ACCELERATING COMBINED HEAT & POWER DEPLOYMENT

An Industry Consultation by the United States Energy Association

August 31, 2011

USEA
United States Energy Association

Cover Photograph:
CHP Plant at the Mueller Energy Center in Austin, Texas

Dedicated in 2006, the Mueller Energy Center features a 4.3 MW combustion turbine coupled with 13,500 lb/hr heat recovery steam generator making its CHP unit 75 % efficient. This district cooling and heating center is located on the newly redeveloped site of the former Austin's Robert Mueller Municipal Airport. It provides steam heating, chilled water cooling and onsite electric production to Seton's Dell Children's Medical Center and nearby buildings.

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INTRODUCTION

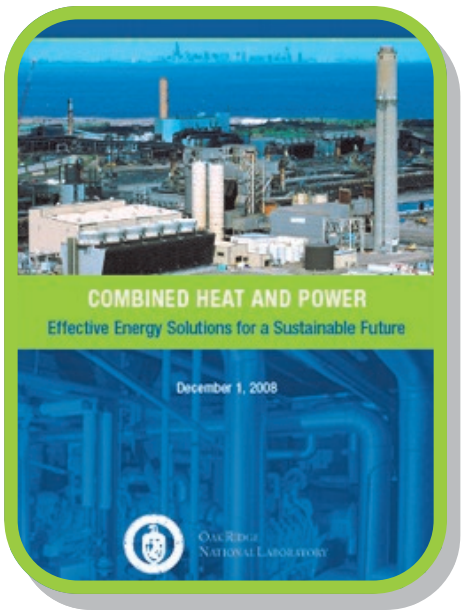
Technologies that produce electricity and heat, from combined heat and power (CHP) systems, are some of the oldest and most efficient machines used to generate power. Technical papers from the Second World Power Conference, held in Berlin in 1930 (and addressed by Albert Einstein), had 16 papers focusing on CHP. One paper commented, "The full economic value…can be developed only by the cooperation between industries and public utilities for the combined production of process steam and electric power. The first requirement for the success of such a cooperative enterprise is that the advantages must be equitably divided between two parties."

Other papers stressed the value of "fuel conservation," issues of interconnections, financial protection of investments and concerns over who operates specific plants (dispatching). These discussions, circa 1930, occurred before the advent of state Public Utility Commissions to regulate utilities and to referee customer complaints.

Flash forward 80 years. Today, combined heat and power is widely acknowledged as an effective and economical technology to reduce energy consumption and provide the well-recognized benefits of efficiency:

- Economic competitiveness
- Enhanced electric reliability
- National/energy security
- Greenhouse gas reduction potential
- Preservation of manufacturing jobs
- Reduced electric grid congestion
- Pollution reduction

Most institutional/regulatory/business models do not incentivize CHP deployment in a manner that helps optimize energy utilization for the United States as a nation. Some have cited the lack of federal, state and local policies that fail to recognize the intrinsic value that CHP offers.



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In December 2008, the Oak Ridge National Laboratory (ORNL) published, "Combined Heat and Power – Effective Energy Solutions for a Sustainable Future," a report detailing the ways in which combined heat and power (CHP) can help to address America's current and future energy needs. The report accomplishes two principal objectives: 1) it describes the environmental, economic, energy security and infrastructural benefits that CHP contributes to our current energy system; and 2) it proposes a scenario in which CHP could produce 20% of U.S. electric generation capacity from CHP.

The United States Energy Association (USEA) hosted a workshop to release this report in an effort to gauge the energy industry's reaction to the recommendations. The meeting participants broadly supported the report's conclusions and encouraged DOE to consult further with industry stakeholders to determine a series of recommendations representing the energy industry's consensus views on how to best accelerate CHP deployment nationwide.

USEA organized a CHP stakeholder consultation process that resulted in a series of industry-vetted recommendations for accelerating CHP deployment in the United States. Three regional dialogues were held:

- New York City (Northeast),
- San Francisco (California/Southwest), and
- Raleigh (Southeast).

The workshops asked the participants to share their perspectives and challenged them to think of unique, innovative, "win-win" solutions. A final stakeholder dialogue was conducted in March 2011 in Washington, D.C., during which participants reviewed an "inventory of ideas" containing policy recommendations. The final list of agreed-upon recommendations follows in the next section.

Throughout the stakeholder consultation process, USEA has attempted to be as inclusive and comprehensive as possible considering the diverse interests represented in the national CHP dialogue. Stakeholders present at regional dialogues included CHP developers and end-users, equipment manufacturers, energy corporations, utilities, state and federal regulators, energy consultants and industry associations.

Participants were free to agree and disagree with one another during moderated panel discussions that produced insights into the opportunities and challenges presented by accelerated CHP deployment. Additionally, the diverse representation at each meeting allowed for a constructive dialogue on advancing the national CHP discussion in an open and inclusive manner.

Recommendations included herein are directed at all stakeholder groups represented throughout this process and have been endorsed by organizations representing a broad range of America's energy industry.

RECOMMENDATIONS

POLICYMAKERS ON ALL LEVELS

1. There is a great need on all levels – federal, regional, state and local – to include CHP in energy policies that create frameworks to further encourage energy efficiency and the deployment of clean energy systems.

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2. Policymakers should consider policy options to remove disincentives for utilities and other industries to encourage efficiency. Utilities should not suffer enterprise financial penalties if they encourage their customers to become more efficient. There are several options for achieving this including: revenue decoupling and capitalizing and rate basing efficiency investments. When looking at generation and transmission options, this would allow efficiency investments to be treated equally.

3. Significant CHP potential exists within non-profit facilities, i.e., schools, universities, medical facilities, government buildings, etc. These institutions do not benefit from investment tax credits, making the financial hurdle higher for projects in these facilities. Policymakers should consider innovative incentives such as grants targeted at efficiency projects for such facilities when third-party ownership of CHP installations is impractical. Eligibility for such incentives should be extended to all project developers, including utilities in both regulated and competitive markets.

4. For the rules and fees associated with interconnection standards, CHP installations should be treated on a level playing field relative to renewable energy installations.

5. When considering incentives, policymakers should apply CHP efficiency standards, perhaps requiring 60% efficiency for facilities up to 20 megawatts and 70% efficiency for facilities over 20 megawatts (the exact percentages being negotiable). Care should be exercised when defining efficiency standards so that different technologies are treated on an equal basis.

6. While incentives are useful in accelerating significant CHP deployment, policymakers on all levels should consider how to put into place long-term, permanent strategies to sustain CHP deployment.

7. Policy actions are needed at all levels for CHP:

    a. Federal – financial incentives;
    b. State – policy, regulations and programs, and;
    c. Local – local ordinances and zoning/building codes.

"The lack of uniform standards for interconnection procedures is due, in part, to the fact that jurisdiction over interconnection is split between the Federal Energy Regulatory Commission (FERC) and the states' utility regulatory body."
- Oak Ridge National Laboratory Combined Heat and Power Report 2008.

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FEDERAL POLICYMAKERS

8. Enhanced short-term federal financial incentives, including investment tax credits up to 30%, should be made available for highly efficient CHP units that are at or above 70% efficient.

9. Federal policy makers should consider public education efforts focusing on energy efficiency and include a specific focus on CHP.

10. Federal Policy makers should consider loan or grant programs to support domestic workforce training in design, finance, installation, operation and maintenance of CHP systems.

STATE POLICYMAKERS

With official or inherent responsibility for greenhouse gas reductions, state regulators should consider whether their agencies have responsibility to encourage utility deployment of advanced technologies.

11. States wishing to accelerate CHP deployment should consider regulatory and legislative policies and results of recent actions by California (CHP regulatory/legal settlement), North Carolina (30% tax credit) and Connecticut (financial incentives).

12. States that require electric and natural gas utilities to file integrated resource plans should include CHP among the resources considered.

13. Policymakers should consider regulations to assure that CHP projects can sell thermal output to nearby facilities without becoming a regulated entity.

14. Policymakers should consider allowing utilities to build, own, operate and dispatch CHP units in their customers' facilities.

15. Policymakers and developers of state level energy plans should assure that the potential for CHP is considered and adequate regulatory policy frameworks are in place to encourage CHP deployment.

16. State and local policymakers should streamline the permitting process for CHP facilities. Consideration should be given to establishing a "one-stop shop" to facilitate regulatory reviews such that public-health and safety is protected while the transaction costs of obtaining necessary permits are reduced.

In one state a new CHP facility required 45 separate regulatory approvals.

17. Policymakers and utility planners should consider the potential for CHP to play a role in demand side management.

18. In jurisdictions with portfolio standards, CHP should be given appropriate consideration.

19. If policymakers consider CHP as a potential source of greenhouse gas reductions (GHG), it is necessary to clearly define how GHG reductions are measured and verified.

MUNICIPAL GOVERNMENTS

20. Municipalities that have significant multi-family dwelling units should consider local ordinances that encourage replacement of boilers with higher efficiency clean technologies, such as CHP units.

21. Municipalities should consider reviewing zoning laws, ordinances, regulations and procedures to assure that CHP projects are encouraged rather than discouraged. Model building codes could be reviewed and perhaps modified to ensure that CHP projects are not discouraged.

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22. Throughout their urban planning initiatives, municipalities should consider how to locally encourage innovative ownership arrangements for CHP/district energy plants, such as cooperative ownership agreements among property owners. This could be particularly useful for large, multi-family residential structures on adjacent properties or those within close proximity to one other. The American Planning Association could be engaged to help develop a training program.

23. Jurisdictions that have large opportunities for small scale CHP could benefit from promotion of small scale (<1 megawatts (MW)) prepackaged systems, such as those supported by USDOE.

"New York City specifically should consider how to optimize CHP across multiple buildings. Over 200 sites have the potential to utilize between 1-5 MW CHP systems, potentially reducing local air pollution, particulates, and reducing traffic congestion from local fuel oil deliveries. Another 26,000 sites have potential for small CHP systems at less than 1 MW for a potential of 800 MW." ***- New York State Energy Research and Development Authority (NYSERDA)***

ELECTRIC UTILITIES AND INDEPENDENT POWER PRODUCERS

24. System fees such as interconnection charges, backup rates, stand-by charges and exit fees, among others, should be consistent and cost-based.

25. Consideration should be given to integration of CHP with new generation where appropriate.

26. Utilities and state regulators should consider simplified power purchase contracts for power exported from relatively small CHP systems where transaction costs could be prohibitive.

27. In developing smart-grid and micro-grid strategies, utilities should give consideration as to how CHP can complement other distributed generation and demand response strategies.

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U.S. DEPARTMENT OF ENERGY

28. USDOE should consider increasing its efforts to make CHP system performance data broadly available. Potential users including financial institutions and other stakeholders have limited access to unbiased information.

29. USDOE should consider assessing facilities/institutions/companies with significant CHP potential and target for direct communication prospective CHP champions within these constituent organizations. It has been noted that a champion is incredibly valuable, perhaps necessary, to advocate for CHP projects among competing investment options.

30. USDOE should consider establishing training workshops for local/municipal zoning, building, fire, electrical and other inspectors to increase their familiarity with CHP applications. USDOE could consider working with the Association of Energy Engineers on developing a training program.

31. USDOE should consider collecting and disseminating information on the viability of third party ownership of CHP facilities.

32. USDOE should consider engaging municipalities and others who can issue tax-exempt financing to educate them on the value of CHP to their communities.

33. USDOE should consider working with manufacturers to determine if training workshops are useful for design and operating engineers. Maintenance and system optimization workshops specifically designed for very small consumers (gyms, laundromats, for example) may be useful.

34. USDOE should consider efforts to directly provide technical assistance to small municipal utilities and rural cooperatives in order to integrate CHP in their systems. USDOE Headquarters in Washington, DC, can work with the American Public Power Association and the National Rural Electric Cooperative Association to communicate the availability of USDOE assistance to their members.

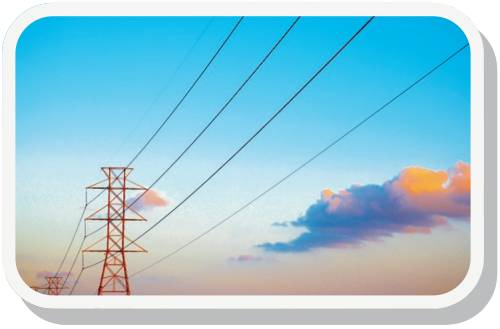
35. USDOE should consider communication efforts targeted to Independent System Operators/Regional Transmission Organizations on the role of CHP in their markets. A pilot effort could be considered for PJM/ISO. The Organization of PJM States (OPSI) could be helpful in organizing such an initiative, to bring the ISO/RTO community into the CHP discussion.

INDEPENDENT SYSTEM OPERATORS/REGIONAL TRANSMISSION ORGANIZATIONS

36. Transmission system planners should consider distributed generation including CHP installations in their load forecasts to determine their ability to reduce transmission congestion and constraints and improve system reliability and stability.

37. When CHP is dispatchable, it should be treated consistently with other interconnected, dispatchable resources.

38. Independent System Operators and Regional Transmission Organizations should enter the CHP dialogue, as they have informational needs and information to contribute to the discussion.



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CHP INDUSTRY

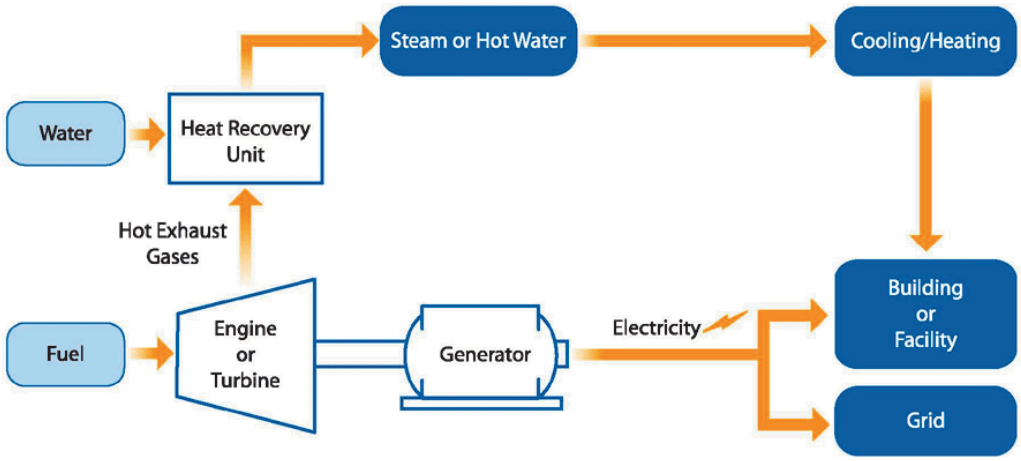
39. The CHP industry should consider efforts to broaden "the conversation" about CHP and embrace a dialogue with other industry sectors. Industry stakeholders should engage regional and national industry trade associations in the electric power, natural gas and renewable sectors.

40. The CHP Industry should consider a targeted public education campaign about combined heat and power. CHP is an energy resource that is generally not known or understood by energy consumers because it is not a visible technology that has been widely discussed in recent debates on clean energy.

41. The CHP industry should consider a targeted public education campaign to accurately communicate the environmental capabilities of CHP, its role as a clean energy technology, and its ability to meet strict emissions standards. This is needed in some regions more than others.

42. The CHP industry and the electric utility industry should continue their dialogue on the desirability for streamlined and standardized interconnection rules/standards in some states. The U.S. Clean Heat and Power Association (USCHPA) and the various regional and national energy associations could facilitate this dialogue.

43. The CHP industry should consider working with public and private school facilities that are candidates for CHP, specifically offering an "educational package" to supplement equipment sales/installation. This has been successfully done by renewable and efficiency equipment manufacturers. Organizations such as the National Energy Foundation can be utilized to help develop the educational component and help to integrate these activities in local school curriculum. Perhaps USDOE can consider funding the development and testing of curriculum materials.



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CASE STUDIES

CHP IN CALIFORNIA – TRANSITIONING AWAY FROM PURPA

In an attempt to resolve disputes surrounding PURPA-era Qualifying Facilities (QFs), the California Public Utilities Commission (CPUC) began the task of mediating an agreement between California's QF trade associations, Investor Owned Utilities (IOUs) and consumer advocacy groups. The result: a legal settlement that would replace PURPA's QF program with a state-run CHP procurement authority that uses a competitive solicitation process to achieve both megawatt and greenhouse gas reduction targets. This settlement would close the books on pending claims before the CPUC and the California Court of Appeals and require existing CHP units in California with sales to the grid to comply with the new regulations.

"December 16, 2010 - The California Public Utilities Commission (CPUC) today adopted comprehensive reforms to its regulation of the state's combined heat and power (CHP) facilities in order to bolster the CPUC's efforts to secure a clean and efficient energy future."

http://docs.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/128180.htm

The settlement lays out a suite of reforms that will transition the CHP procurement process and pricing system to a market-based model by 2015. First, it modernizes the CHP procurement options for utilities and independent power producers (IPPs) by enabling them to procure and account for CHP units through competitive solicitations; bilateral negotiations for purchase power agreements and amendments; standard offer contracts; applying feed-in tariffs; utility investments in CHP; and ratepayer funded programs. Second, it sets a minimum 3,000 MW target for CHP to be procured by California IOUs by the end of 2020 and designates a proportional share of statewide GHG emissions reductions from CHP. This is consistent with the California Air Resources Board (CARB) goal of reducing overall GHG emissions by 6.7 MMT over the same time period. Finally, it establishes a pricing system that monetizes GHG reductions on a per bid basis, allocating a one-time payment for avoided GHGs to the CHP owner and sets a floor price for bid payments that does not take into account GHG reduction payments.

Beyond these reforms, the settlement implicitly acknowledges that all CHP systems are not equal and that the characteristics of individual projects should be evaluated on their own merits, not according to a series of "one size fits all" standards. The flexible contract arrangements take into account the ancillary benefits of CHP and other customer-owned generation, including a utility's avoided cost of generation, transmission and distribution investments; possible reductions in fuel consumption and GHG emissions; added electric reliability from on-site power generation and economic development within a niche power generation sector. The settlement establishes a degree of certainty for existing CHP owners, particularly for manufacturers with on-site CHP or industrial CHP users whose businesses depend on their ability to own and operate CHP units at their facilities.

CHP IN CONNECTICUT: CAPACITY PAYMENTS FOR DISTRIBUTED GENERATION

On July 21, 2005, in part to alleviate grid congestion, the Connecticut General Assembly approved Public Act 05-01, An Act Concerning Energy Independence, which explicitly recognized the value of distributed generation in circumventing changes to the electric grid, while simultaneously reducing peak demand. The Act required that the Connecticut Department of Public Utility Control (DPUC) establish programs for Connecticut's distribution utilities and their customers to incentivize investments in customer-side distributed generation. Specifically, the Act provided $200-500/kilowatts (kW) capacity payments to the owners of newly-installed customer-side distributed generation, as well as $50-200/kW capacity payments to the distribution utilities for these same systems. These incentives were built into the distribution company's electric rates. On March 27, 2006, DPUC Decision on Docket No. 05-07-16 opened the program for applications, hoping to incent roughly 100 MW in new distributed generation capacity.

Over the course of these programs, the DPUC received 300 project applications totaling over 500 MW of generation capacity, including about 330 MW of mostly natural gas-fired CHP. After two and a half years of administering these incentives, the DPUC conducted a cost analysis showing that the distributed resources built and permitted through this program had in part driven down congestion charges to a point that they could no longer sustain the capacity payments. In October 2008, the DPUC discontinued capacity payments for projects that had not yet been approved. In total, 81 CHP projects were approved under this program for approximately 250 MW of distributed generation.

While the capacity payments succeeded in accelerating the deployment of CHP and other forms of distributed generation over the course of the incentive program, it is unclear how much CHP contributed to alleviating grid congestion.

"Sec. 12....The Department of Public Utility Control shall...identify those measures that can reduce federally mandated congestion charges....Such measures may include...demand response programs, other distributed resources, and contracts between an electric distribution company....The department shall order each electric distribution company to implement...such measures as the department considers appropriate. The company's costs associated with complying with the provisions of this section shall be recoverable through federally mandated congestion charges."
http://www.cga.ct.gov/2005/ACT/PA/2005PA-00001-R00HB-07501SS1-PA.htm

CHP IN NORTH CAROLINA – INCENTIVIZING EFFICIENCY

In August 2010, the North Carolina legislature enacted House Bill 1829, amending existing legislation concerning North Carolina's renewable energy tax credit by including CHP systems among eligible technologies. The credit is equal to 35% of the cost of qualifying renewable energy and/or energy efficient systems constructed, purchased or leased by a taxpayer and placed into service in North Carolina during the taxable year. Depending on the fuel source, CHP can either qualify as renewable energy or energy efficiency, thus endowing developers and end users with a range of choices in fuel options and system designs.

As CHP only recently became eligible to benefit from this tax credit, it is too soon to tell whether it has helped to boost CHP deployment in North Carolina. According to ICF International and the U.S. Department of Energy, North Carolina has 59 installed CHP sites with 1,500 MW nameplate capacity and the potential for 7,200 MW total CHP capacity. Given the flexibility of North Carolina's CHP tax incentives and other energy efficiency and renewable energy policies, North Carolina is poised to become a regional leader in CHP development in the coming years.

WHAT BENEFITS DOES CHP OFFER?

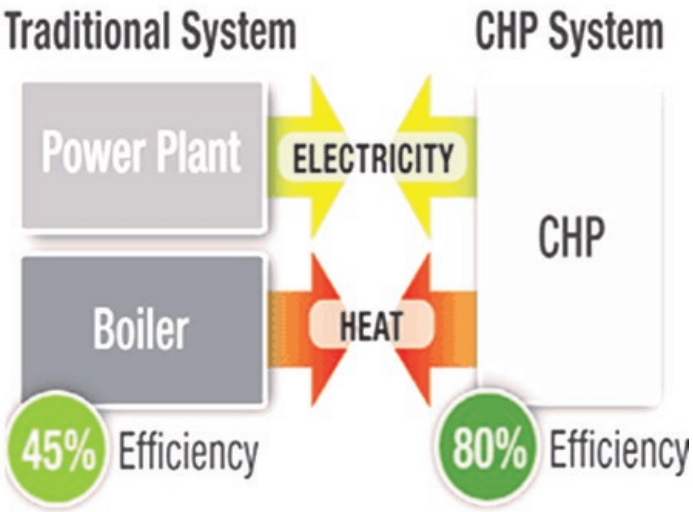
The U.S. Department of Energy and the Oak Ridge National Laboratory estimate the total CHP potential in the U.S. could be roughly 240,000 MW, or about 20% of total U.S. electric generation capacity, by 2030. This level of CHP deployment would provide numerous economic, environmental, energy security and system benefits to the United States.

ECONOMIC COMPETITIVENESS

For end users, CHP may provide an economically competitive, environmentally viable alternative to electricity provided by the electric grid. By having on-site power generation that also provides a thermal load, industrial facilities and buildings maybe able to provide for their electric and heating/cooling needs. On-site power generation also protects energy end-users against disruptions on the electric grid, ensuring 24/7 reliable service. This can be especially important for critical infrastructure facilities, such as hospitals and airports, as well as businesses that require an uninterruptable power supply, such as stock exchange trading floors or network server facilities.

Moreover, CHP has been noted as the least cost and effective form of CO_2 abatement for new capacity in the power generation sector. According to a 2007 McKinsey & Co. survey comparing the cost of CO_2 abatement by various technologies and CO_2 reduction methodologies, new commercial and industrial CHP proved to be among the only power generation technologies that deliver CO_2 reductions at a negative marginal cost.

Finally, accelerated CHP deployment offers the possibility of domestic job creation. If the U.S. pursued a goal of 240,000 MW of installed CHP by the year 2030, or an estimated 20% of U.S. generation capacity, the U.S. Department of Energy predicts that this would generate $234 billion in new investment and create nearly 1 million highly technical, well-paying jobs nationwide.



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SYSTEM BENEFITS

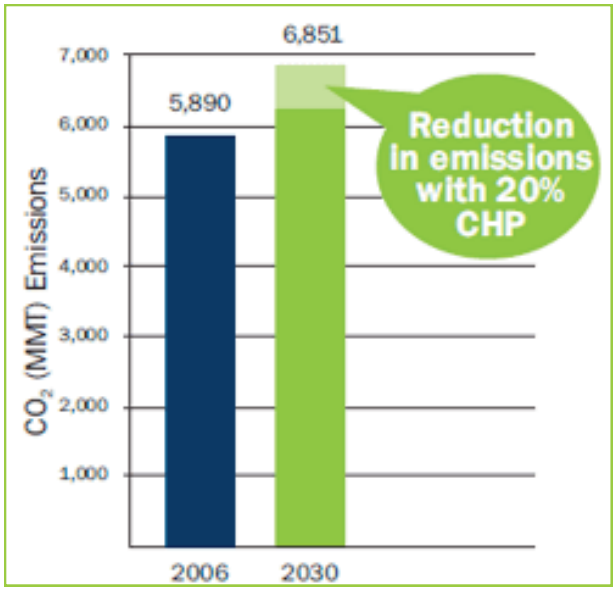
Since CHP can be a dispatchable resource, it may be used in periods of peak demand and help promote voltage stability and reactive power support. In certain circumstances, CHP can allow utilities to defer investments in generation, transmission and distribution projects. It can reduce transmission line overloads. This is helpful in densely populated areas where citing new power plants and/or transmission lines is problematic.

Investments in CHP can increase the reliability and efficiency of normal daily grid operations, benefits that will become increasingly vital to reliable grid operations as utilities try to extend the life of the U.S.'s aging energy infrastructure. CHP contributes to the development of a more robust and secure energy supply system for our country that will enable it to be prepared for electric supply interruptions.

ENVIRONMENTAL BENEFITS

CHP provides many environmental advantages by promoting fuel conservation and emissions reductions. Emissions reductions could become a driver for accelerating CHP deployment if rules and regulations on air pollutants shutter power plants. According to the Oak Ridge National Laboratory, "CHP in the United States today avoids more than 1.9 Quadrillion Btu of fuel consumption and 248 metric tons of CO_2. ... This CO_2 reduction is the equivalent of removing 45 million cars from the road." If the United States increased its current 9% CHP capacity to 20%, it would be equivalent to removing more than 154 million cars from the road.

In addition to the emission reduction benefits, CHP can be an effective resource for optimizing water and land utilization. Unlike thermoelectric plants, CHP does not use cooling towers that contribute to the evaporation of the water. As a result, it can operate on lower water consumption levels. Generally, CHP units can be built on existing footprint, which helps defer additional land use.



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CHALLENGES FACING ACCELERATED DEPLOYMENT OF CHP

Participants in the regional dialogues identified the following challenges as most problematic in accelerating the deployment of CHP.

FINANCIAL

- **Don't pick my pocket:** As an energy efficient power generation technology installed behind a customer's meter, newly-installed CHP negatively impacts the kWh sales of the utility to which its end-user is interconnected. At the same time, new CHP end-users also need to remain connected to the electric grid in order to be supplied with electricity during planned maintenance or unplanned outages. Consequently, utilities bear the burden of falling sales while they simultaneously face potential stranded assets.

- **If we don't pay taxes, what good are tax credits?** One of the most popular ways to incentivize distributed generation is through tax credits. However, some of the most appropriate potential hosts for CHP systems are institutional or non-profit organizations (hospitals, municipal buildings, universities, military bases, etc.) that are tax exempt and thus do not benefit from tax credits.

- **Risk, risk, and more risk:** Volatile fuel markets and the complexity of mitigating fuel cost risk over the life of CHP projects increase the risk of investing in CHP technology, particularly for hosts of relatively small projects. In addition to fuel, CHP faces the same risks as other construction projects.

- **"It's the economics, stupid":** Traditionally, CHP end-users are also CHP owners/operators. The relatively high up-front capital costs for CHP projects combined with lower returns than other investment opportunities and tight credit markets has made it increasingly difficult to finance new CHP projects.

- **C-H-What?:** Within the financial community, CHP is less visible than other clean, distributed generation technologies.

REGULATORY

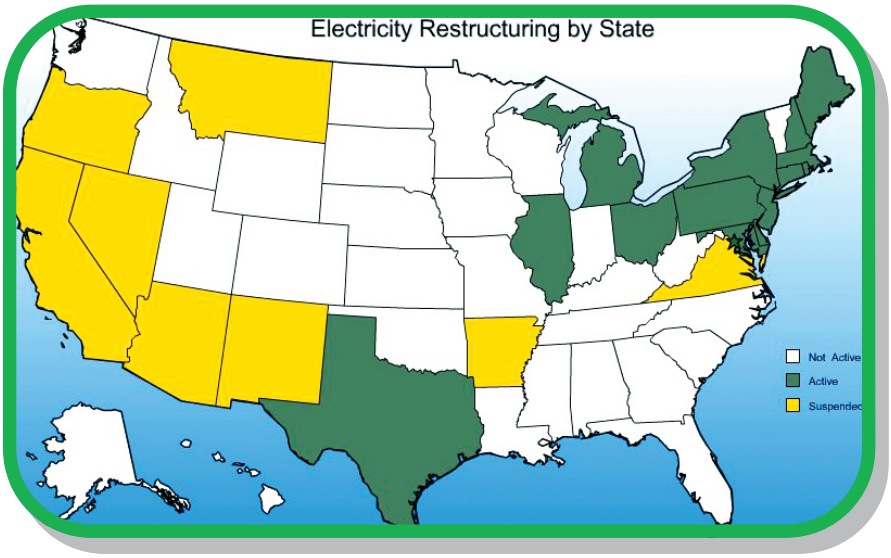
- **A seat at the regulatory table:** In many regions of the country, CHP is absent from regulatory dialogues. Regulators sometimes overlook the potential of CHP as an energy and an efficiency resource, or do not mandate utilities to consider CHP in their integrated resource plans. There is an under appreciation of the system benefits that CHP can contribute to the electric grid, such as alleviating bottlenecks and delaying other infrastructure investments in congested regions.

- **Why not CHP?** Regulatory policies often do not incentivize utilities to encourage CHP deployment in their service areas.

- **I still need the grid:** Utilities are required to maintain a reserve margin of electric generation and transmission capacity. CHP owners benefit from this requirement margin in the event that their CHP unit goes offline. Regulators may permit utilities to charge CHP end-users with back-up, emergency service and/or stand-by charges.

- **My utility is my partner:** Alternative ownership structures in which a utility owns the CHP unit would help end-users reduce large financial risks. In some jurisdictions, particularly in competitive markets, utilities are currently prohibited from rate basing any generation, including CHP.

- **CHP in deregulated markets:** Electric utilities in deregulated markets are frequently prohibited from owning their own generation resources. Consequently, they would not be eligible to enter into ownership agreements with CHP end-users and limited in their ability to promote CHP among their customers .



Data as of: September 2010 © U.S. Energy Information Administration

PERMITTING

- **Layers of red tape:** Permitting for CHP systems can be a very complex, time-consuming process that involves multiple regulatory authorities that frequently have conflicting interests. For example, state or federal air quality regulators may want to encourage CHP, as it helps to decrease overall emissions levels, whereas local air quality officials are concerned with localized air pollution from CHP facility emissions. Permitting delays tend to drive up the cost of CHP installations and inject a layer of uncertainty as to whether the projects will actually get built. Also, in many states, permitting procedures for CHP varies based on the size and output of the CHP system, causing confusion for developers and discouraging end-users from investigating CHP for their energy needs.

- **Antiquated building codes:** In many municipalities, building codes may prevent CHP from being incorporated into new or existing buildings.

- **What's CHP?** State and municipal permitting officials sometimes delay or fail to issue permits for CHP projects because they are unfamiliar with the technology.

VISIBILITY & EDUCATION

- **Clean energy resource or West Coast highway patrols?:** CHP is among the least visible distributed generation resources employed in the U.S. If someone were to conduct a Google search for "CHP," they would first be directed towards the California Highway Patrol's homepage. Even though CHP holds the potential for many financial and environmental benefits, a great majority of potential CHP hosts fail to investigate CHP technology because they do not understand it and the advantages it offers.

- **Putting people to work:** While rapid CHP deployment poses a tremendous opportunity for job creation, significant financial and educational/training resources will be essential to fostering the size and scale of the workforce development needed.

- **Clean enough?** Since most CHP systems use fossil fuels, CHP is sometimes not considered a "clean" or "clean enough" technology. In states with the most stringent environmental and air quality regulations this is a challenge to widespread deployment of CHP, despite its overall environmental advantages.

ILLUSTRATIVE LIST OF PARTICIPATING ORGANIZATIONS

USEA extends a sincere note of thanks to all entities and individuals that participated in any part of this stakeholder consultation. Their input and endorsement gives these recommendations weight and meaning and we hope this report serves them in advancing the cause of accelerated CHP deployment in the United States.

Participating organizations include but are not limited to the following:

- Aegis Energy Services, Inc.
- Alcantar & Kahl
- American Electric Power
- American Gas Association
- American Public Power Association
- BHMM Energy Services LLC
- California Air Resources Board
- California Cogeneration Council
- California Energy Commission
- California Public Utilities Commission
- Capstone Turbine Corporation
- CenterPoint Energy
- Chevron
- City of Palo Alto Utilities
- Clean Energy RACs (Northeast, Pacific, and Southeast)
- Connecticut Department of Public Utility Control
- ConocoPhillips
- Consolidated Edison Company
- Cook + Fox Architects
- Cornell University
- Cummins Inc.
- Cushman & Wakefield
- Day Carter Murphy LLP
- DE Solutions, Inc.
- Deloitte & Touche LLP
- District of Columbia Public Service Commission
- Duke Energy
- Edison Electric Institute
- Florida Public Service Commission
- GE Energy
- Georgia Public Service Commission
- Gotham 360 LLC
- ICF International
- Independent Energy Producers Association

- Integrated CHP Systems Corporation
- International District Energy Association
- Kaiser Permanente
- Los Angeles Department of Water & Power
- Louisiana Public Service Commission
- Massachusetts Department of Energy Resources
- MWV-MeadWestvaco, Inc.
- National Association of Regulatory Utility Commissioners
- National Grid
- National Rural Electric Cooperative Association (NRECA)
- New Jersey Board of Public Utilities
- New Jersey Department of Environmental Protection
- New Jersey General Assembly
- New York State Department of Public Service
- North Carolina Public Service Commission
- Northeast Clean Energy Regional Application Center
- NRG Thermal
- NYS Energy R&D Authority (NYSERDA)
- Oak Ridge National Laboratory
- Pace University Energy & Climate Center
- Pepco Energy Services
- PG&E
- San Diego Gas & Electric
- Scana Corporation
- Sentech Inc.
- SoCal Gas
- Solar Turbines, Inc.
- South Carolina Public Service Commission
- South Jersey Energy Solutions LLC
- South Jersey Gas
- Southern California Edison
- Southern Company
- Southern States Energy Board
- Southwest Gas Corporation
- Stanford University
- Tecogen Incorporated
- The Port Authority of New York & New Jersey
- U.S. Clean Heat & Power Association
- U.S. Department of Energy
- U.S. Environmental Protection Agency
- U.S. House of Representatives: Energy and Commerce Committee (Staff)
- University of California, Berkeley
- University of Southern California Energy Institute
- Vanasse Hangen Brustlin, Inc.
- Veolia Energy North America Holdings
- Wilson Sonsini Goodrich & Rosati
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