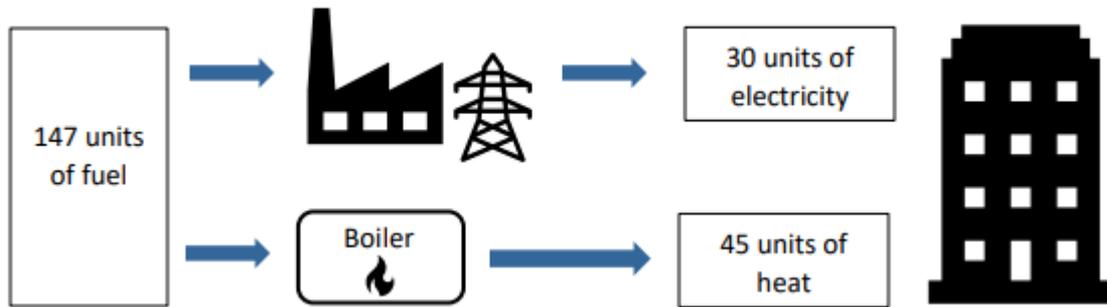
CHP Overview

CHP: Combined Heat and Power

- System that produces electricity and usable heat from one fuel source
- Is a type of Distributed Energy Resource (or “DER”)
- Also known as “cogeneration,” “cogen,” or “trigeneration”
- Wide array of types, can be combusting or non-combusting
- Versatile fuel sources (e.g. natural gas, biogas, hydrogen, etc.)
- Highly-efficient, cleaner, and more affordable energy



Traditional Energy Setup



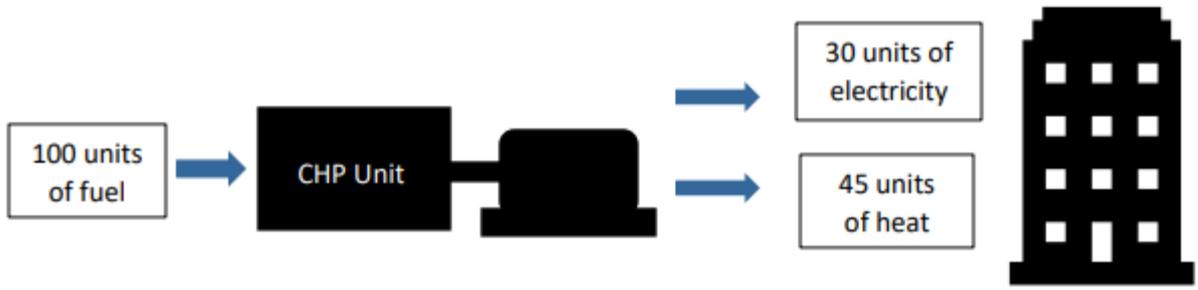
Only about

51%

Combined
Electrical and
Thermal
Efficiency



CHP Setup



About
75%
Combined
Electrical and
Thermal
Efficiency

CHP: Technologies

Technology Types

- Reciprocating Engines
- Turbines
- Microturbines
- Micro-CHP (<60 kW)
- Waste Heat to Power
- Fuel Cells (non-combusting)

Fuel Types

- Natural Gas
- Biogas
- Biomass
- Hydrogen



CHP: Heat Recovery & Use

- Heat typically recovered from engine block and/or exhaust
- Converted to useable thermal energy, typically steam or hot water, in a heat exchanger
- Can also be sent to an absorption cooler to create chilled water (typically used in trigeneration setups)
- Common applications of thermal energy include space conditioning, domestic hot water production, varying grades of steam, process-specific applications (e.g. manufacturing)



CHP: Value Creation

- CHP systems are **continuous generators**, meaning they don't typically turn on/off in response to varying energy demands
- Ideal for **baseload** energy needs
- 67% of CHP energy output is thermal – the more used, the better the project economics
- Maximizing the annual use of both electrical and thermal output is key
- Otherwise energy is wasted, which means money is wasted (degrades economics)



CHP – Resilience Benefits

- CHP systems can be designed to operate independently of the electricity grid
- Include **black start** technologies which allow unit to restart after grid goes down
- Can then enter **islanding mode** and continue providing electricity and heat to essential loads
- Can continue operating absent grid power as long as fuel is available
- Allows organizations to avoid downtime losses (e.g. manufacturers) and mitigate against threats to life and property (e.g. hospitals, wastewater treatment facilities, multifamily housing)



CHP Value Proposition

Reduces Energy Expenses

- Improves bottom line
- “2 for 1” energy solution (buy fuel to serve two purposes)
- Frees capital for other projects

Improves Sustainability

- Provides more efficient energy
- Fewer greenhouse gas emissions than utility-sourced energy

Mitigates Risk

- Can be constructed to black start and island absent grid power
- Avoids costly downtime
- Prevents essential loads from losing power

Provides More Control

- Allows facilities staff more direct control of energy management
- Diversifies facility energy options
- Can be paired with other DERs such as solar PV and storage (e.g. a microgrid configuration)



Good CHP Candidates

What facility attributes are ideal?
What other factors impact the decision?



Ideal Facility Attributes

- Continuous need for electrical and thermal energy
- Ability to maximize application of thermal energy throughout year
- Sufficient space for CHP system siting
- Existing access to fuel source or ability to affordably obtain it



Examples of Ideal Candidates

- Hospitals/Medical Facilities
- Wastewater Treatment Plants
- Manufacturers and Industrial Entities
- Hotels/Hospitality Industry
- Multifamily Housing Complexes
- Essential Government Infrastructure

This is not an exclusive list.

If a facility can usefully employ most of the annual energy output from a CHP system, it is likely a good candidate!



Economic CHP Drivers

- A primary driver on the decision to pursue CHP is the **spark spread** – the difference between the price of retail electricity and the CHP fuel (typically natural gas)
- The larger this difference – i.e. the higher the price of electricity, the lower the price of fuel – the more beneficial the CHP option becomes and the more quickly it repays itself
- When the spark spread is not large, a CHP system takes longer to pay itself off, potentially exceeding the expected useful life of the system (typically 20 years)
- Organization decision-makers should always be cognizant of these financials when making the decision to go with CHP



More CHP Resources

- MEA's [CHP Resource Guide](#)¹ available on our [CHP webpage](#)²
- U.S. Department of Energy [CHP Basics resource page](#)³
- [U.S. Environmental Protection Agency CHP Partnership](#)⁴
- U.S. DOE Better Buildings [CHP Technical Assistance Partnerships](#)⁵



U.S. DOE CHP eCatalog

- U.S. Department of Energy provides a searchable database of packaged CHP systems available free of charge to organizations contemplating CHP: the [CHP eCatalog](#)⁶
- Allows users to filter on many metrics, including system type, capacity, thermal output, container size, etc.
- Also provides information on CHP packagers, solution providers, and customer engagement partners
- MEA highly encourages interested parties to use this resource in their planning



FY21 CHP Grant Program

Incentive Overview
Eligibility Requirements
Incentive Calculation
How to Apply





Since FY 2015:

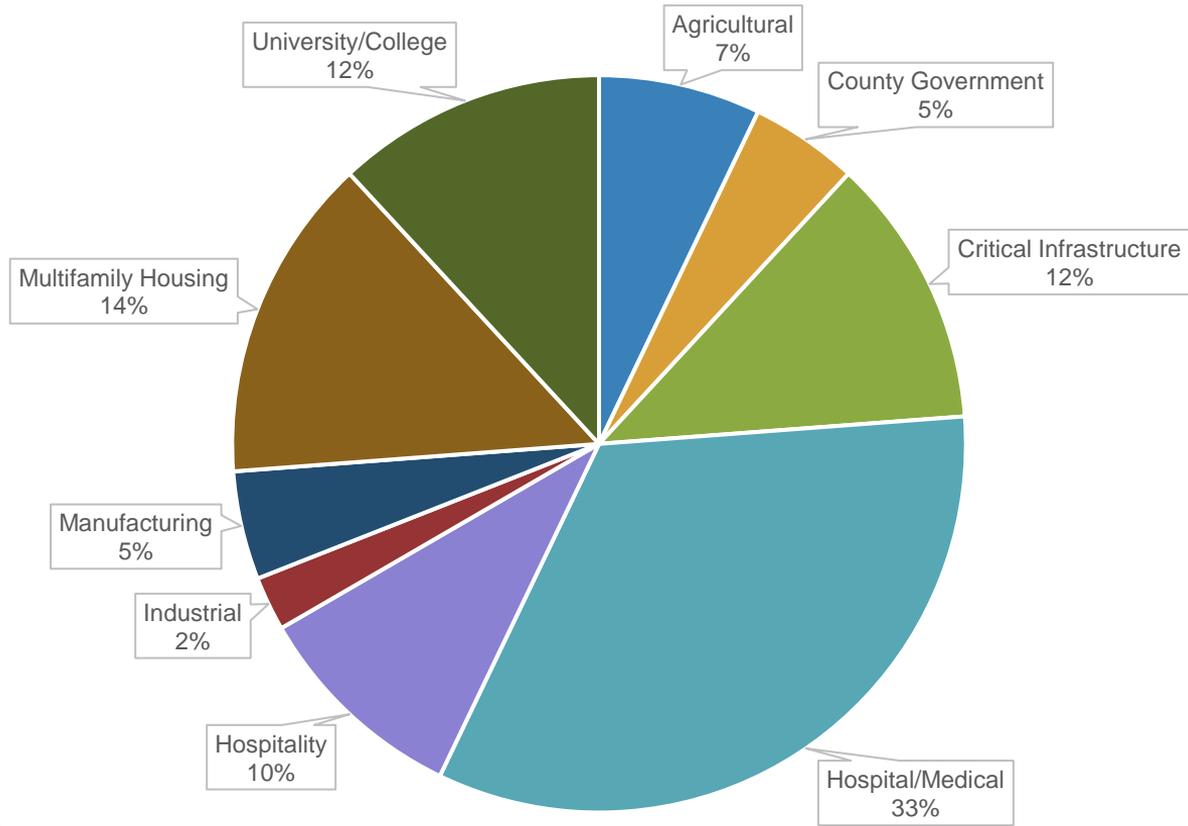
42 active and completed awards

Value of over **\$13** million dollars

Broad appeal: agricultural, county government, critical infrastructure, hospital/medical, hospitality, industrial, manufacturing, multifamily housing, and university/college



MEA CHP Total Active and Completed Awards, FY 2015 - Present



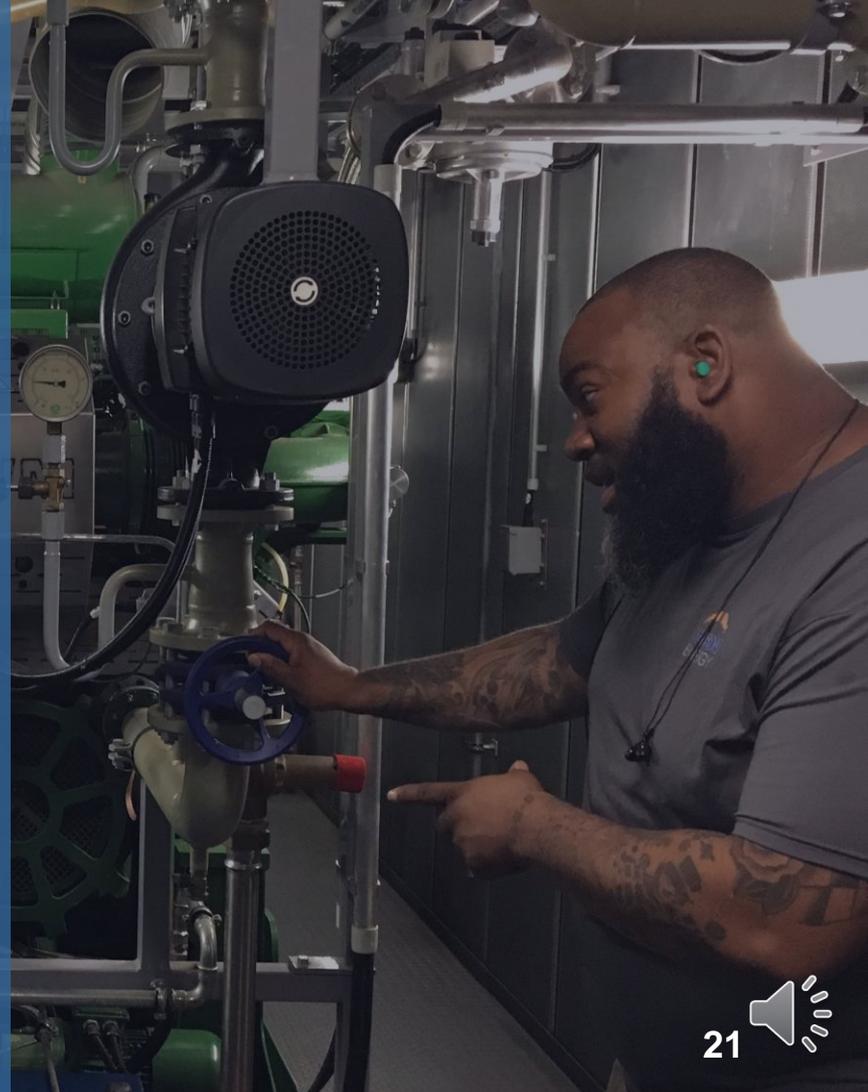
INSIGHTS

**Influx in demand for smaller, packaged units
in multifamily housing complexes (FY 2019 – 20)**

**Developers are integrating packaged CHP
as part of clean, efficient facility management
strategies**

**Growing emphasis on resilience benefits over
economic benefits**

**Increase in thermal load-following systems to
enhance resilience in FY20**



Overview

- Provides grant funds for qualified CHP systems installed by Maryland commercial, industrial, critical infrastructure, and other commercial-scale organizations
- Up to **\$3.26 million** available, subject to funding availability
- Offered in **two funding rounds** in FY21; \$1.63 million in each
- First-come, first served basis
- Up to **\$600,000** per project, calculated based on \$ / kW of capacity
- Up to 20% more if using biogas or employing resilience technologies

Eligible Entities

Businesses

Nonprofits

Critical Infrastructure

Manufacturers

Industrial
Organizations

Chemicals &
Pharmaceuticals

Colleges &
Universities

Public & Private
Schools

Multifamily Housing

Hotels / Hospitality

Agricultural

Local, State, and
Federal Government

...and others!



Efficiency Requirement

- Eligible CHP systems must achieve at least 60% higher heating value (HHV) annual fuel use efficiency
- MEA may grant exceptions to this requirement, to a minimum of 55%, if achieving 60% is not technologically or economically feasible (but this is not guaranteed)
- Fuel cells must achieve at least 50% higher heating value (HHV) annual fuel use efficiency
- Annual HHV efficiency is calculated as follows (all figures in MMBtu):

$$\text{HHV Fuel Use Efficiency} = \frac{\text{Electricity Produced} + \text{Thermal Energy Captured and Used}}{\text{Fuel Consumed}}$$

Funding Categories

- MEA offers funding in three Areas of Interest (AOIs)
- **AOI 1: CHP for Energy Resilience:** Funding for CHP systems primarily meant to enhance energy resilience of a facility. Eligible systems must include black start and islanding capability
- **AOI 2: CHP for Energy Efficiency:** Funding for CHP systems primarily meant to improve facility energy efficiency and affordability of energy. Black start and islanding not required, but systems must achieve full simple payback in no more than 20 years.
- **AOI 3: Fuel Cells:** To encourage the use of emerging and innovative fuel cell technologies, funding is provided under this AOI for fuel cells. Systems must achieve at least 50% HHV annual fuel use efficiency.

Base Incentive Calculation

- Grants are calculated in a tiered structure based on nameplate capacity and are **capped at \$600,000 total**
- These figures have been **updated for FY21** in response to the COVID-19 pandemic's impact on capital financing and for ease of calculation

Capacity Range	Incentive Amount
Micro-CHP (Equal to or less than 60 kW)	Up to 50% of the total project costs, not to exceed \$100,000 total
Between 61 kW and 500 kW	Up to \$600/kW
Between 501 kW and 1 MW	Up to \$550/kW
Greater than 1 MW	Up to \$500/kW

Resilience/Biogas Multiplier

- AOI 1 projects, AOI 3 projects which include resilience technologies, and systems which include an anaerobic digester (AD) to produce biogas to fuel the CHP system are eligible for an additional incentive
- Black start/islanding technologies and biogas systems are more expensive than traditional CHP setups
- Additional incentive is calculated as a multiplier to the base grant amount, **at up to 20%** (the multiplier will be determined by MEA on a case-by-case basis after thorough review of the proposal and funding availability of the CHP Grant Program)
- Example 1: 1,100 kW Natural Gas CHP System with Black Start and Islanding – MEA grants a 15% multiplier
- **Incentive Amount = (1,100 kW x \$500) x 1.15 = \$575,000**
- Example 2: 600 kW Biogas CHP System with AD System – MEA grants a 20% multiplier
- **Incentive Amount = (600 kW x \$550) x 1.20 = \$396,000**
- The **maximum total incentive amount** for any resilient and/or biogas CHP system is **\$650,000**

Grant Payout Schedule

MEA will issue Grant payments in **three installments**, as follows:

Milestone	Installment Amount
Groundbreaking (CHP equipment onsite, construction begins)	30%
Commissioning (CHP installation complete and approval to operate granted)	60%
Performance (After 1 full year of commercial operation, demonstrates it meets projected efficiency)	10%

How to Apply

- Visit the [MEA CHP Webpage⁷](#) and review all information
- Download and review the FY21 CHP Funding Opportunity Announcement (FOA) (contains all terms, conditions, requirements, and restrictions of the FY21 program – think of it as the “master control document”)
- Download and complete the FY21 CHP Application Workbook (7 tabs total)
- Be sure to sign the workbook on tab 7 – at the bottom
- Gather all necessary supplemental documents (refer to FOA)
- Submit Application Package via email to CHP.MEA@Maryland.gov by no later than **11:59 P.M. EDT, October 30, 2020**
- MEA can make alternative submission arrangements if necessary. Please contact Program Manager Brandon Bowser at BrandonW.Bowser@Maryland.gov.



FY21 Resilient Maryland Program

Planning & Design Funds for DER Projects

Maryland's Holistic Approach to Energy Resilience:

Resilient Maryland

MEA's grantees, applicants, and the energy industry stakeholders and influencers we have worked and partnered with note that surmounting the initial planning & design hurdle is typically the "make or break" point.

Organizational decision-makers and capital providers need proof of concept through vetted designs and modeled performance, savings, and ROI to provide buy-in

This step can be costly to adopters, who often don't have adequate access to the capital necessary to complete this phase. Provides grants for DER system feasibility analysis, engineering, and design to help get projects to "shovel-ready"

Resilient Maryland Program Operation

Four Areas of Interest (AOIs)

AOI 1: Community/Campus Microgrid Planning (Up to \$100,000 per Project)

AOI 2: Resilient Facility Power System Planning (Up to \$25,000 per Project)

AOI 3: Advanced CHP Planning & Design (Up to \$10,000 per Project)

AOI 4: Resiliency Hub Planning & Design (Up to \$10,000 per Project)

Grantees will use funds to complete a set of final project deliverables

Detailed Feasibility Report

Preliminary Engineering & Designs

20-Year Pro Forma Financial Model

Greenhouse Gas Reduction Report

Implementation Barriers Report

Resilient Maryland Response

25 unique project proposals

Applicants demographic: government, agricultural, low-to-moderate income (LMI), multifamily housing, food processors, universities, essential infrastructure, businesses, and nonprofits

14 Projects awarded for a combined total of \$1.05 million of state investment

Grantees will be prepped for equipment procurement and system installation

Lessons Learned - replicable and scalable DER system models + insights into common project barriers



Resilient Maryland Contact Information

- For more information, visit the [Resilient Maryland Webpage](#)⁸
- Program Manager: Brandon Bowser
- Email: BrandonW.Bowser@Maryland.gov
Program Email: RMP.MEA@Maryland.gov



EmPOWER Utility Incentives

Additional Incentives for CHP & Efficiency



Maryland
Energy
Administration

Overview

- Utilities provide incentives for CHP and energy efficiency measures through their **EmPOWER** programs
- EmPOWER was enacted in 2008 to introduce year-over-year efficiency requirements for utilities in Maryland
- Utilities achieve this by incentivizing customers to install measures to improve their efficiency, CHP included
- These incentives can be stacked with MEA incentives, minimizing out-of-pocket cost
- Large incentives, potentially **up to \$2 million**



Links to Utility Incentives

- Five EmPOWER-participating utilities in Maryland
- BGE: [CHP Incentives⁹](#) & [Efficiency Incentives¹⁰](#)
- PEPCO: [CHP Incentives¹¹](#) & [Efficiency Incentives¹²](#)
- Potomac-Edison: [CHP Incentives¹³](#) & [Efficiency Incentives¹⁴](#)
- SMECO: [CHP Incentives¹⁵](#) & [Efficiency Incentives¹⁶](#)
- Delmarva Power & Light: [CHP Incentives¹⁷](#) & [Efficiency Incentives¹⁸](#)

Additional CHP Financing

MEA Lawton Loan Program C-PACE



MEA Lawton Loan Program

- MEA provides its [Jane E. Lawton Conservation Loan Program](#)¹⁹ to businesses, nonprofits, local governments, and Maryland State government facilities
- Financing available for energy efficiency and CHP projects that reduce GHGs
- APR does not exceed **1.0%** for businesses and nonprofits
- No interest charged for local government and State Government loans
- Flexible terms, up to 13 years
- Loans for up to **\$200,000**
- New in FY21: Micro-loans (up to \$40,000, expedited processing and up to 5-year terms)



C-PACE Financing

- CHP projects may also benefit from C-PACE: Commercial Property Assessed Clean Energy financing
- C-PACE is a form of third-party financing which is assessed on the property and repaid through property tax over a 20-year period
- Financing stays with the property, not the Borrower
- C-PACE financing available in 18 of Maryland's 24 counties and Baltimore City, with two additional counties in the process of establishing C-PACE
- Competitive interest rates
- Contact [Maryland C-PACE²⁰](#) to learn more





Questions?

**Maryland
Energy
Administration**

**BrandonW.Bowser@Maryland.gov
443-306-0304**

Energy.Maryland.gov



**Maryland
Energy
Administration**



Hyperlinks in Presentation

- 1 <https://energy.maryland.gov/business/Documents/MEA CHP Resource Guide.pdf>
- 2 <https://energy.maryland.gov/business/Pages/MEACHP.aspx>
- 3 <https://www.energy.gov/eere/amo/combined-heat-and-power-basics>
- 4 <https://www.epa.gov/chp>
- 5 <https://betterbuildingsolutioncenter.energy.gov/chp/chp-taps>
- 6 <https://chp.ecatalog.lbl.gov/>
- 7 <https://energy.maryland.gov/business/Pages/MEACHP.aspx>
- 8 <https://energy.maryland.gov/business/Pages/ResilientMaryland.aspx>
- 9 <https://www.bgesmartenergy.com/business/business-programs/chp>
- 10 <https://www.bgesmartenergy.com/business/business-programs/energy-solutions-business>
- 11 <https://cienergyefficiency.pepco.com/combinedHeat.aspx>
- 12 <https://homeenergysavings.pepco.com/business/applyMLB>
- 13 <https://energysavemd-business.com/combined-heating-and-power>
- 14 <http://energysavemd-business.com/>
- 15 <https://www.smeco.coop/save-energy-and-money/business-solutions/combined-heat-power>
- 16 <https://www.smeco.coop/save-energy-and-money/business-solutions/combined-heat-power>
- 17 <https://www.delmarva.com/SmartEnergy/MyGreenPowerConnection/Pages/CombinedHeatPower.aspx>
- 18 <https://cienergyefficiency.delmarva.com/Default.aspx#incentives>
- 19 <https://energy.maryland.gov/govt/Pages/janeelawton.aspx>
- 20 <https://md-pace.com/>