**Mid Atlantic Combined Heat & Power Technical Assistance Partnership**
**CHP Related Recommendations to the West Virginia Office of Energy for the West Virginia Energy Plan 2018-2022**
**November 30, 2017**

## Background

Combined Heat and Power (CHP) is an efficient and clean approach to generating electric power and useful thermal energy from a single fuel source. Instead of purchasing electricity from the distribution grid and separately burning fuel in an on-site furnace or boiler to produce thermal energy, an industrial or commercial facility can use combined heat and power to provide both services in one, energy -efficient step. CHP is a clean energy solution that directly addresses a number of national priorities, including improving U.S. competitiveness by:

- reducing energy operating costs,
- increasing energy efficiency,
- reducing greenhouse gas emissions,
- enhancing our energy infrastructure,
- improving energy security and resiliency, and
- "growing" the U.S. economy.

There are several emerging market drivers contributing to current CHP growth, including lower energy operating costs, CHP-friendly environmental regulations, resiliency initiatives, federal and state policies and incentives, utility support, and project replicability. The drivers that are currently influencing the market growth of CHP are part of a larger recognition of the benefits that CHP provides both to the user and the nation as a whole. CHP can reduce strain on the electric grid and lower greenhouse gas (GHG) and other harmful emissions. CHP can lessen the need for new transmission and distribution infrastructure and uses abundant clean domestic energy sources such as natural gas and biomass. CHP can be utilized in a variety of industrial facilities and commercial buildings with coincident power and thermal loads. Industrial manufacturing facilities that are a

good fit for CHP include food processing, chemicals, refining and metal manufacturing. For commercial buildings, year-round coincident on-site loads suitable for CHP are present at hospitals, multi-family buildings, colleges and universities, wastewater treatment plants, and military campuses. In addition to industrial and commercial facilities, CHP can also be integrated into district energy systems.

**CHP in West Virginia**

The Department of Energy has performed a CHP technical potential study for each state to develop an estimation of market size for CHP[i]. The goal of the report is to provide data on the technical potential for CHP in sufficient detail for stakeholders to consider combined heat and power in strategic energy planning and energy efficiency program design. The results of the study indicate that the CHP potential in West Virginia in the commercial and industrial/Institutional sectors is over 900 MW. The key markets within those sectors include Chemicals/ polymers, lumber/wood, metals, healthcare, multifamily and colleges.
Another key factor to consider is the potential for CHP as part of a natural gas utilization strategy, with the development of the Marcellus, Utica and Rogersville shale gas reserves.

**Energy Policy Options**

There are several policy approaches adapted by numerous states throughout the country with CHP as an eligible measure. A detailed list of key state CHP policy best practices is included below. The following policy approaches are highlighted based on existing West Virginia policies and those adopted by other states to support development of CHP:

<u>Increase the WV Interconnection Standards Limit</u>

This standard features two tiers of application, up to 2 MW in size. CHP is an eligible technology. Systems over 500 kW require $1M liability insurance. Recommend increasing the upper limit to 10 MW which will better accommodate healthcare facilities, institutions of Higher learning and large industrials.

Increase the WV Net Metering Policy Limit

Systems that generate electricity using alternative or renewable energy resources are eligible, including CHP. There is currently a system cap of 2 MW. Recommend increasing the upper limit to 10 MW which will better accommodate healthcare facilities, institutions of higher learning and large industrials.

Establish Utility Energy Efficiency targets -Leverage existing utility programs by establishing specific energy savings targets for utility programs through a State-directed CHP Portfolio Resource Standard. This is similar to the approach in several of the regulated states listed at the end of this document and the Marshall University study "Energy Efficiency in West Virginia".

Develop Energy Efficiency Grant and Loan program - Several states offer state financed grant and loan programs to support emissions reductions, grid resiliency, energy efficiency, and in state generation capacity, including CHP.

Utility Owned CHP - Utility owned CHP, as a rate based asset, should be evaluated in every utility Integrated Resource Plan (IRP) just like Energy Efficiency, Combined Cycle Combustion Turbines, and other viable supply & demand technologies. IRP evaluations should include all hard, documentable benefits, including reduced T&D impacts, lower environmental impact, faster planning, customer retention, avoidance of lost revenue and other factors.

CHP/Renewables Hybrid Microgrid Development -Energy efficiency, enabling of Solar and Wind renewables and increased, WV intra-state fossil fuel utilization can be simultaneously increased within WV by establishing industrial parks and economic growth centers using its indigenous shale gas in CHP+PV hybrid configurations. Industries, particularly thermally intensive industries, get the resiliency and low energy costs per unit production that is always associated with well-designed CHP based operation and stable low-priced natural gas. When hybridized with solar PV, the CHP approach simultaneously increases the renewable energy output within the State.

The Commonwealth of PA is funding a demonstration of the CHP + PV + Battery Storage Hybrid system in the Philadelphia Navy Yard and has identified several key sites within the state seeking to employ the system technology to increase regional economic growth while lowering carbon utilization per unit economic growth using the CHP+PV approach with Marcellus Shale gas resources. Similar demonstration projects could be part of a comprehensive WV energy plan.

**Key State CHP Best Policy Practices**

The following is a summary of best practices from several states that have instituted energy efficiency measures that include CHP as an energy efficiency measure that are reflected in the policy comments provided above. They include both regulated states, deregulated states and a mix of gas and electric regulated states.

**Pennsylvania** - Deregulated

Act 129 Energy Efficiency and Conservation Program Phase III

The Pennsylvania Energy Efficiency and Conservation Program established electricity consumption and peak demand reduction targets for each utility, who then established an incentive program to best meet their targets, resulting in varying CHP incentive programs between utilities. The current programs are as follows:

PECO offers both capacity and production incentives for CHP. The capacity incentives are: $300/kW for units under 500 kW, $150/kw for units between .5-1.5 MW and $75/kW for units between 5-10 MW. The production incentive is $.02 /kWh for the first year, independent of unit size. Details can be found at: https://www.peco.com/WaysToSave/ForYourBusiness/Pages/CombinedHeatPower.aspx

First Energy offers a production incentive of $.03/kWh. Details can be found at:

http://energysavepa-business.com/combined-heat-and-power/

PPL offers a production incentive of $.03/ kWh saved annually. Details can be found at https://www.pplelectricbusinesssavings.com/rebates/combined-heating-and-power

Department of Community and Economic Development

The Pennsylvania DCED offers grant and loan funds for development/construction of Energy Programs including. There are no prescriptive amounts, which vary depending on individual applications. Details can be found at: http://dced.pa.gov/programs-funding/commonwealth-financing-authority-cfa/energy-programs/

**New Jersey** - Deregulated

Energy Resiliency Bank

The NJ Energy Resilience Bank completed its preliminary round of applications in September 30, 2016. According to the EDA, the program, which was funded with $200M of HUD block grant money, was fully subscribed and there will be no more application opportunities through this program.

Clean Energy Program

The New Jersey Clean Energy Program established incentives for the installation of CHP based on the installed kW, as follows: $2.00/W for units under 500 kW; $1.00/W for units up to 1MW; $0.55/W for units between 1-3 MW, and $0.35/W for units over 3 MW. Details of the program can be found at: http://www.njcleanenergy.com/

**Maryland -** Deregulated

EmPOWER Maryland - Utility managed incentive program

The Empower Maryland Program requires utilities to establish any program that it deems appropriate and cost effective to encourage and promote the efficient use and conservation of energy. The program requires electric utilities to achieve annual incremental cost-effective energy savings equal to two percent of their retail electric sales. The current programs are as follows:

Capacity Incentives will be paid in two steps: 30% when the customer provides a signed contract for installation and 70% when the CHP system has been installed and commissioned. The capacity incentive will be capped at $1,250,000. Systems of 250 kW and larger are eligible for a capacity incentive of $250/kW. Systems smaller than 250 kW are eligible for a capacity incentive of $350/kW. A Production Incentive of $0.07/kWh will be paid for net electricity (kWh) produced during a period of 18 months following system commissioning. More detailed information can be found at:

Pepco/Delmarva: https://cienergyefficiency.pepco.com/combinedHeat.aspx

BGE: http://bgesmartenergy.com/business/chp

Maryland Energy Administration Grants

In support of Maryland's ongoing efforts to enable sustainable energy development, the Maryland Energy Administration (MEA) is announcing a newly enhanced program designed to further encourage CHP growth. The MEA CHP FY17 Grant Program" will target eligible Industrial facilities and critical infrastructure facilities with incentives of $425/kW to up to $575/kW, based on the size of the CHP system, with a maximum per project cap of $500,000. Details can be found at:

https//energy.maryland.gov/business/Pages/MEACHP.aspx

**Kentucky** - **Deregulated** - Gas

State CHP Action Plan

During 2014 and 2015, the Kentucky Department for Energy Development and Independence (DEDI) worked with Kentucky Association of Manufacturers (KAM) to develop a State CHP Action Plan. This project was funded in part by DOE, with support from the DOE Southeast CHP TAP. Working with KAM and other CHP stakeholders, DEDI developed a plan that recommended actions in the areas of outreach, technical assistance and policy. Specific policy recommendations include development of financing tools such as PACE financing, industrial revenue bonds and tax credits, as well as reform of standby rates.

Kentucky's Action Plan for Combined Heat and Power can be downloaded at this link:

http://energy.ky.gov/Programs/Documents/Kentucky%20CHP%20Action%20Plan%205-8-2015.pdf

**Delaware** - Deregulated - Electricity

Delaware Energy Efficiency Investment Fund

The Energy Efficiency Investment Fund (EEIF) was created to help Delaware businesses make strategic investments in capital equipment and facility upgrades that will help decrease operating costs, reduce energy consumption, and improve environmental performance. The program provides design and equipment grants of up to $500K. Details can be found at:

http://www.dnrec.delaware.gov/energy/services/otherservices/Pages/EEIF/Custom.aspx,

**Illinois -** Deregulated

Gas/Electric Utility CHP Incentive Program

Illinois has created a unique CHP incentive program that allows both electric and natural gas utilities (or joint utilities) to offer incentives for installation of CHP and to claim savings towards the state's Energy Efficiency Portfolio Standards. The electric utility gets credit for promoting the installation of the CHP system and achieving baseline efficiency, while any increase in efficiency of the system above the baseline is credited to the natural gas utility. The Illinois approach aligns both

the electric and natural gas utilities towards a common objective. It ensures that the electric utility gets credited for its efforts to encourage displacement of electricity delivery, while the natural gas utility is credited for its efforts towards maximizing the heat recovery and thermal efficiency of the CHP system. The protocols for calculating and claiming electricity and natural gas savings are incorporated into the Illinois Technical Reference Manual. A feature of these protocols is that the claimable savings are calculated to approximate the $CO_2$ benefits of the displaced electricity and natural gas. For example, utilities that incentivize a 75% efficient CHP system are able to claim 70% of the CHP electric generation and 25% of the gas displaced from an on-site boiler. These levels of displaced gas and electricity, when applying source-level calculations, reflect the net reduction in $CO_2$ emissions.

ComEd and Nicor, the state's largest electric and gas utilities, now offer joint CHP utility incentives, with funding available for feasibility studies as well. Ameren Illinois, a joint gas-electric utility, is in the process of developing CHP incentives.
https://www.comed.com/SiteCollectionDocuments/WaysToSave/Business/PY9_CHP_flyer_v03.pdf
https://nicorgas.com/business/equipment/combined-heat-and-power-generation

**Michigan** - Deregulated

Evaluating CHP options as part of Integrated Resource Plan

In April 2017, Michigan joined the ranks of states requiring utilities to include consideration of CHP in their integrated resource plans (IRPs); a policy considered best practice by ACEEE. With the addition of Michigan, fourteen states now require or "call out" CHP as an option to be considered in utility IRPs: Connecticut, Georgia, Iowa, Indiana, Kentucky, Nebraska, Nevada, New Mexico, Oregon, Massachusetts, Minnesota, Utah, Washington, and Michigan. Several prominent agencies and organizations – including DOE, US EPA, RAP, ACEEE, NASEO, and Pew Charitable Trust – all highlight the important role that IRPs can play in evaluating and promoting CHP as an option for efficiently and cost-effectively meeting electric demand. "Integrated resource planning helps monetize the benefits of CHP that do not currently have a market value, such as reduced emissions and increased resiliency and efficiency, enabling planners to

account for all of the technology's advantages." (Pew Charitable Trust) In Michigan, each utility IRP must now include the projected energy and capacity purchased or produced by the utility from cogeneration resources (MCL 460.6t (5) (g)). Utilities must file new IRPs with the Michigan Public Service Commission no later than April 2019. The Michigan Energy Office has funded a project to develop an IRP planning model that fully incorporates the costs and benefits of a range of CHP technologies, including the resiliency benefits of CHP for critical facilities.

**Massachusetts -** Deregulated - Electricity

CHP incentives come in many forms: capital grants to lower initial equipment costs, Operating incentives to offset ongoing costs, low interest loans, preferential rates for the cost of natural gas used to power a CHP system. Massachusetts offers both a capital incentive and an operating Incentive for CHP. Capital Incentives are available from the MASS SAVE program, rate-payer funded and operated by the MA utilities. This program's purpose is to offset some of the initial cost of the CHP system.

Operating incentives available from the Alternative Energy Portfolio Standard (APS) CHP program, Administered by MA Department of Energy Resources.

The Massachusetts "Alternative Portfolio Standard" program: Under the terms of the Green Communities Act (2009), Massachusetts retail electric companies must purchase a certain quantity of Alternative Energy Credits (AECs) per year (or make an Alternative Compliance Payment, currently $21.43/credit).

Systems that are qualified under the APS program generate Alternative Energy Credits (AECS), that are based on source fuel saved by CHP generated kWh's and MMBTU thermal as compared with kWh from grid and MMBTU from an onsite boiler or furnace. The number of credits earned by cogeneration projects is calculated as follows: # Credits = (electricity generated/0.33) + (useful thermal energy output/0.8) − (total fuel consumed by cogen), where all quantities are expressed in MWh. The current average value for AECS is $.025 to $ .035/kWh.

Mass Saves Program: As a result of the MA Green Communities Act of 2008, CHP projects are eligible for funding as an electric energy efficiency measure.

Incentive levels are based on the annual electrical and thermal efficiency, annual electrical power generation, kW generated during the New England ISO co-incidental peak period and three “Tier levels”. The Tier 1, 2, and 3 incentive structure is for CHP projects that meet all program requirements under the Retrofit Program and shall consist of the implementation of CHP projects in support of an existing facility.
https://www.masssave.com/en/learn/business/combined-heat-and-power

**New York** - Deregulated
NYSERDA CHP Catalog program:
NYSERDA's CHP Acceleration "Catalog" Program: In 2014, NYSDERDA implemented this program designed to treat CHP as an appliance by creating a catalog of “pre-qualified” systems. These systems range from 50 kW to 1.3 MW and include clean and efficient microturbine and engine based CHP systems. NYSERDA promotes the Catalog via CHP Expos that brings together the vendors and interested end users to greatly shorten the gestation time for product sales.

Con Edison Standby Rates: The Joint Proposal recommends the implementation of a standby rate pilot, consisting of two options: 1) an up-to-ten-year standby rate exemption or 2) a standby rate pilot to be developed through a collaborative process. The standby rate exemption option is intended to encourage development of efficient DERs in Con Edison’s service territory. Under this option, efficient new or expanded Combined Heat and Power (CHP) facilities and new battery storage projects can qualify for a standby rate exemption for up to ten years. Existing standby customers that do not qualify for the standby rate exemption can participate in the standby rate pilot, through which various rate options will be tested, including, among other things, varying contract demand levels, locational and time-varying rates. Participants in the pilot will provide data regarding their hourly generation, fuel consumption and efficiency.

**North Carolina** - Regulated

CHP in State Renewables & Efficiency Portfolio Standard

North Carolina passed legislation establishing a Renewables & Efficiency Portfolio Standard (NC REPS) in 2007 that includes compliance eligibility for several types of CHP, including renewable and biogas CHP as well as fossil fueled CHP. Under the NC REPS, the state has seen an increase in renewable CHP, including that fueled from woody biomass, as well CHP fueled by agricultural byproducts such as swine and poultry waste. Based on the potential for CHP as a low-cost generation resource that can create energy efficiency credits, the state's largest investor-owned utility, Duke Energy, included CHP in their 2016 Integrated Resource Plan and is pursuing CHP projects at customer sites.

For more info: http://programs.dsireusa.org/system/program/detail/2660

**Washington** - Deregulated – Natural Gas

Standby Rates

Washington utility PSE Rate 91, is progressive – Notably, it does NOT include a standby rate for relatively small systems (<5 MW), which are most common. However, what makes this tariff a 'best practice' is its simplicity and guaranteed terms that provide the predictability needed to make business cases and thus encourage development of distributed resources. Naturally, this is predicated by its upper capacity limits (5 MW), but these are not especially small. For more info: https://pse.com/aboutpse/Rates/Documents/elec_sch_091.pdf

**Oregon** - Deregulated - Electricity

Standby Rates

Oregon's Pacific Power – Partial Requirements Service is considered a model of reasonable approach: www.pacificpower.net/about/rr/ori.html

State CHP Deployment Programs/ CHP in State Energy Efficiency Programs

The Oregon Dept. of Energy has consistently supported the deployment of CHP through research, policy development and regulatory reform, staff focused on CHP, and – currently probably most important - by best practice financing support, including performance – based funding.

Merging CHP with renewable energy goals - Since almost half of the ODOE Grant program's funding went to Biogas CHP systems, state support has been refocused on developing bio-fueled CHP.

**California -** Deregulated - Natural Gas
The state has interconnection standards and includes CHP as an eligible technology within its energy efficiency resource standard and renewable portfolio standard. Under the AB32 scoping plan (the California Global Warming Solutions Act of 2006), the goal is 4,000 MW of new installed CHP capacity by 2020. California offers several incentives to encourage CHP installation.

Bioenergy Procurement / SB 859 (2016): This law mandates that CA electricity retailers collectively procure 125 MW of energy from bioenergy projects that use dead/dying trees as fuel stock, for a five-year period. Many of the forestry areas of California are exploring biomass CHP projects. The CA Energy Commission has awarded over $25 million to help develop biomass-to-electricity projects in the state over the past year that use forestry wood.

Self-Generation Incentive Program (SGIP) – SGIP was extended to 2021. 85% of funds allocated for storage and 15% for generation technologies. New SGIP eligibility requirements for natural gas CHP include biomass minimums.

IOU delivered natural gas to CHP gets Electric Generation gas rate and exemption from Public Purpose Program Charge.

SoCal Gas utility Rule 38 provides shareholder incentive for incremental gas revenue. DER Tariff & Advice Filing approved by CPUC to own/operate customer sited CHP.

CA AB 1637, grants Net Energy Metering (NEM) status to eligible fuel cell systems less than 5 MW in size. A 2017 bill (AB 36) would extend AB 1637 benefits to all eligible DG/CHP technologies. NEM DG facilities are exempt from Departing Load Charges (DLCs) and Standby Charges.

**Hawaii - Regulated**

CHP is included in the Hawaii Energy Efficiency Performance Standard (EEPS)

**Louisiana - Regulated**

State Energy Office Study of CHP Potential and Market Development

As a follow-up to a 2013 study of CHP in Louisiana, the Louisiana Energy Office commissioned a study by Louisiana State University on "Capacity Utilization, Efficiency Trends and Economic Risks for Modern Combined Heat & Power Installations." Recognizing that CHP capacity in Louisiana totals 6,300 MW and generates more than 30% of electricity used in the state, with more potential to be realized, the study recommends addressing barriers including: 1) lack of market transparency, 2) limited openness to transmission and 3) lack of institutions to support CHP access to wholesale markets. The study will be completed in late 2017.

**Texas -** Deregulated - Electricity

CHP Critical Infrastructure Evaluation Guidelines

Texas HB 1864 (83R) 10 Tex. Gov. Code §2311 was passed by the Texas Senate on May 22nd 2013 as an amendment of HB 1831. The bill requires all critical governmental facilities to formally consider the feasibility of implementing Combined Heat and Power (CHP) technology prior to construction or extensive renovation or replacing major heating ventilation and air conditioning equipment of critical buildings and facilities. The guide can be downloaded at Energy Security Technologies for Critical Governmental Facilities

CHP Interconnection Less than 10 MW

Texas does have helpful interconnection regulations for systems less than 10 MW (PUCT 25.211 and 25.212). Upon receipt of a final application, the standards require that utilities take no more than six weeks to interconnect systems less than 10 MW unless interconnect requires significant facility upgrades. The standards also allow multiple systems to be interconnected on-site and do not place a limit on the total interconnection CHP capacity at any one facility. The

rules differ for different tiers, which allows for less restrictive interconnection requirements as systems become smaller in size.

CHP Interconnection Greater than 10 MW

The interconnection process in Texas for greater than 10 MW loads is very demanding. The average interconnection time takes anywhere between 270 days to 1020 days depending on project complexity. To decrease the time for interconnection and facilitate installation, SECO and HARC have designed a web-based dynamic, process map that walks project developers step by step through the interconnection process. The web tool provides all of the required information in one place with easy access to forms and material required for each step of the process. Further, the tool provides helpful hints and additional context as the project developer goes through the process. Visit the CHP Interconnection Tool on HARC's website.

**New Mexico –** Deregulated – Natural Gas

Net Metering

In 2007, the New Mexico PRC significantly extended out the size of systems that can participate in net metering. The original net metering threshold was 10 kW. The new maximum is 80 MW, which covers a significant portion of CHP potential installs in the state. There is no statewide limit on the aggregate capacity of net-metered systems. A limitation is that municipal utilities do not have to participate. Fortunately, there are only two munis in New Mexico.

**Colorado –** Deregulated – Natural Gas

Interconnection

The state follows FERCs interconnection standards for small generators. There are tiered standards that go up to 10 MW in size. The most promising of this interconnection rule is that all power providers must comply, including municipal utilities. The rule is CCR 723-3.

[i] https://www.energy.gov/eere/amo/downloads/new-release-us-doe-analysis-combined-heat-and-power-chp-technical-potential