

Energy Performance Contracting for Water and Wastewater Projects

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AECOM

Presentation Outline

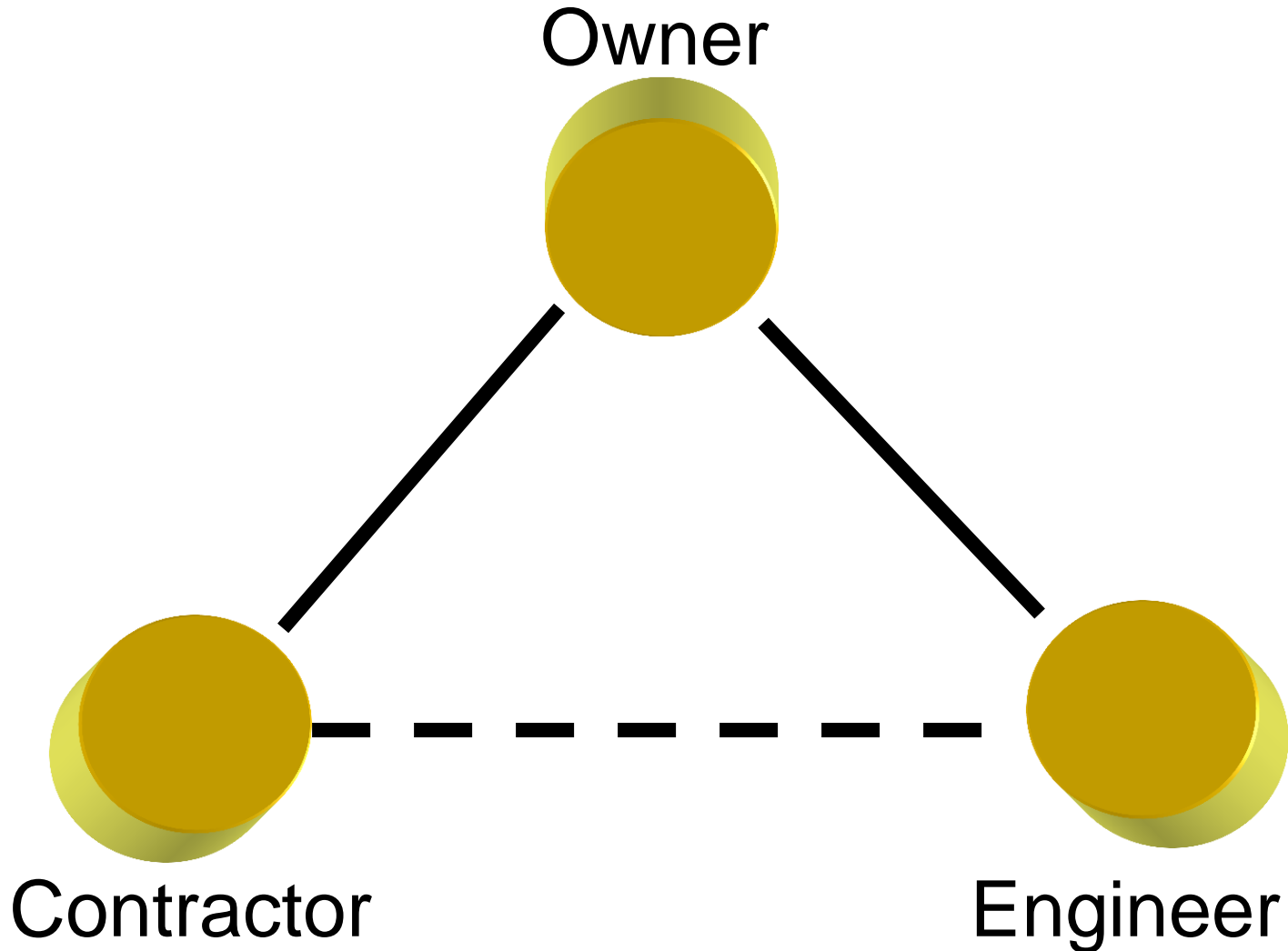
- What is Performance Contracting?
- Why Should I Care?
- What are the Benefits?
- What are the Challenges?
- Conclusions and Recommendations
- Questions??

What is Performance Contracting?

Typical Municipal Project Delivery

- Engineering
 - Studies
 - Design
 - Services During Construction
- Construction – Bid by Contractors
- Owner holds both contracts

Typical Municipal Project Delivery



Energy Performance Contracting

- Alternative delivery/procurement mechanism
- Implement necessary infrastructure improvements that reduce energy consumption and operating costs
- 3rd party financed and paid thru cost savings (avoidance)
- Paid through existing utility budget
- Identify, fund, design, and construction of Energy Conservation Measures (ECMs)

Energy Performance Contracting

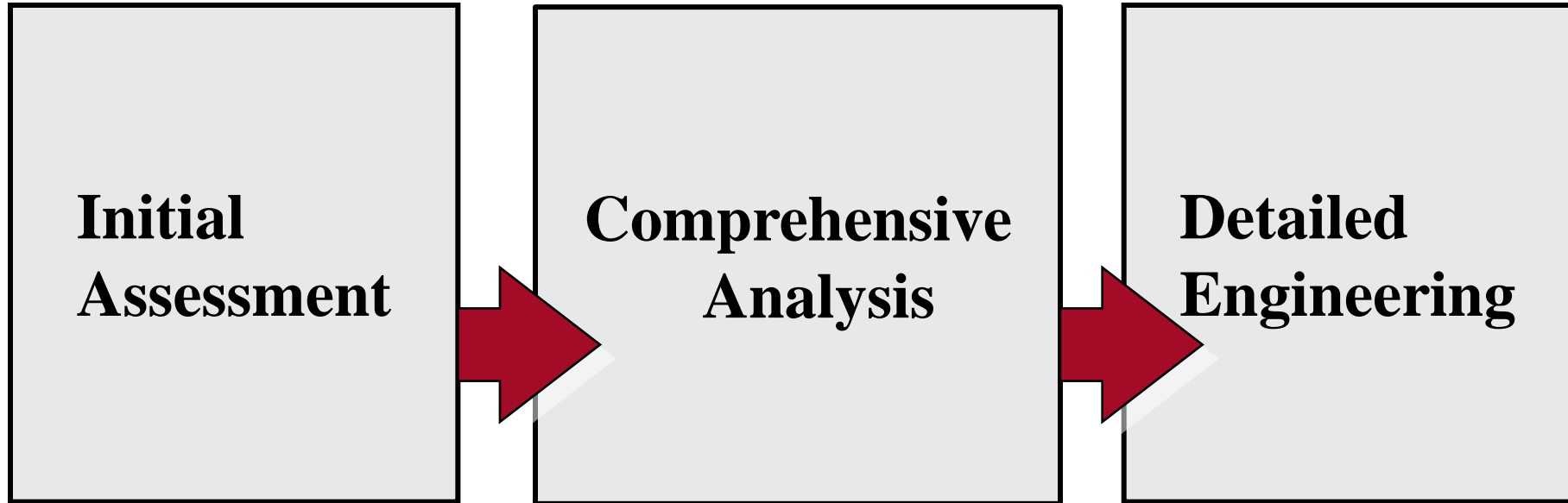
- **Design/build/finance** – with ongoing services
- Use **cost savings** from the project to solve issues, improve performance and fund CIP measures by redirecting funding to improvements instead of Utility bills.
- **Streamlined procurement** allows for faster project completion AND you can hand-select equipment and contractors (Wisconsin State Statutes, Chapter 66 – General Municipal Law, Article 66.0133)
- Achieve master plan benefits in advance of next capital project or plant upgrade
- Project financing paid from savings – with **guaranteed results**
- **Bundle energy conservation measures** for a more impactful program – shorter payback measures support longer payback measures

Performance Contracting Process

Project life cycle



Solution Design Phases



**Initial
Assessment**

**Comprehensive
Analysis**

**Detailed
Engineering**

**Customer Interview
Review of Utility Bills
Facility Survey
Financial Modeling
Benchmarking**

**Utility Consumption/ Demand Profiles
Load and Power Factors
Rate Structure
Plant Survey
Development of Energy Baseline
Data Logging Instruments
Computer Utility Baseline Modeling
Preliminary Engineering Calculations
Establish Budgetary Cost vs.. Savings**

**Design and Specifications
Detailed Construction Plans
Equipment Cut sheets
Operating Characteristics
Drawings and Technical
Submittal**

Energy Services Companies

Energy Service Company (ESCO)

- Identifies energy savings opportunities
- Guarantees a specified level of cost savings
- Incurs the cost of developing and implementing an energy project
- Finances, designs and constructs the project

Ordering Agency (Customer)

- Selects ESCO
- Negotiates, awards and administers contract
- Ensures that savings exceed contractor payments

Financial Approach

- Project funded through energy/operational reductions
- Capital improvements without budget increases
- Annual cost less than annual savings
- Excess savings remain with City

Measurement and Verification

- Required to verify proper operation to achieve guaranteed savings
- Defined in contract between ESCO and Owner
- Often includes some level of operations or maintenance assistance
- Often done in accordance with International Standard from the EVO (Energy Valuation Organization)
 - IPMVP – International Performance Measurement & Verification Protocol
 - www.evo-world.org

Why Should You Care?

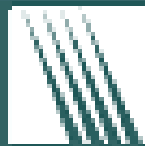
Municipal Issues

- Many have capital project restrictions or holds
- Energy largest recurring cost after labor
- Many have sustainability and energy conservation goals
- Many states have renewable energy portfolio requirements

Energy Services Companies

- Many large, reputable Energy Services Companies (ESCO)
- National Association of Energy Services Companies (www.naesco.org)
- Historically for private buildings and industrial facilities
- Substantial number now are municipal and federal projects

NAESCO



® National Association of
Energy Service Companies

Energy is Hot!!

- Water Environment Federation’s (WEF) 2011 position statement called for “wastewater-generated energy to be widely-recognized as a renewable resource”
- Many municipalities have established sustainability offices or managers and have defined energy or greenhouse gas reduction goals
- Alternative project delivery is anticipated to grow substantially including PC (which many consider a form of Design-Build)

ESCOs – Water and Wastewater

- Successful projects for municipal buildings
 - Libraries
 - Schools
 - Courthouses
 - City Halls
- Often largest municipal energy user is water and/or wastewater facilities
- ESCOs typically do not have water/wastewater expertise, experience, or licensure needed
- Results in formation of teams with consulting engineers for water/wastewater projects

What are the Benefits?

Financial & Operational Benefits

- Plant improvements funded by guaranteed savings
- Reduction in plant operational costs
- Jointly establish common objectives and goals
- Measurement & verification of savings
- Design, build, on going support ESCO responsibility

Benefits (con't)

- Comprehensive Approach
 - Maximize benefit to facility
 - Combine longer payback measures with shorter ones for reasonable overall payback
- Substantial Risk Transfer
 - From facility to ESCO
 - Design, implementation, performance
 - Guarantee that debt service paid from savings

Typical Water and Wastewater Projects

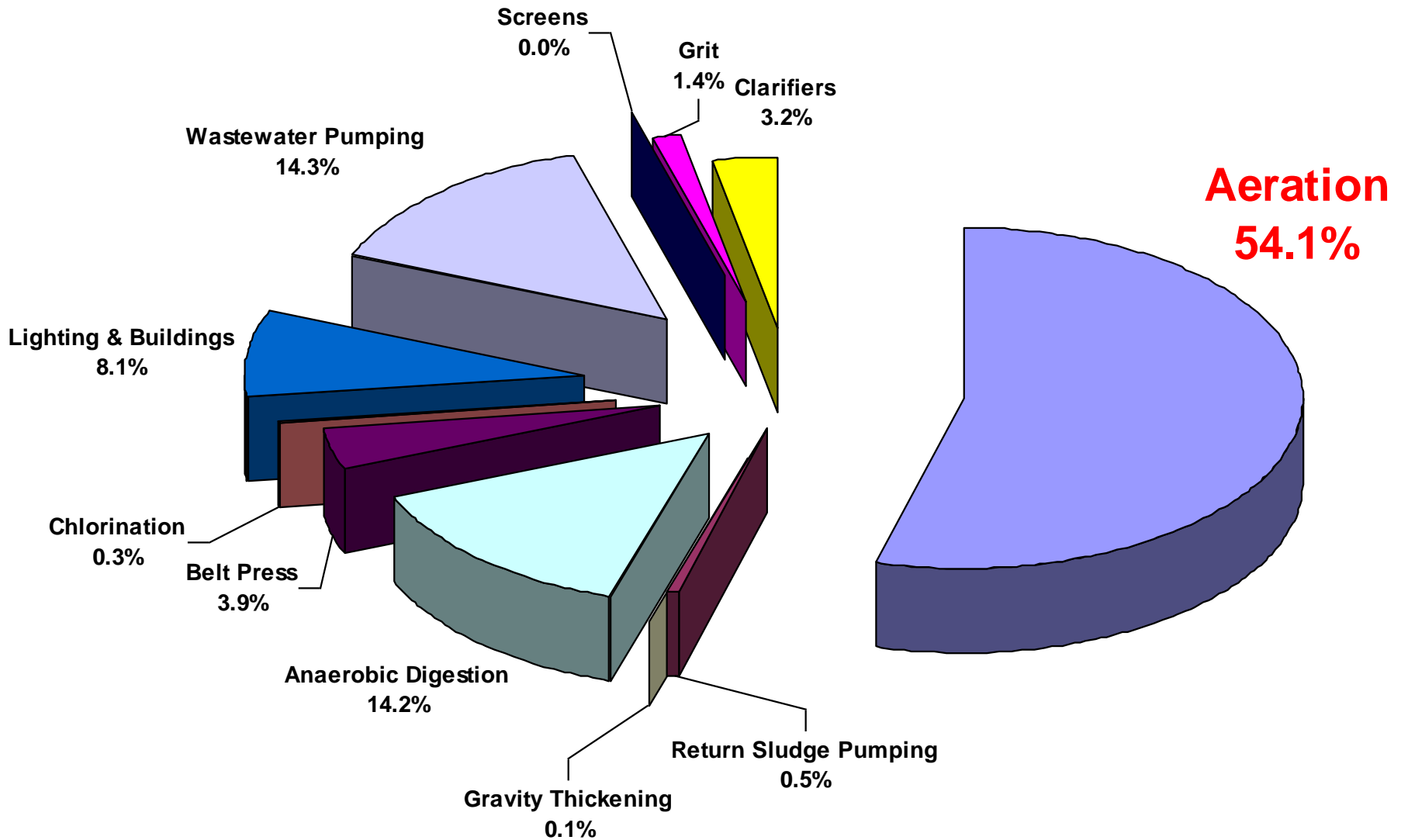
– Water

- New meters and meter automation
- Pump improvements
- Pump and pressure instrumentation and controls
- Treatment plant improvements
- Building Improvements – typical ESCO projects

Typical Water and Wastewater Projects

– Wastewater

- Aeration system improvements, automation, and controls
- Pump improvements
- Pump instrumentation and controls
- Digester gas Combined Heat and Power (CHP) or Cogeneration
- Other process improvements
- Building Improvements – typical ESCO projects



Electricity Requirements for Activated Sludge Wastewater

Derived from data from the Water Environment Energy Conservation Task Force *Energy Conservation in Wastewater Treatment*

What are the Challenges?

Working with ESCOs

- Proposals and interviews – lack of familiarity/preparation
- Preliminary phase done for no fee
 - Want to spend minimal dollars
 - Fast turn around expected
 - Lack of understanding of differences from typical projects
 - Building modifications versus technical, brick-and-mortar projects
- Payment Options – issues and concerns

Working with ESCOs (con't)

- Design and construction phase similar to design build
 - Cost risk
 - Owner input and feeling of loss of control
 - Lack of understanding of regulatory environment
 - Permits (e.g., air, stormwater)
 - Reviews and approvals

Working with ESCOs (con't)

- Client Perception
 - Cheapened project (similar to DB)
 - Loss of control (also similar to DB)
- Memorandum of Understanding
- Confidentiality Agreement
- Contract Terms and Conditions
 - Consequential Damages
 - Performance Liability
 - Need clear, well defined roles, responsibilities, LOE, etc.
 - Early involvement in project definition and costs

Working with ESCOs (con't)

- Risk identification and mitigation
 - Construction
 - Pricing
 - Permitting
- Owner involvement and buy-in
- Owner requirements, cons
- Reviews, QA, QC imp
- Change management
- Communication
- Documentation

**You Still Need
Management
Practices**

Selection of ESCO

- Many major firms with a variety of expertise
- Several regional firms
- Typical teaming issues
 - Client alignment and reputation
 - Cooperative, true teaming approach
 - Winning proposition
 - Mutual respect and understanding

Conclusions and Recommendations

Conclusions

- Energy a Major Issue to Municipalities
- Water and Wastewater Major Municipal Energy User
- Performance Contracting a Growing Alternative Project Delivery Method
- Multiple ESCOs Active in the Market
- PC Can Provide Funding and Other Benefits

Recommendations

- Consider PC Opportunities
- Vet ESCO and Project
- Obtain Assistance from Experienced Individuals
- Contract Very Carefully

Questions??

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Additional References

Resources and Contacts

- US Department of Energy, Office of Energy Efficiency & Renewable Energy
 - <http://www1.eere.energy.gov/femp/financing/superespcs.html>
 - Contains tools, templates and guidance
- Introduction to Performance Contracting by Energy Star
 - http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf
- IPMVP Standard for Measurement & Verification (from NREL – National Renewable Energy Laboratory)
<http://www.nrel.gov/docs/fy02osti/31505.pdf>



Sustainable Infrastructure for Water & Wastewater



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Energy and Water

Reducing climate impacts, saving money, and saving water – these are the goals of projects and programs that exploit the nexus between energy use and water use. Identifying approaches to integrate energy efficient practices into the daily management and long-term planning of the water sector also contribute to the long-term sustainability of water infrastructure by reducing operation costs and adding to a utility's bottom line. This page provides information on a number of activities EPA is supporting to improve energy efficiency at water utilities across the country.

- [Memo from Assistant Administrator Benjamin H. Grumbles: The Nexus between Water and Energy: Promoting Energy Efficiency for the Water Sector PDF](#) (3pp, 182K)
- **On this page**
 - [Basic Information](#)
 - [How much energy do drinking water and wastewater utilities use?](#)
 - [Does energy efficiency save money?](#)
 - [Does water efficiency save energy?](#)
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http://www.epa.gov/waterinfrastructure/bettermanagement_energy.html

EPA Encourages Combined Heat and Power (CHP)



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[Combined heat and power \(CHP\)](#), also known as cogeneration, is an efficient, clean, and reliable approach to generating power and thermal energy from a single [fuel source](#). By installing a CHP system designed to meet the thermal and electrical base loads of a facility, CHP can greatly increase the facility's operational efficiency and decrease energy costs. At the same time, CHP reduces the emission of greenhouse gases, which contribute to global climate change. [Read more basic information regarding CHP.](#)

The CHP Partnership is a voluntary program seeking to reduce the environmental impact of power generation by promoting the use of CHP. The Partnership works closely with energy users, the CHP industry, state and local governments, and other clean energy stakeholders to facilitate the development of new projects and to promote their environmental and economic benefits.

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Have Questions? Need Assistance? ▼


Contact:
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Gary McNeil
[mcneil.gary@epa.gov](mailto:mcnail.gary@epa.gov)

Call the CHP Partnership help line at 703-373-8108 or email chp@epa.gov. [more »](#)

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CHP
 EPA COMBINED HEAT AND POWER PARTNERSHIP

Producing Reliable Energy & Preserving the Environment

What's New

- [November 16 - Presentations from the EPA CHP Partnership Meeting Now Available](#)
- [November 2 - EPA Recognizes Facilities for Energy Savings](#) >> [EPA Press Release](#)
- [July 23 - Presentations from the EPA and DOE Webinar, "Output-Based Emissions Standards 101" Now Available](#) [EXIT Disclaimer](#)

Did you know...?

Through 2009, the CHP Partnership has helped install more than 460 CHP projects, representing 4,850 megawatts (MW) of capacity. The high efficiency of these projects resulted in greenhouse gas

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www.epa.gov/chp