



CHP: Opportunities for Energy Efficiency and Resiliency

2015 Better Building Summit

May 27, 2015

CHP Opportunities for Energy Efficiency and Resiliency

AGENDA

- DOE CHP Deployment Program -- CHP 101-- Claudia Tighe
- Harbec Plastics – Better Plant Partner expanding existing CHP operations—Bob Bechtold
- North Carolina State University CHP Plant— NCSU is one of DOE’s seven CHP TAPs providing CHP technical assistance and now they have a CHP plant of their own -- Jack Colby
- Upper Chesapeake Medical Center – Clark Financial Services Group— financier investing in CHP -- Claudia Meer



Better Building Summit 2015: CHP Market 101

5/27/2015

Claudia Tighe
U.S. DOE CHP Deployment Program
Manager

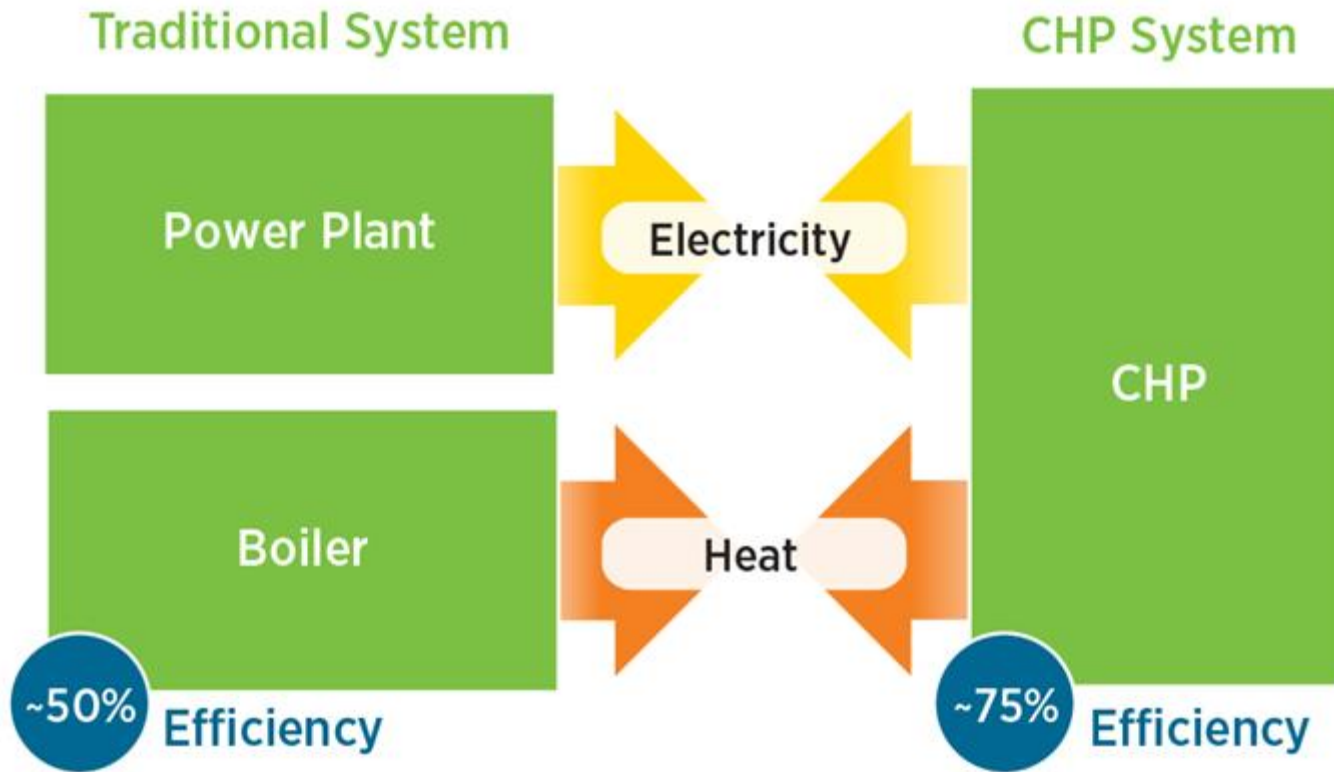
What Is Combined Heat and Power?

CHP is an *integrated energy system* that:

- Is located at or near a factory or building
- Generates electrical and/or mechanical power
- Recovers waste heat for
 - Heating
 - Cooling
 - Dehumidification
 - Process heat
- Can utilize a variety of technologies and fuels

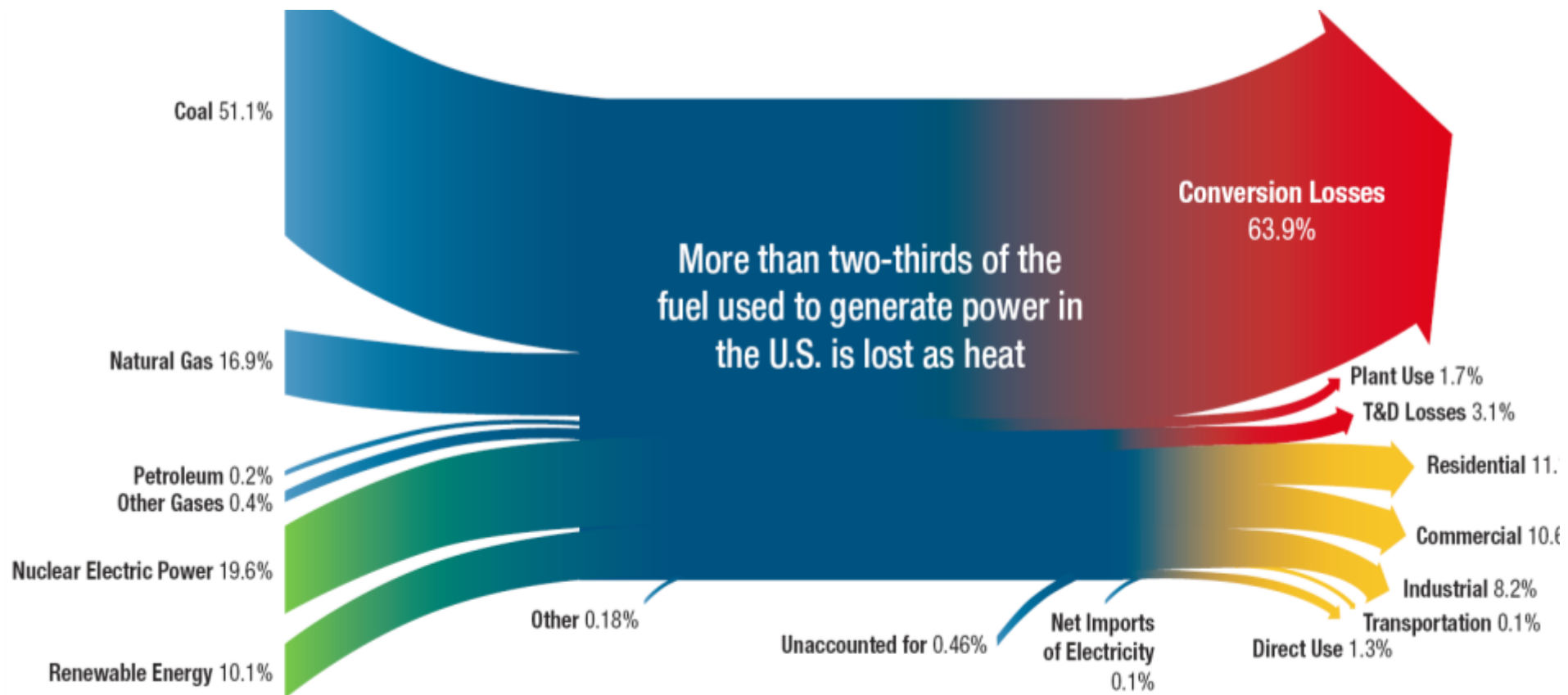


Combined Heat and Power (CHP) Process Flow Diagram



See CHP Basics <http://www.energy.gov/eere/amo/combined-heat-and-power-basics>

Fuel Utilization by U.S. Utility Sector



Source: http://www1.eere.energy.gov/manufacturing/distributedenergy/pdfs/chp_report_12-08.pdf

What Are the Benefits of CHP?

- CHP is more efficient than separate generation of electricity and heat
- Higher efficiency translates to lower operating cost, (but requires capital investment)
- Higher efficiency reduces emissions of all pollutants
- CHP can also increase energy reliability and enhance power quality
- On-site electric generation reduces grid congestion and avoids distribution costs

President's Executive Order 13624: 40GW of new CHP by 2020

DOE's AMO CHP Deployment Program assists industrial, institutional, commercial, and multifamily facilities/buildings to accelerate investment in energy-efficient CHP thereby improving competitiveness, heightening energy security, and protecting our environment. Program activities include:

- **Market Analysis and Tracking**

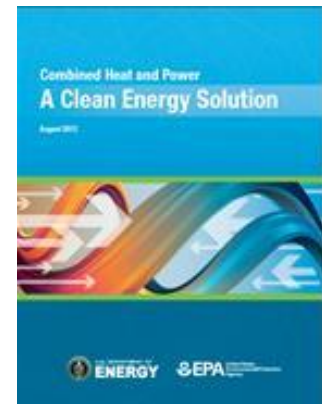
- DOE/ICF CHP Installation Database:
<https://doe.icfwebservices.com/chpdb/>

- **Publication of fact sheets, reports, project profiles:**

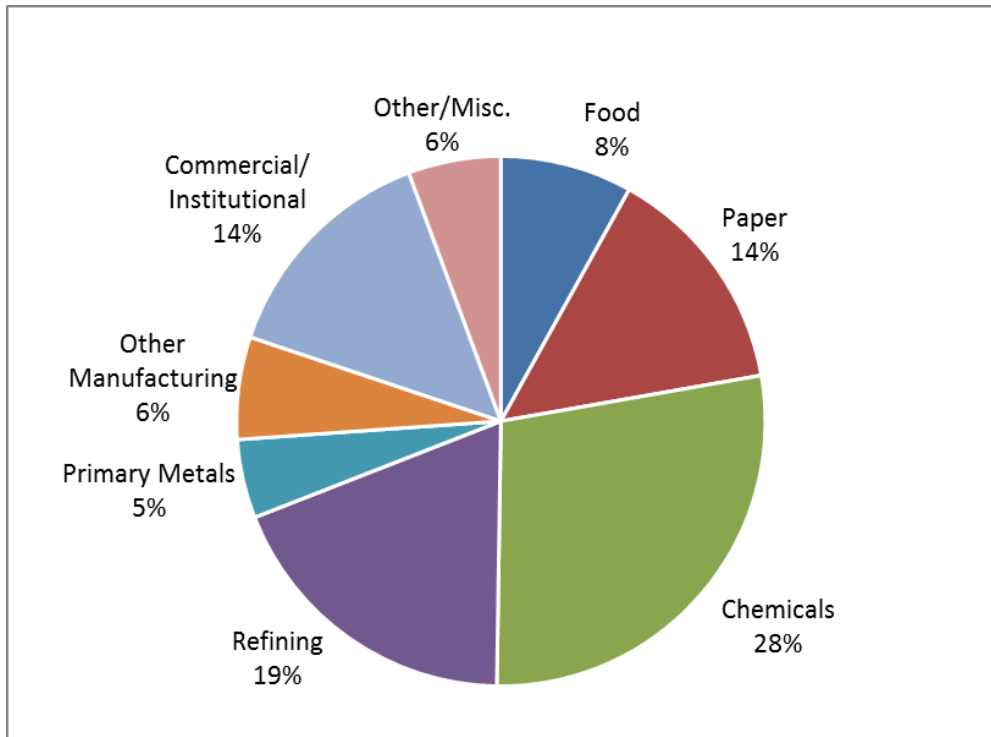
- Waste Heat to Power Market Assessment
<http://info.ornl.gov/sites/publications/Files/Pub52953.pdf>
- Combined Heat and Power: A Clean Energy Solution
http://energy.gov/sites/prod/files/2013/11/f4/chp_clean_energy_solution.pdf

- **Regional CHP expertise** through the 7 CHP Technical Assistance Partnerships (CHP TAPs)

- **Partnerships** with Better Building/Better Plants Partners, other federal agencies, stakeholder groups, associations, Climate Action Champion (CAC) Cities, and enterprise accounts



Where are We Now: U.S. CHP Installations



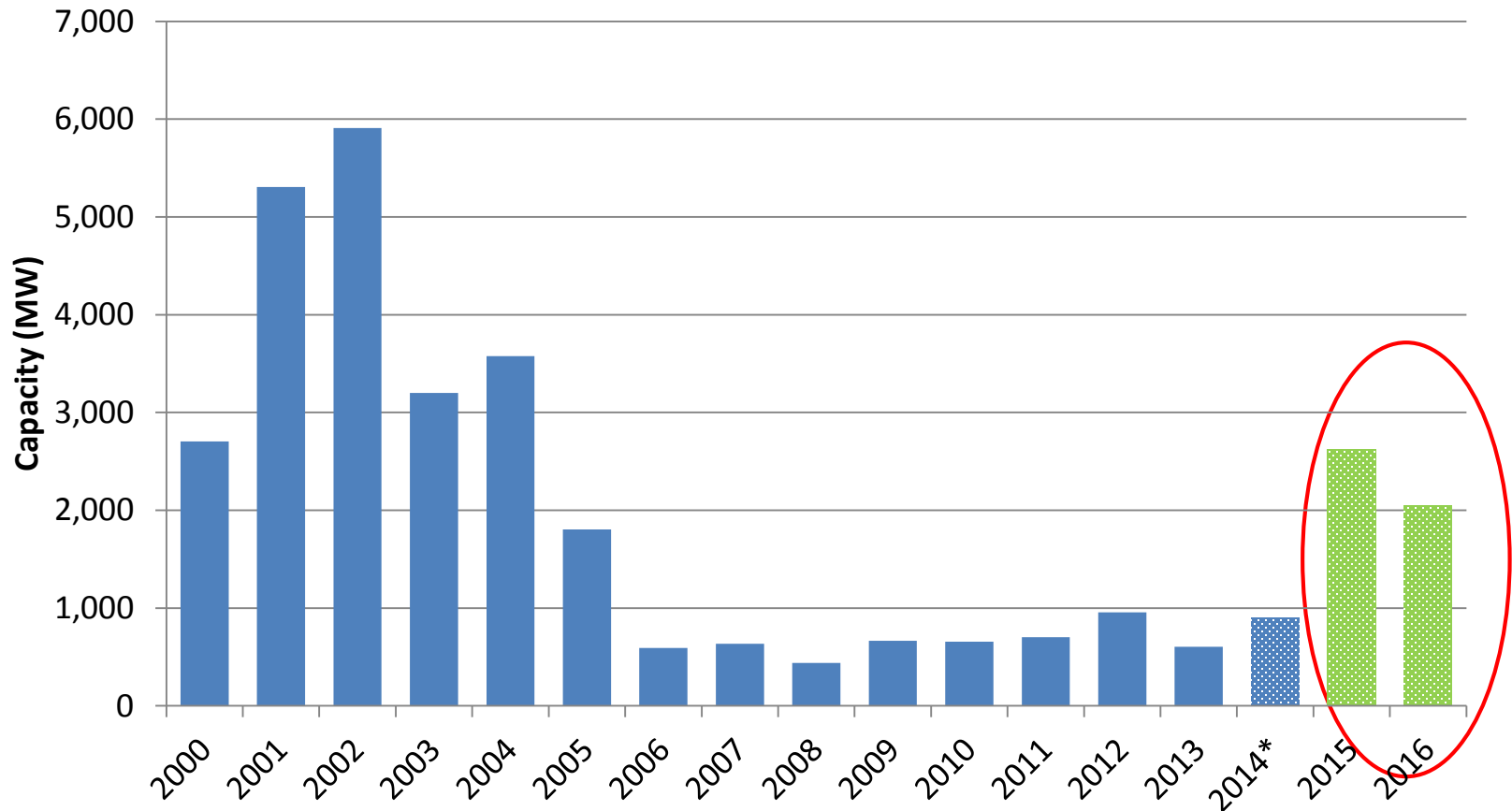
- **82.7 GW** of installed CHP over 4,300 industrial and commercial facilities
- 80% of capacity in industrial applications
- 70% of capacity is natural gas fired
- Avoids more than **1.8 quadrillion Btus** of fuel consumption annually
- Avoids **241 million metric tons of CO₂** compared to separate production

Sources: DOE/ICF CHP Installation Database (U.S. installations as of December 31, 2013);

EIA <http://www.eia.gov/todayinenergy/detail.cfm?id=8250>
Energetics, "US Manufacturing Energy Use and Greenhouse Gas Emissions Analysis, November 2012"

CHP Market Activity

Annual CHP Capacity Additions



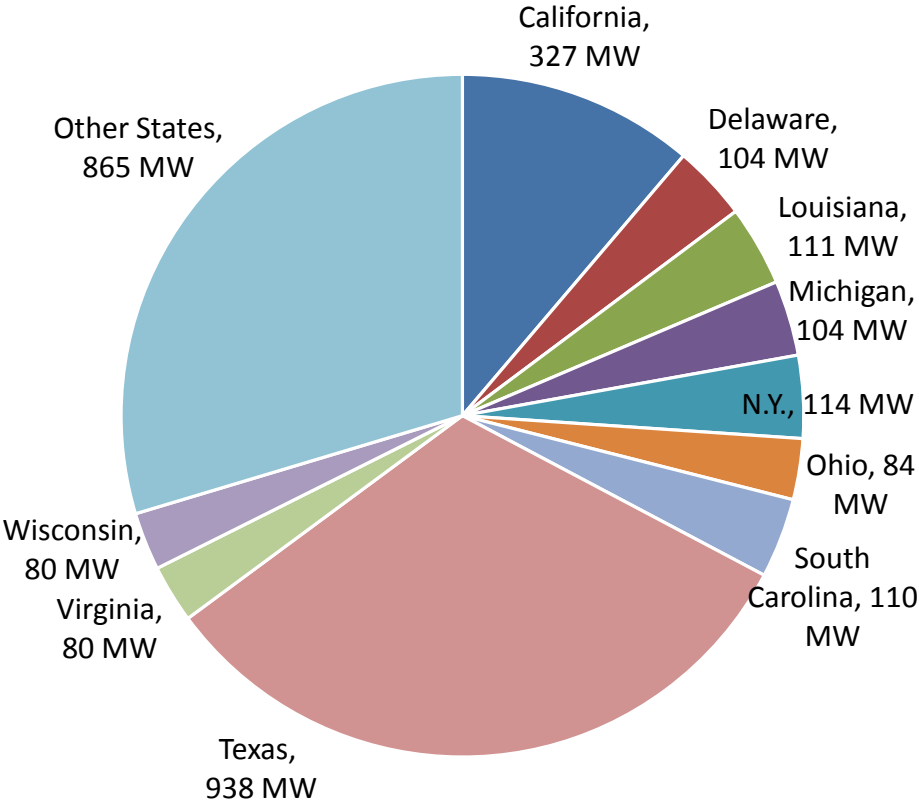
*Preliminary data

Source 2000-2013 data: DOE/ICF CHP Installation Database

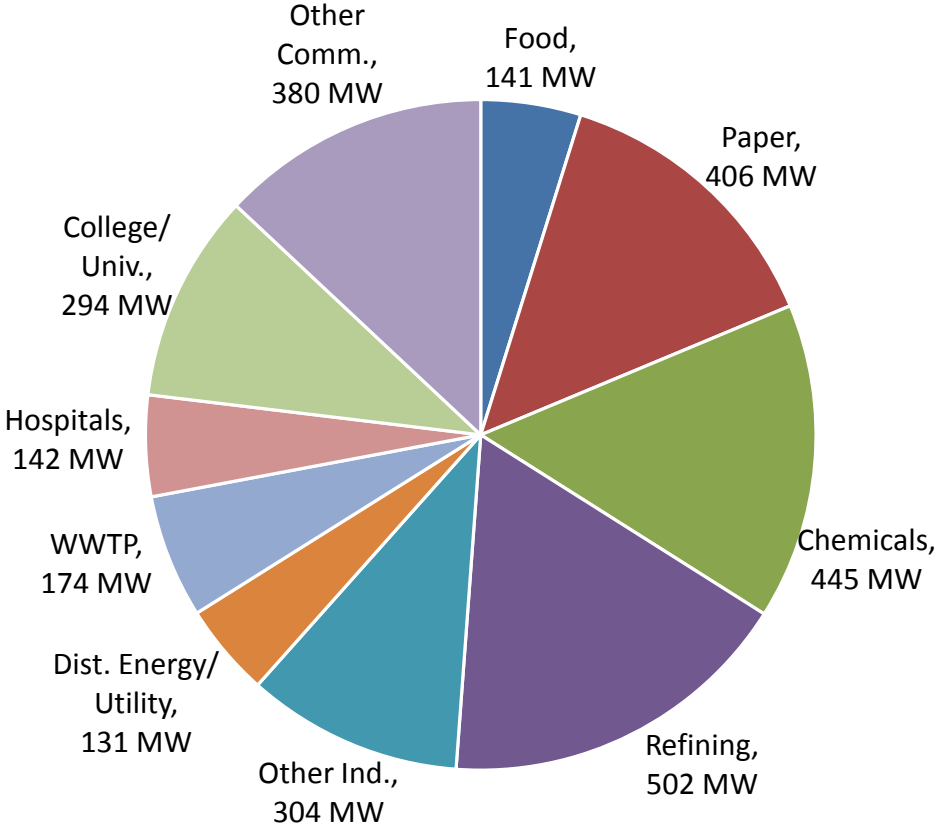
Source 2014-2106 data: ICF Internal Tracking

CHP Additions, 2010-2013 (2,919 MW)

By State (MW)



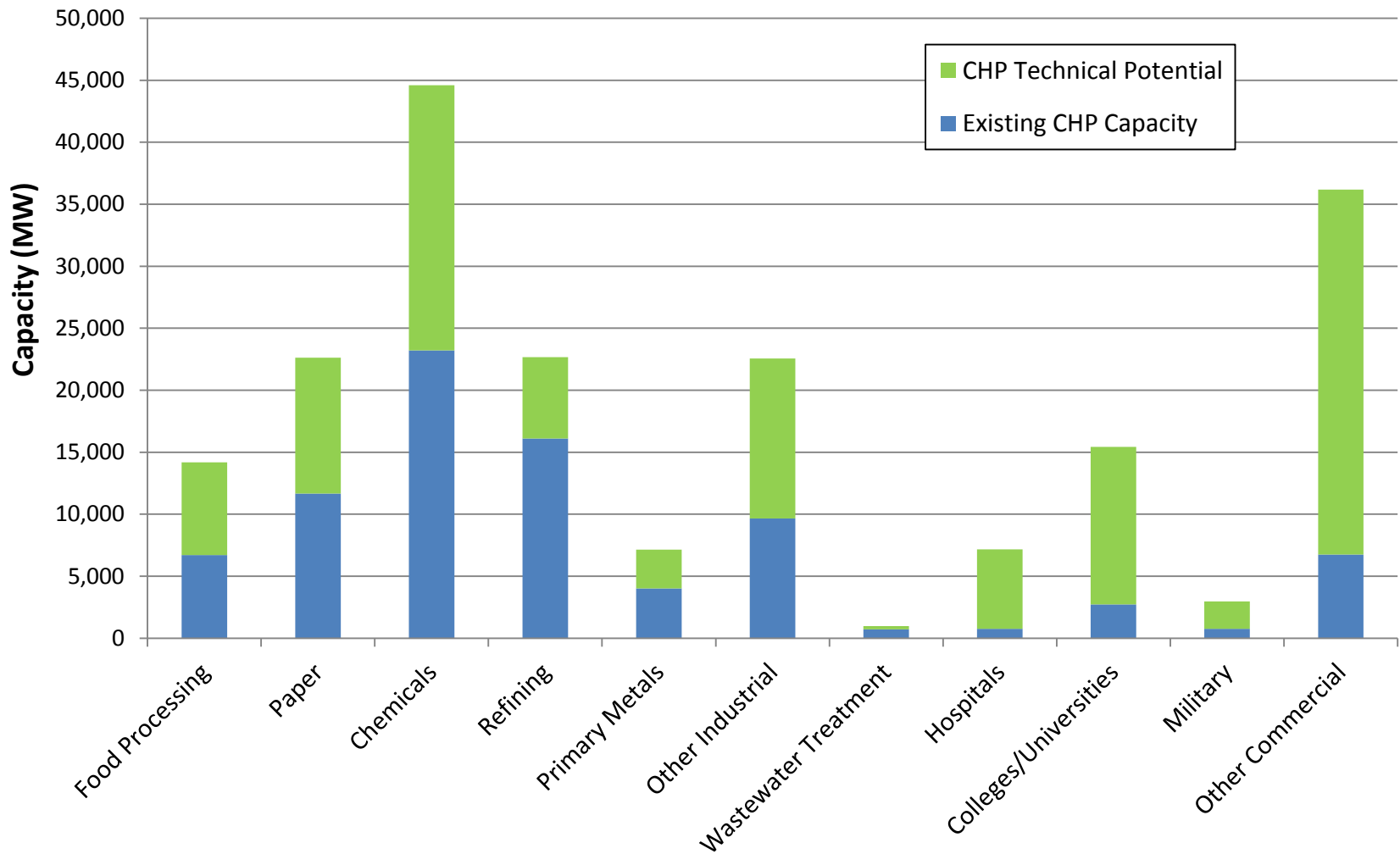
By Application (MW)



Source: DOE/ICF CHP Installation Database (U.S. installations as of December 31, 2013)

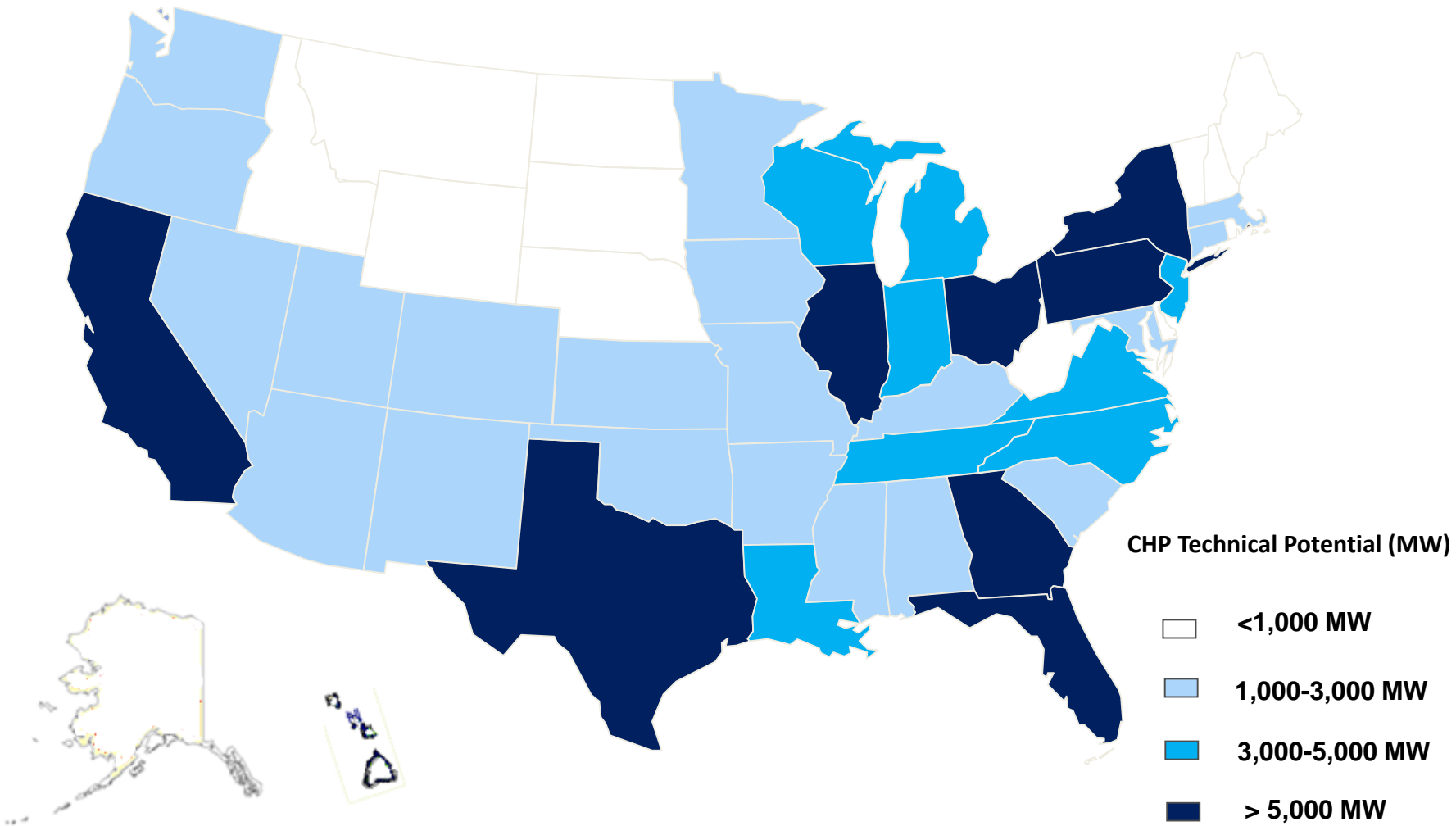
Where is the Remaining Potential for CHP?

Existing CHP Capacity vs Technical Potential



Source: ICF internal estimates (2014)

The Potential for Additional CHP Is Nationwide



Source: ICF Internal Estimates (2014)
13

DOE CHP Technical Assistance Partnerships (CHP TAPs)

DOE's CHP TAPs promote and assist in transforming the market for CHP, waste heat to power, and district energy or microgrid with CHP throughout the United States. Key services include:

- **Market Opportunity Analysis**

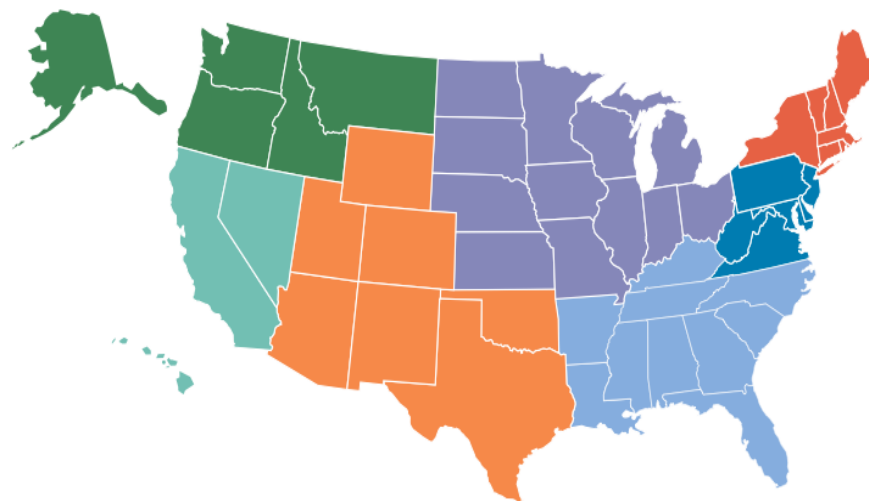
Supporting analyses of CHP market opportunities in diverse markets including industrial, federal, institutional, and commercial sectors

- **Education and Outreach**

Providing information on the energy and non-energy benefits and applications of CHP to state and local policy makers, regulators, end users, trade associations, and others.

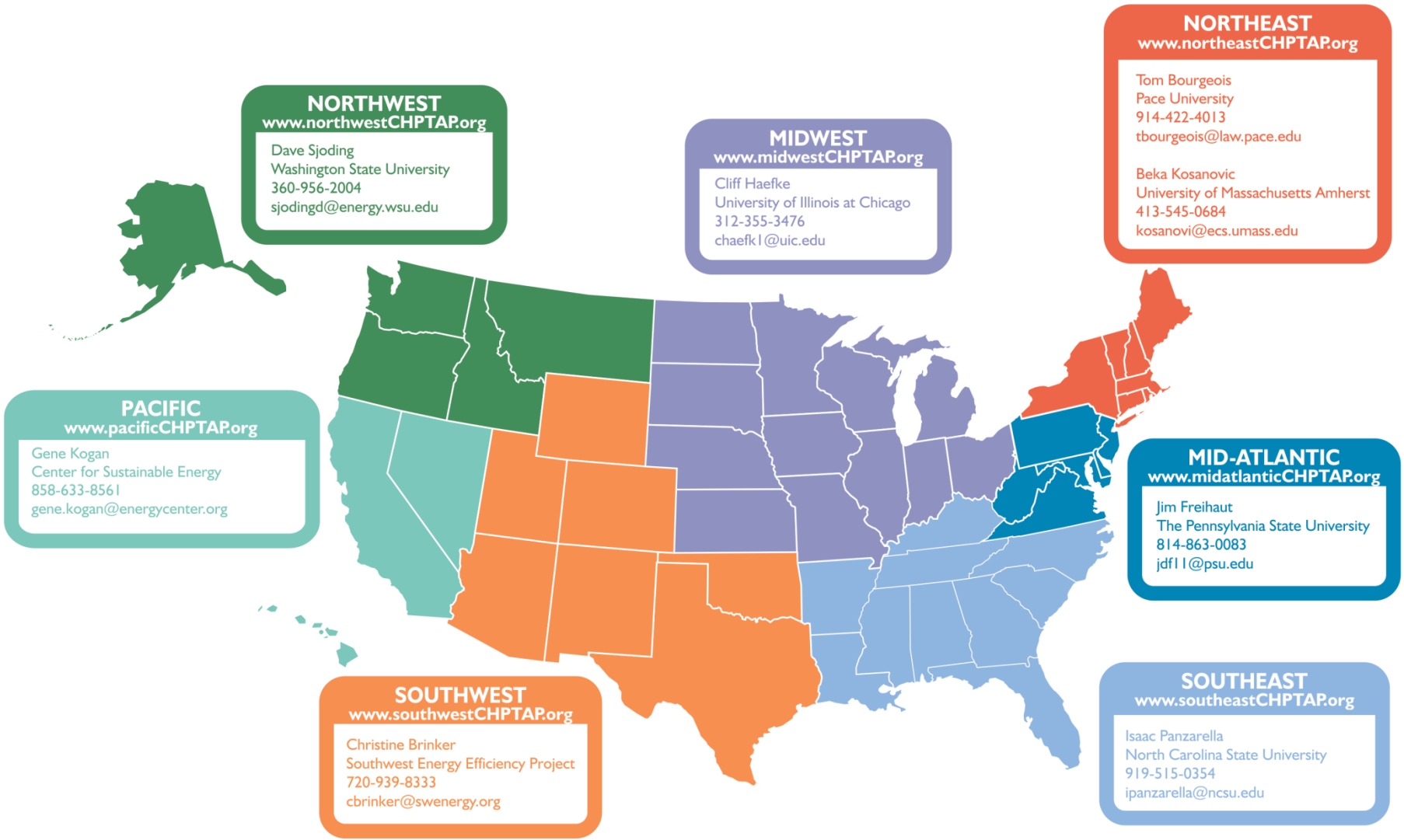
- **Technical Assistance**

Providing technical assistance to end-users and stakeholders to help them consider CHP, waste heat to power, and/or district energy or Microgrid with CHP in their facility and to help them through the development process from initial CHP screening to installation.



www.energy.gov/chp

DOE CHP Technical Assistance Partnerships (CHP TAPs)



Thank you!

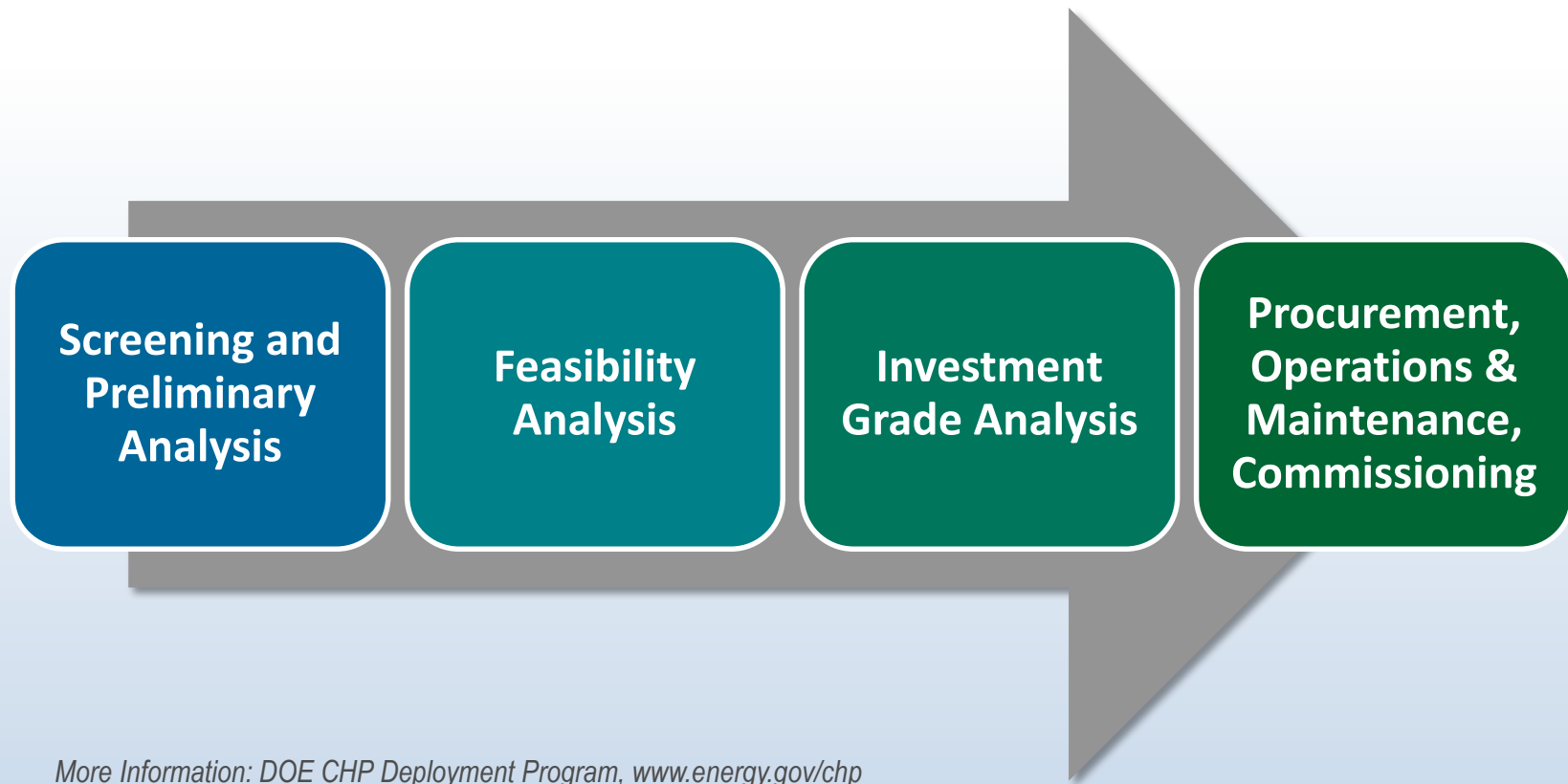
Learn more about the DOE CHP Deployment Program
and contact us:

www.energy.gov/chp

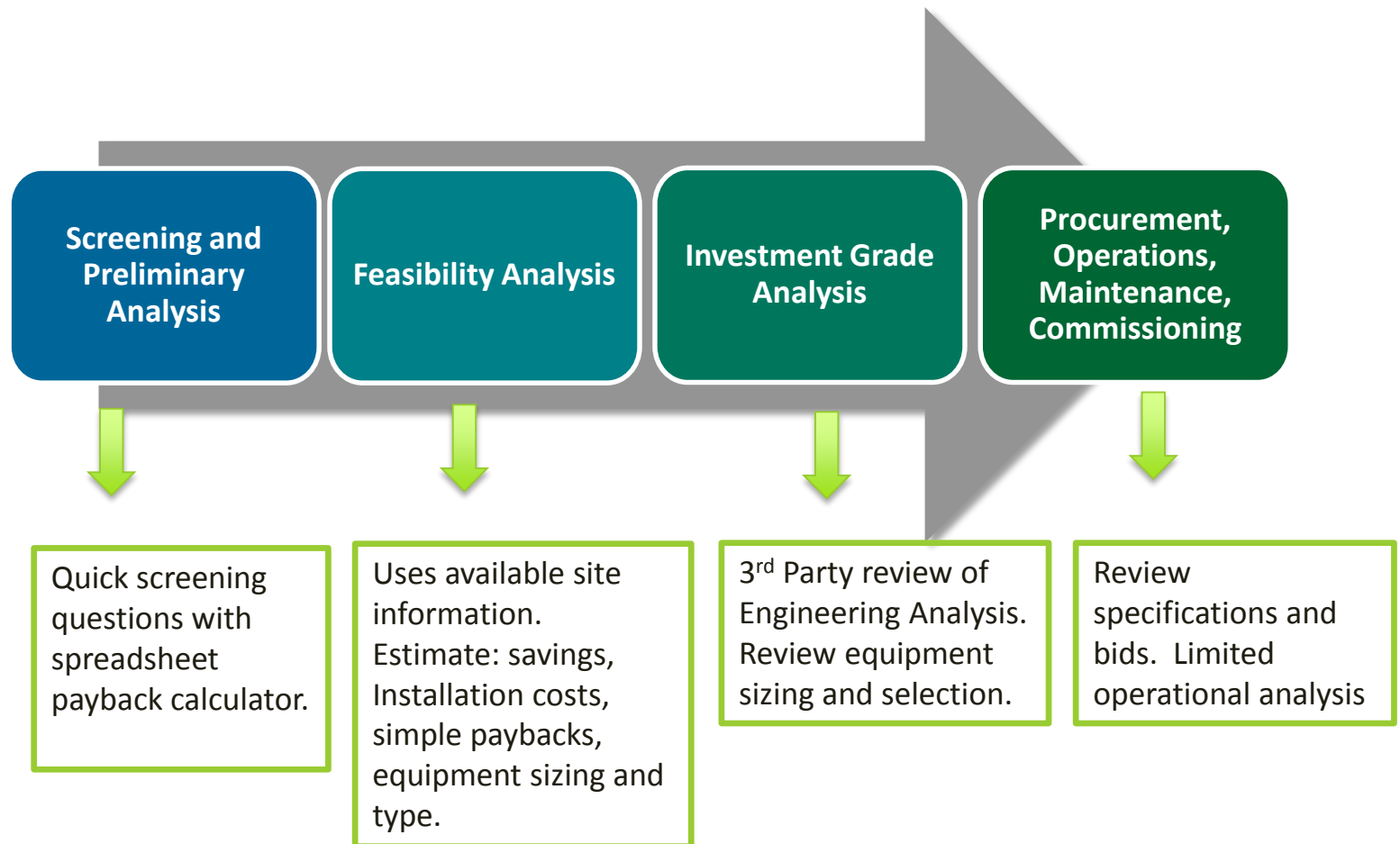
Further Information on DOE Technical Assistance

APPENDIX

CHP TAP Technical Assistance Project Support

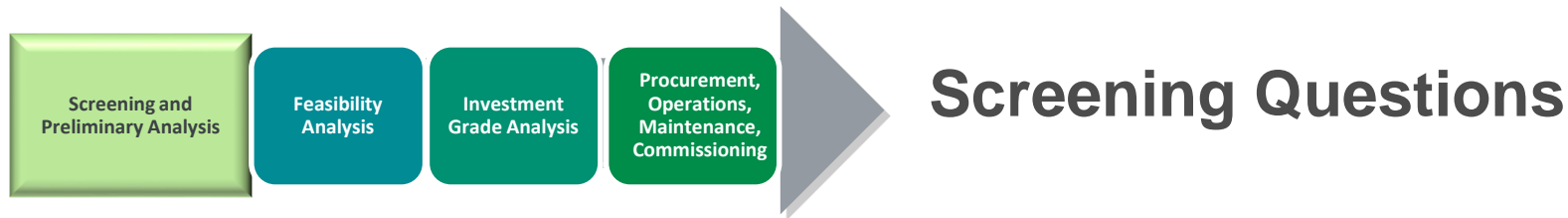


CHP TAP Project Development Technical Assistance



**US DOE
CHP TAP
Services:**

CHP TAP Qualification Process



- Do you pay more than \$.06/kWh on average for electricity (including generation, transmission and distribution)?
- Are you concerned about the impact of current or future energy costs on your business?
- Are you concerned about power reliability? Is there a substantial financial impact to your business if the power goes out for 1 hour? For 5 minutes?
- Does your facility operate for more than 3000 hours per year?
- Do you have thermal loads throughout the year (including steam, hot water, chilled water, hot air, etc.)?

Source: *Combined Heat and Power A Clean Energy Solution: August 2012: DOE and EPA*

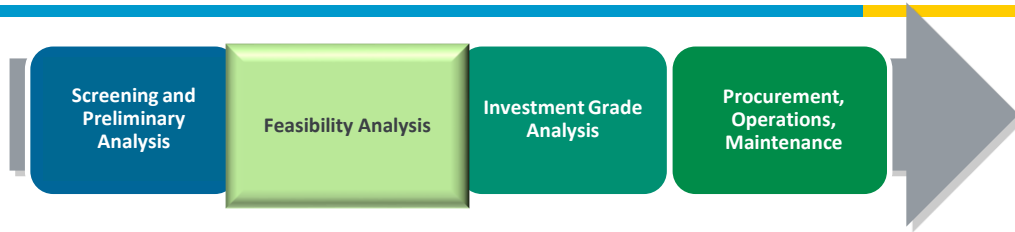
Screening Questions (cont.)

- Does your facility have an existing central plant?
- Do you expect to replace, upgrade, or retrofit central plant equipment within the next 3-5 years?
- Do you anticipate a facility expansion or new construction project within the next 3-5 years?
- Have you already implemented energy efficiency measures and still have high energy costs?
- Are you interested in reducing your facility's impact on the environment?
- Do you have access to on-site or nearby biomass resources (i.e. landfill gas, farm manure, food processing waste, etc.)?

If you answer "yes" to 3 or more of the following questions, your facility may be good candidate for CHP.



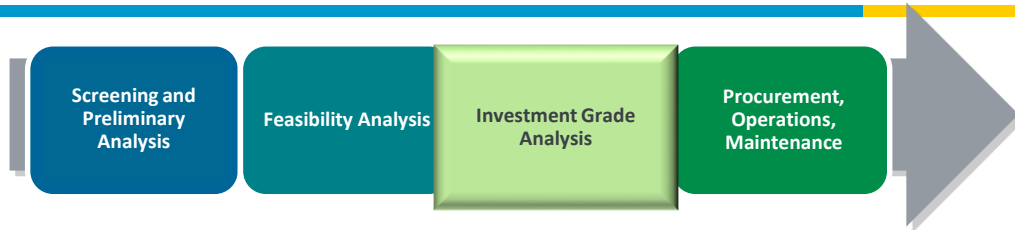
CHP TAP Feasibility Analysis (Technical and Financial)



Feasibility Analysis typically involves:

- Electrical load profiling (minimum of 12 month prior electric usage - hourly/daily)
- Thermal load profiling (minimum of 12 month prior fuel usage - hourly/daily)
- Thermal use determination (opportunities to use the heat)
- Unit sizing
- Installation cost estimations (including available incentives)
- Financial calculations (simple payback, ROI, etc.)
- Other CHP system benefits (environmental, resiliency, etc.)

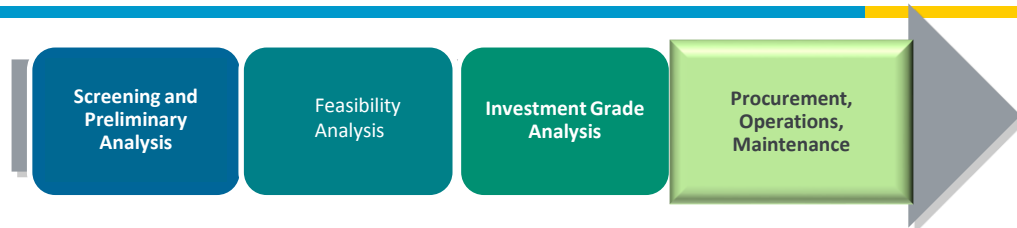
CHP TAP 3rd Party Review: Investment Grade Audit



Independent Review of an Engineering Firm’s Analysis encompassing:

- Feasibility Analysis results
- Design specifications
- Equipment sizing and selection
- Facility design for “balance of plant” (items needed to install CHP but not part of CHP unit – e.g. piping, switchgears, pumps, etc.)
- Utility interconnection studies, if appropriate

CHP TAP Procurement, O&M, Commissioning



- Support preparation of an RFP for engineering and CHP equipment
- Review of specifications and bids
- Review of O & M procedures
- Assess “as-built” to ensure design specifications met and facility operating as expected

Bob Bechtold, Harbec

Department of Energy
2015 Better Buildings Summit

CHP Opportunities and Benefits
2015

Bob Bechtold



HARBEC goals for CHP

- **Problems: (late 90's)**
 - Poor power quality caused expensive damage to high tech manufacturing equipment
 - When asked, utility had no answers that would guarantee reduction or elimination of problems
 - A desire to improve employees' working conditions (sweat-shop) while remaining competitive
 - A need to improve part quality by reducing ambient moisture



Initial Concerns...

- More potential conflicts with the utility
- Customers' impressions that we were 'buying toys'
- Customer concerns that we would have unreliable power and not be able to deliver
- That we were not in the utility business and so it (managing and maintaining) might be too big of a distraction for us to handle



Actual Outcomes

- We ran our CHP plant for 2 years before telling any customers it was there, so that when we did tell them we already had 2 years of confidence and excellent performance...
- We also were able to offer the ability to stay fully operational when the grid was down...something that our competition could not offer to our customers
- Eventually we were able to demonstrate and quantify the fact that we were reducing our operating cost and making our pricing more competitive



Meeting Expectations...

- Economically
 - Beat ROI expectations due to increase in gas cost



- Maintenance
 - Never had a Capstone serviceman in our building



- Reliability
 - After 14 years of constant operation we are updating and refurbishing mostly for efficiency improvement opportunities

If We Knew Then What We Know Now...

Unexpected Problems

- Our utility will not recognize the energy that our CHP produce for net-metering purposes and worse, because it is mixed with our energy from our wind turbines they determined that we were not eligible for net-metering of the power they produce either.
- The result of this is we donate \$50k to \$60k worth of green power to the grid annually.



If We Knew Then What We Know Now...

Unexpected Bonuses

- Our CHP experience taught us how to think ‘thermally’ which can make very significant improvements in company economics
- We learned that if a CHP plant is operated under Thermal Priority it will always be economically positive, regardless of changing fuel and utility pricing
- Having one moving part in your generator is worth the extra initial cost
- DOE CHP TAP and NYSERDA



Value of DOE CHP TAP

- Providing resources to interested communities including:
 - Assessing economic viability
 - Addressing interconnection issues
 - Navigating legal and regulatory matters
 - Understanding tariffs and standby charges
 - First Order District Energy Screening Tool
 - CHP Qualification Screenings & Technical Assessments



U.S. DEPARTMENT OF
ENERGY

Value of DOE CHP TAP

- Main Features
 - Data – Regional Load Profiles, Energy Prices, Labor Rates, Financial rates, Pipe Cost,
 - Project Definition - District Composition, Phasing
 - Options appraisal – LIFE CYCLE COST Comparison of Costs of Options vs Baseline (Building Boilers and Chillers and Purchased Power)
 - NOT Proforma



U.S. DEPARTMENT OF
ENERGY

Screening Tool Parameters

Operating Expense

- Energy Costs
- Labor Costs
- Maintenance Costs (LTSA)
- Consumables

Capital Expense

- Unit Cost estimates by system type
 - Boilers
 - Chillers
 - Electric gear
 - CHP equipment
 - Distribution Piping
 - Building SF Costs
- Debt Service

Economic Considerations

- Discount Rate
- Escalation Rates
 - Electricity
 - Natural Gas
 - General Inflation
- Loan Terms

Value of **NYSERDA**

Financial Assistance

- **PON 2701 Combined Heat and Power (CHP) Performance Program**
 - The New York State Energy Research and Development Authority (NYSERDA) offers incentives to promote the installation of clean, efficient, and commercially available Combined Heat and Power (CHP) systems with an aggregate nameplate greater than 1.3 megawatts (MW)
- **PON 2568 CHP Acceleration Program**
 - NYSERDA will provide financial incentives for the installation of pre-qualified (or conditionally qualified), pre-engineered CHP systems by approved CHP system vendors at customer sites



NYSERDA

Energy – CHP = Electricity and HVAC

Combined Heat and Power CHP

- 25 CNG fueled 30kW Microturbine Generators
- 750 kW max potential provides:
 - 500 kW for *HARBEC's* max electric load requirement
 - 250 kW redundancy for back-up and maintenance

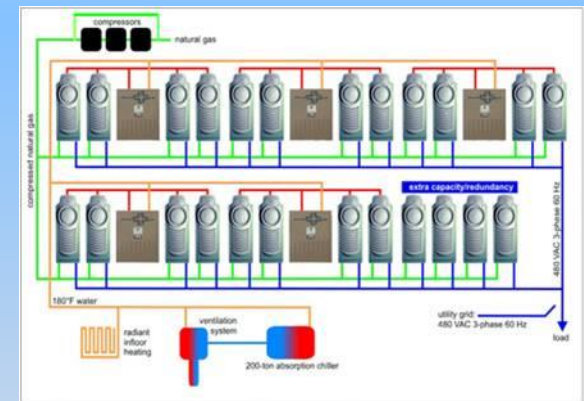


Thermal Advantages

Heating and A/C almost energy (fuel) free

No Magic

We just use the 65 - 75% that Utilities throw away



By using the thermal energy from exhaust, we heat and air condition 9000 sq.ft. molding area with 25 injection molding machines and a 17,000 sq.ft. manufacturing/warehouse space

\$\$\$ 7 Year ROI paid for with energy dollars not spent \$\$\$



Energy – CHP – Upgrade in progress

Combined Heat and Power CHP

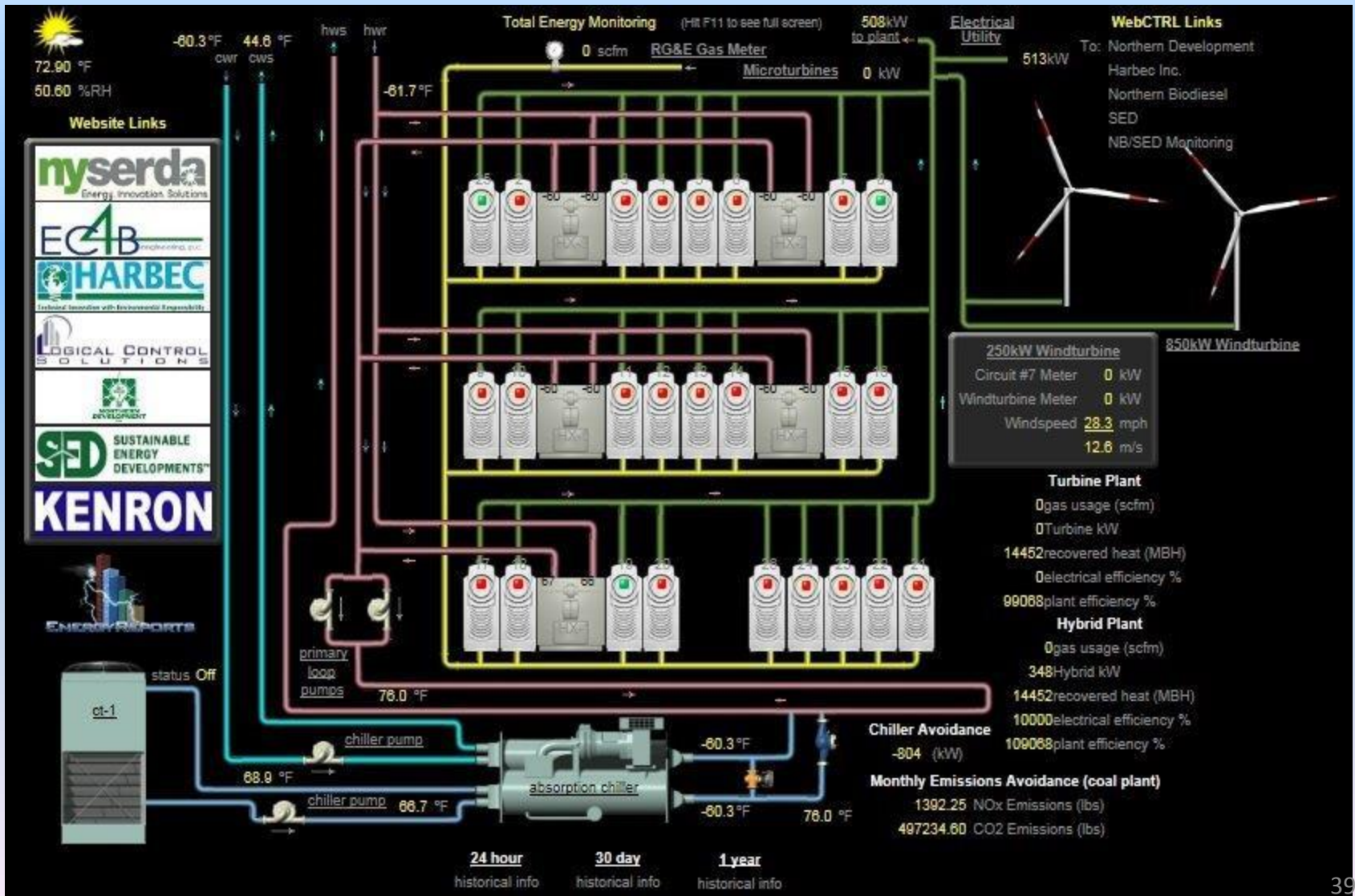
- 10- CNG fueled 30kW Microturbine Generators –Refurb
- 8- 65kW Microturbine Generators = 520 kW
- Increase to 820 kW max potential provides:
 - 500 kW for *HARBEC*'s max electric load requirement
 - 320 kW redundancy for WISP and maintenance

By using the thermal energy from exhaust, we heat and air condition 9000 sq.ft. molding area with 25 injection molding machines and a 17,000 sq.ft. manufacturing/warehouse space and soon 14,000 sq.ft. of shop and office



The HARBEC CHP Project

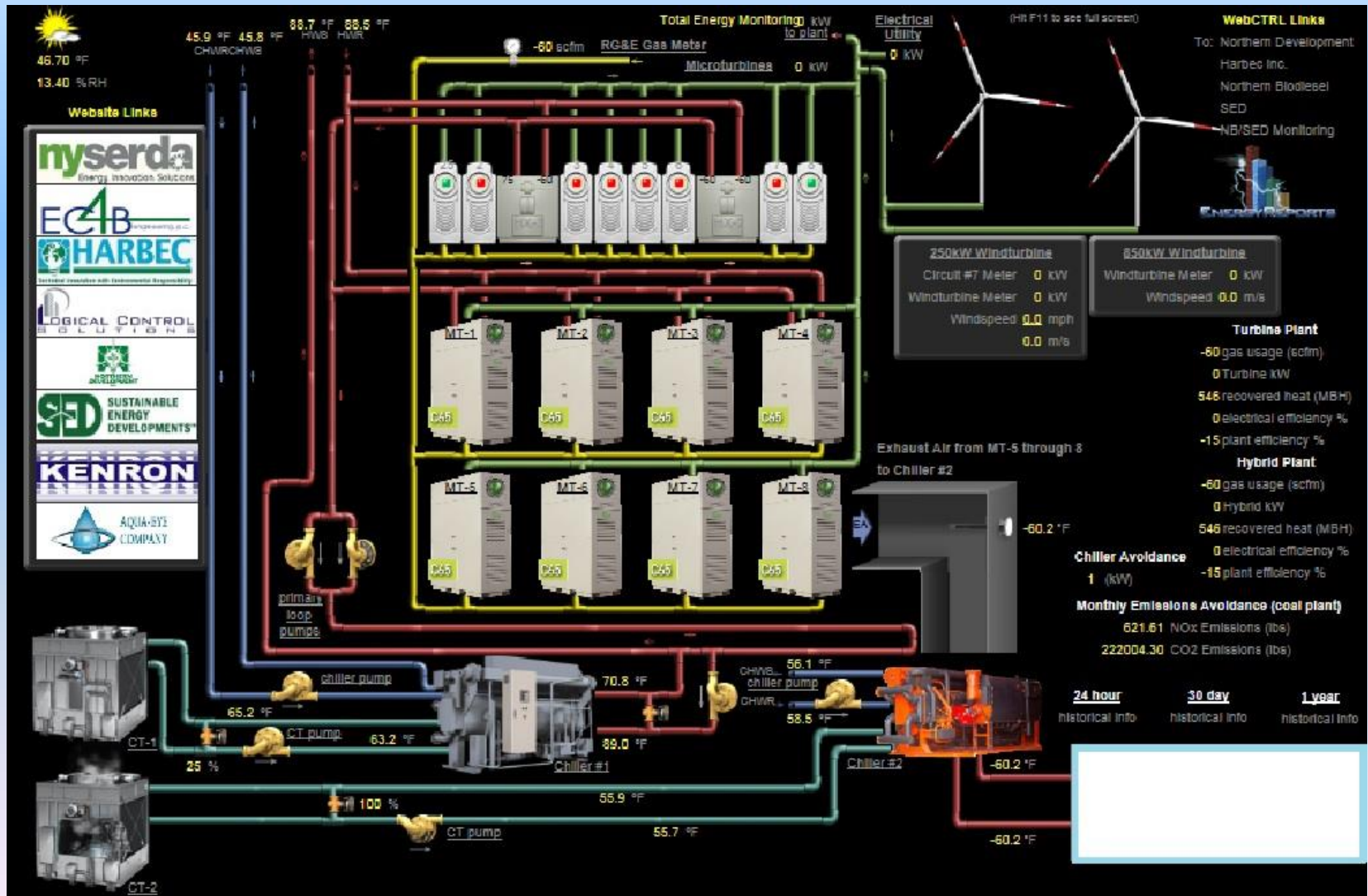
www.northerndevelopment.com



Coming soon...

The NEW HARBEC CHP Project

www.northerndevelopment.com



HARBEC conviction to Eco-economic Sustainable Manufacturing

At **HARBEC** we regard Eco-economic Sustainability as absolutely critical to the future of our business, and we believe that our success in the pursuit of it, will improve our competitive advantage by insuring our efficiency.



**A Carbon Neutral
manufacturing company**

Striving to be
Water Neutral by 2015



ISO 50001/SEP Platinum Nov. 2013

DOE - Better Plants – Challenge Jan. 2014

HARBEC, Inc.
585-265-0010

Thank You

Ontario, NY
www.harbec.com 41

**Jack Colby, North Carolina State
University**



CHP: Opportunities for Energy Efficiency and Resiliency

Jack Colby, Asst. VC for Facilities Operations

NC State University

DOE Better Buildings Summit

May 28, 2015

By the Numbers

- Founded in 1887
- ~35,000 Students
- ~8,000 Faculty and Staff
- 15.6 million square feet
- ~\$32 million Utility Budget
- 5 District Utility Plants

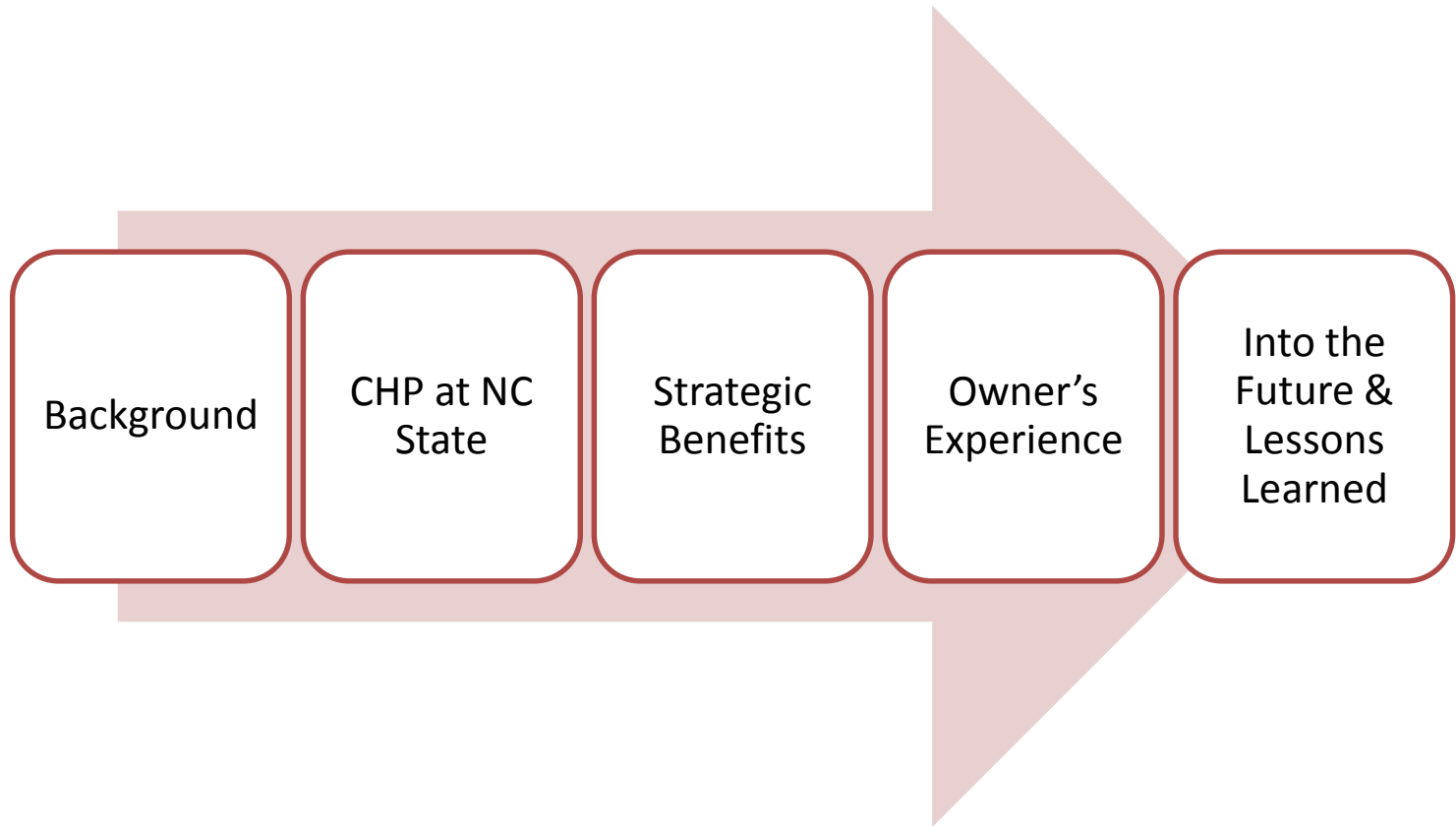




NC STATE
UNIVERSITY



Presentation Overview



Strategic Objectives

- Reliable Steam Production
- Air Quality Compliance
- Carbon Reduction
- Energy Reduction
- Increase Resiliency
- Future Growth



Background

Challenges:

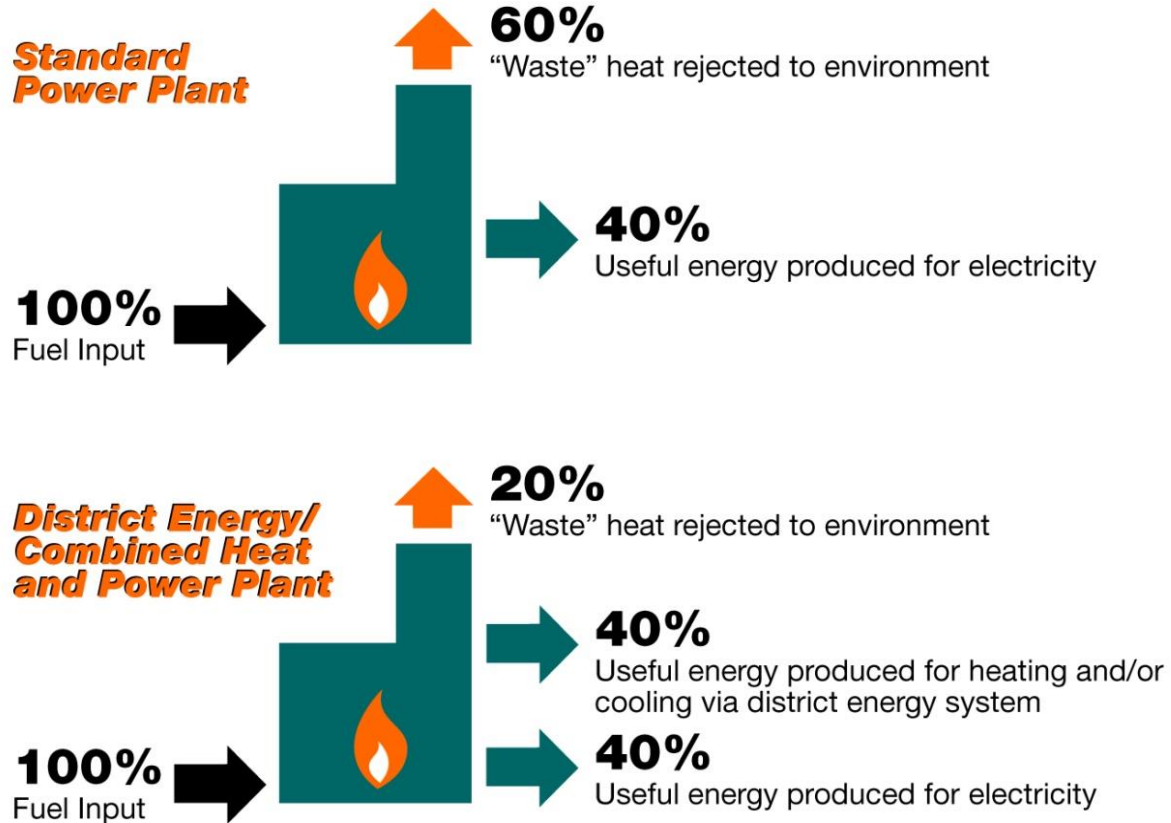
- Potential failure of critical boilers
- High risk for mission critical service
- \$26 million dollar deferred maintenance liability
- No capital funding available
- Air quality compliance (#6 Fuel Oil)
- Local air quality compliance window



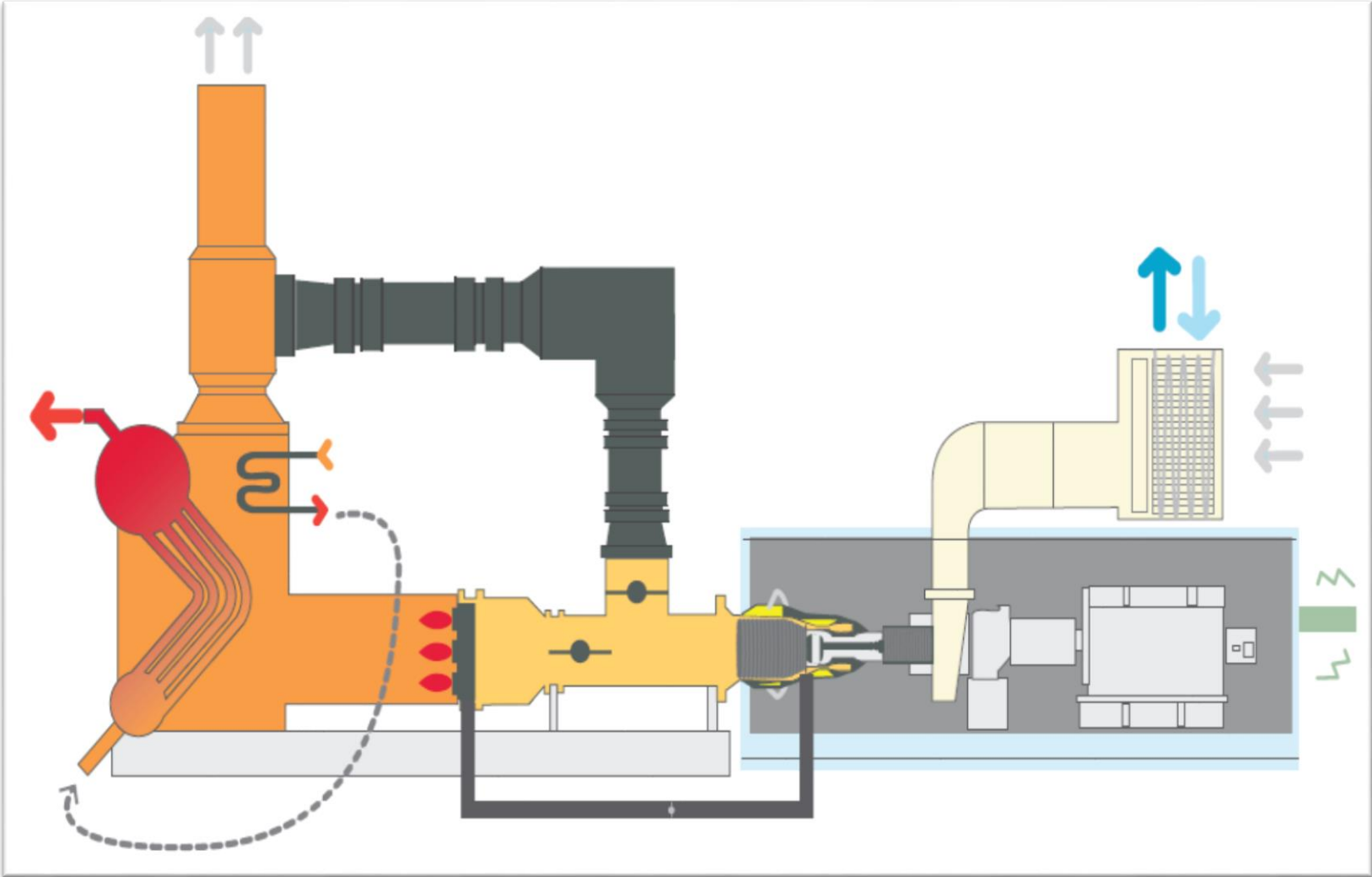
Combined Heat and Power



Energy-Efficiency Comparisons



Heat Recovery Steam Generators



Alternative: Combined Heat and Power

- \$60 million Performance Contract with IGEA
- Financed over 17 year period
- (2) 5.5 MW Combustion Gas Turbine Generators with Inlet Cooling
- (2) 50,000 lb./hr. Heat Recovery Steam Generators
- Plant Auxiliaries
- Utility Interconnects
- Thermal Following
- “Use All” Power

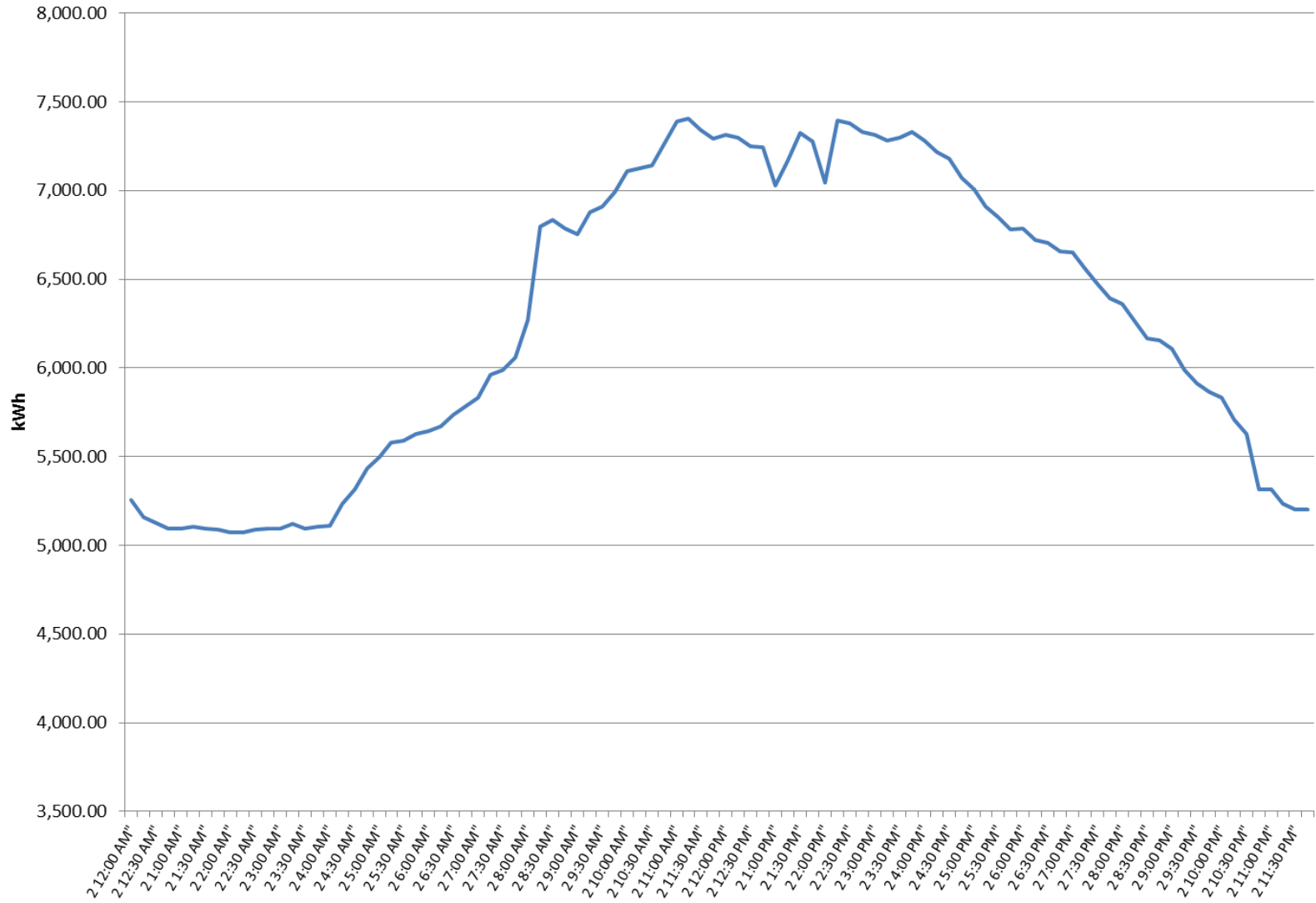


Power Island

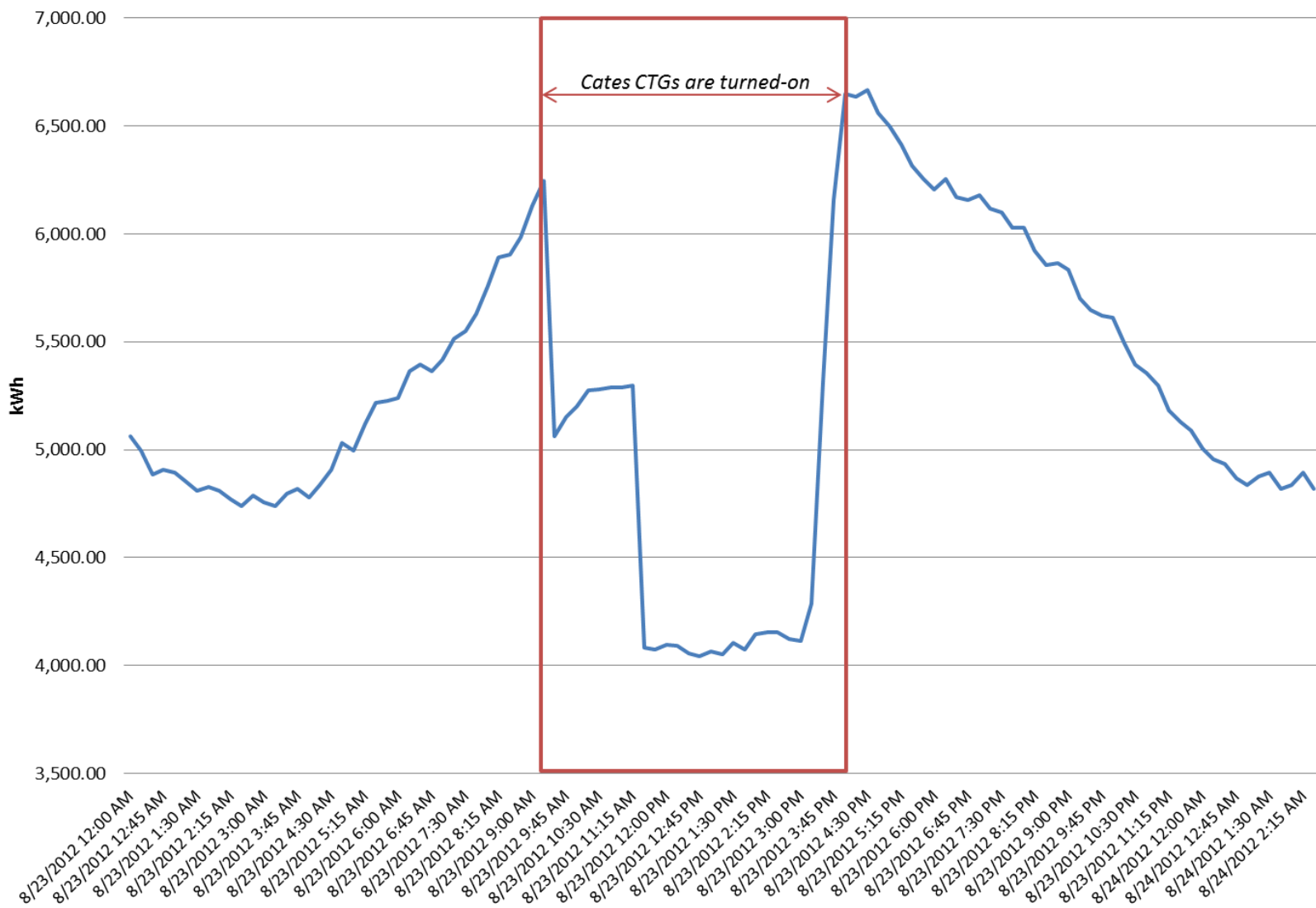




NCSU Sullivan Substation, July 18, 2012



NCSU Sullivan Substation, August 23, 2012



Performance

- First 2 years of savings over \$10 million
- Meets projected steam load for 20 years
- Highly dependent on run hours, heat rate, and spark spread
- 30 to 70% of Load
- The Pain is Fading!



Strategic Benefits

- Addressed \$19 mil Deferred Maintenance Liability
- Improved Reliability for Mission Critical Service
- Improved Resilience
- Black Start Capability
- Consolidated Controls



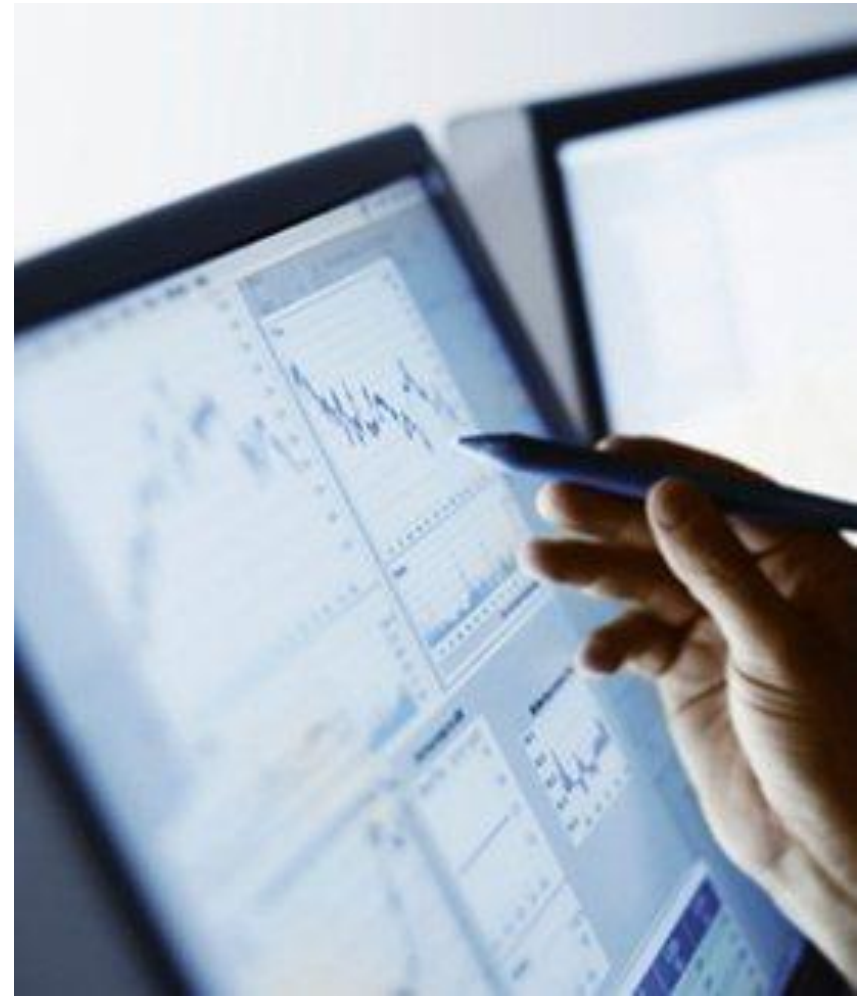
Strategic Benefits

- Energy Efficiency Goals
- Carbon Reduction Goals
- Student Experience
- Visibility



Into the Future

- Refining M&V Process
- Operator Protocols
- Load Prioritization & Islanding Procedure
- 2nd Steam Turbine Chiller
- Demand Management
- Next 5.5 MW Unit at Centennial Campus



Lessons Learned....”The Nuggets”

- Learning Curve for Design
- Simplify Systems and Controls
- Focus on Fuel Pricing, Run Hours, & Heat Rate
- Don't Underestimate Interconnection Cost
- Confidence In Staff
- It's Not Over When the Dust Settles
- High Pressure Gas
- Utilize DOE TAPS for Project Development
- No Pain, No Gain

GO Wolfpack!

A photograph of an industrial facility, likely a water treatment plant or power plant, under a clear blue sky. In the foreground, there are several large, dark-colored cylindrical storage tanks with metal walkways and railings. In the background, there is a large, multi-story building with a mix of red brick and light-colored panels. A tall, slender brick smokestack rises from the building towards the right side of the frame.

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**Claudia Meer, Managing Director - Energy &
Structured Finance, Clark Construction Group**



CFSG

ENERGY & STRUCTURED FINANCE

Financing Combined Heat & Power Systems



Better Buildings Summit

May 28, 2015

CHP Financing Options

- Clark & ESF Introduction
- CHP Financing Options
- Case Study: Upper Chesapeake Medical Center



Clark & ESF Introduction

Clark Construction Group

- Founded in 1906 in Washington, DC
- Headquartered in Bethesda, Maryland
- \$4.5B average annual revenue
 - Ranked No. 1 Privately Held Contractor
 - Ranked No. 3 Healthcare Contractor
 - Ranked No. 1 General Contractor in Baltimore/Washington Metro Area
 - Ranked No. 5 Domestic General Building Contractor



Energy & Structured Finance

Development Group within Clark Construction Group

- Develops on-site energy systems for clients
- Provides turnkey delivery of all aspects of on-site power systems:
 - Development
 - Permitting
 - Design
 - Construction
 - Operations and Maintenance
 - Financing
 - Incentive Management
- Evaluates existing client systems and makes technology-neutral recommendations for implementation of clean energy solutions
- Sells power to Client via long-term Power Purchase Agreements (ESAs) with equipment turnover options mid-term
- Provides development, design-build and other services for clients without funding, as desired



CHP Financing Options

CHP Financing Options

- Balance Sheet Financing
- Property Assessed Clean Energy (PACE) Financing
- Energy Savings Performance Contracts (ESPCs)
- Power Purchase Agreements (PPAs)

Balance Sheet Financing

- Facility owner funds the project:
 - Blend of debt and equity (for profit entities)
 - 100% debt (not-for-profits)
 - Conduit financing funds (municipalities/state owned entities)
- Owner is responsible for project delivery, all project risks and operations
- Owner keeps the asset on its balance sheet
- If owner is a tax-paying entity, they can receive the tax benefits (ITC and accelerated depreciation)
 - Carryback (one year), carry forward up to 20
- If owner is a non-profit, the tax benefits are not available without PPA structure

Property Assessed Clean Energy (PACE) Financing

- Upfront costs for efficiency / renewable energy is financed with repayment through an assessment added to property taxes
- Loan is tied to the property itself, not the borrower – assessment stays with the beneficiary (property owner)
- PACE assessments have a senior lien position over existing mortgages in the event of foreclosure
- Markets with PACE programs include:
 - California
 - Connecticut
 - District of Columbia
 - Florida
 - New Jersey
 - New York
 - Ohio
 - Wisconsin

Energy Savings Performance Contract (ESPC)

- Agreement made with an Energy Services Company (ESCO) that finances energy efficiency and some energy generation improvements for a facility and which guarantees operational cost savings
- Part of future cost savings is earmarked for loan payment
- Challenges:
 - Does not allow access to tax benefits for non-profit facility owners
 - ESCO requirement to back-stop savings can be difficult to enforce as the ESCO can claim a change in facility use, occupancy or other parameters during measurement and verification period

Power Purchase Agreements

- Long-term agreement between a third-party provider and an energy purchaser
- Through a PPA, a third-party provider can:
 - Fund all project costs
 - Sell client electricity and thermal power over 20 years with early buyout options
 - Lock in future electric rates
 - Manage project risks and cost coverages
 - Provide complex project coordination
 - Incorporate federal tax credits and depreciation available to ESF to lower costs of power
- PPA includes turnkey delivery of all aspects system
 - Development
 - Permitting
 - Design
 - Construction
 - Operations and Maintenance
 - Financing
 - Incentive management

Benefits of a PPA

Major Exposures

| | Power Purchase Agreement | Self Financing |
|---|-------------------------------------|----------------|
| Risk of Cost Overrun | PPA Provider | Client |
| Risk of Performance Shortfall | PPA Provider | Client |
| Major Operations & Maintenance | PPA Provider | Client |
| Unscheduled Outage Costs | PPA Provider | Client |
| Staff Training & Augmentation | PPA Provider | Client |
| Permit Development & Compliance | PPA Provider | Client |
| Ownership of CHP Plant | PPA Provider / Client Buyout Option | Client |
| System Commissioning, Burn-in and Integration with Hospital operations | PPA Provider | Client |
| Facility Staff Responsibilities | Minimized | All on Client |
| Tax Credits, ITC, & Depreciation | PPA Provider (reducing PPA rate) | Not Available |

State, Local and Federal CHP Incentive Programs

- Nationwide examples of available CHP incentives:
 - **California:** Self-Generation Incentive Program (SGIP) worth \$440/kW
 - **Connecticut:** CHP Capital Grant program worth \$200/kW
 - **Maryland:** EmPower Maryland incentive for up to \$2.5M per project; MEA launched a program in late 2014 for \$250K- \$500k per project (Hospital and Water/Waste Water only)
 - **New Jersey:** Clean Energy Solutions CHP grant program for up to \$3.0M per project
 - **New York:** CHP Performance Program for up to \$2.0M per project
 - **North Carolina:** Renewable Energy Tax Credit for up to \$2.5M
- 10% Federal Investment Tax Credit and 5 year MACRS (accelerated depreciation)



Case Study:
Upper Chesapeake Medical Center
(UCMC)

University of MD Upper Chesapeake Medical Center

Bel Air, Maryland

- Part of University of Maryland Medical System (UMMS)
- 200 bed state-of-the-art general medical, surgical hospital and medical complex including:
 - Hospital
 - Two medical office buildings
 - Parking garage
 - Klein Ambulatory Care Center
 - Administrative offices
 - Kaufman Cancer Center



Campus Overview



Benefits of CHP

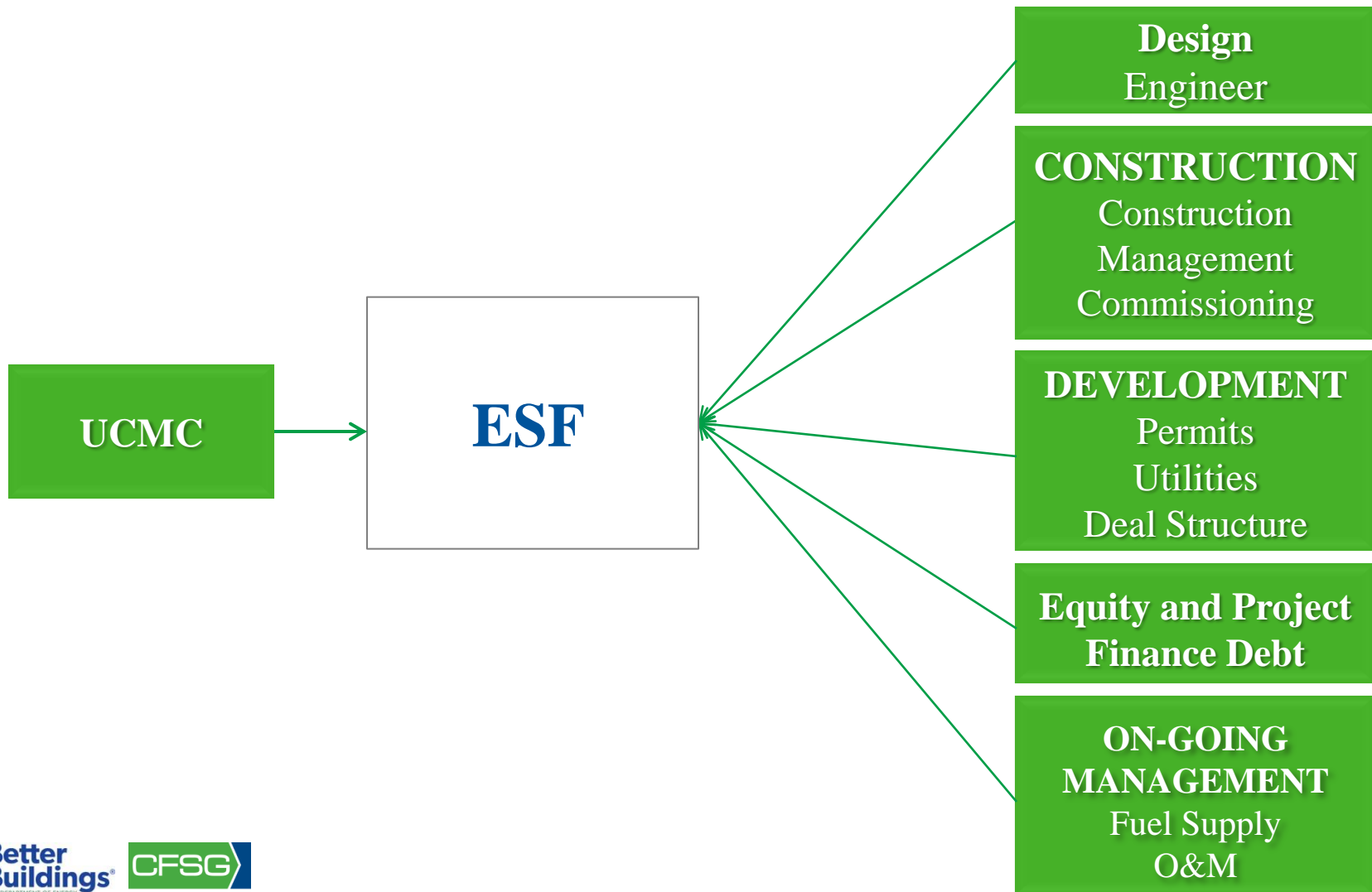
- **Resiliency:** Provides additional source of primary and emergency generation for both electricity and heating/cooling
 - Provide care during protracted outage – island and emergency modes
 - Access data systems for patient care during outages
 - Proven technology with thousands of global applications
- **Cost Savings:** Given efficiency and “spark spread,” CHP yields long-term savings when compared with the cost of grid power
- **Stability:** Provides less volatile lifecycle cost of energy vs. the grid
- **Community Service:** Allows hospital to serve as safe haven to the community during a disaster or prolonged grid failure
- **Environmental:** Can significantly reduce carbon footprint and pollution
- **Political:** Increases energy independence of U.S. from foreign oil

UCMC Motivation for CHP via PPA

- Single point of failure for backup power system
- Needed additional thermal/chilling capacity
- Limited capital available for system upgrades
 - Revenue generating assets (e.g., MRI, CT-Scan, capital dollars for bed additions and Cancer Center) prioritized over other infrastructure investment
 - Previous CHP capital budget requests denied
- Access to Federal funds and depreciation that were unavailable
- Risk shifting of performance
- Limited resources to oversee the design/construction/permitting and operation and maintenance of the CHP system as existing staff focused on day-to-day hospital operations

ESF Managed Delivery of UCMC CHP Project

Project Involved Multiple Disciplines and Risk



ESF Custom CHP Solution for UCMC

- ESF developed a custom-designed solution for hospital:
 - 2.0 MW Caterpillar natural gas reciprocating engine, 350 T Broad Absorption Chiller, HRSG, Cooling Tower, Radiators
 - Supplies electricity, steam, chilled water and hot water to UCMC
- Design and construction minimized impact on existing hospital operations (“Do No Harm”)
- System supports 95% of hospital loads (with existing 1.5 MW diesel gen) when grid down
- 2013 MDH2E Trailblazer Award recipient



UCMC PPA Terms

- ESF owns, operates and maintains the CHP system and sells electricity and delivers thermal energy to the hospital over 20 years
 - Contract provides fixed escalations
 - Early buyout options in mid-term
 - Incorporated \$1.5M EmPower MD incentive and \$870k ITC
- Project is “off credit” to UCMC; no impact on UMMS debt capacity
- UCMC may pay cost premium to grid in early years but is projected to achieve significant long-term savings
- ESF absorbed risks of performance, delivery and O&M by managing:
 - Start-up and integration of the system with hospital plant operations
 - Training of UCMC staff to monitor, operate and maintain the system for eventual takeover

UCMC PPA Terms

- Hospital buys all electricity generated by system from ESF (approximately 45% of total demand)
- Byproduct of waste heat is “free” and used to calculate “effective price of power”
- Minimum monthly volume payments from hospital
- Minimum performance guarantees by ESF
- Operations and maintenance cost of system including all rebuilds incorporated into cost for 20 years
- Hospital supplies natural gas with cost embedded into savings analysis

UCMC CHP Plant Today

- *“CHP at UCMC was a win-win”*

- **Don Allik, Director of Facilities**

- 2.0MW CHP Project operational since June 2014
- PPA structure facilitated delivery of vital infrastructure which would not have otherwise received funding
- Hospital projected to save over \$9 million over 20 years
- In Island Mode:
 - System serves 95% of the hospital loads and 65% of campus loads together with diesel generator
 - Serve as a vital community resource during emergencies
- 2.0MW system is equivalent of taking 2,200 cars permanently off our roads!

For More Information

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