

Innovations in Federal ESPC: Combined Heat & Power, ESPC ENABLE and beyond



ESC Market Transformation Conference
August 13, 2013

Topics

Combined Heat and Power (CHP)

- Highlight two recent Federal CHP projects

ESPC ENABLE

- New DOE FEMP program to implement ESPC at small federal sites

What is Combined Heat and Power?

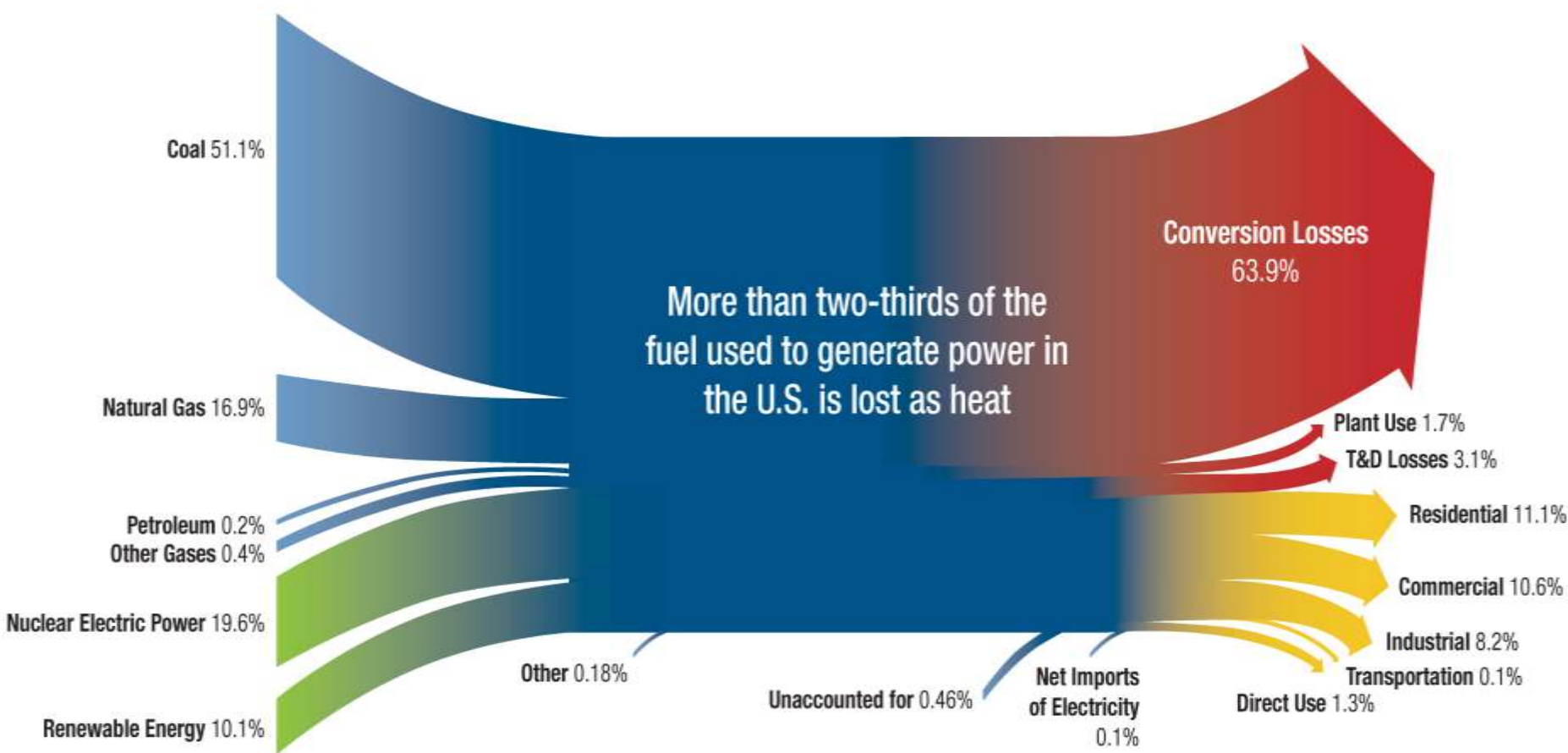
CHP is an *integrated energy system* that:

- is located at or near a facility
- generates electrical and/or mechanical power
- recovers waste heat for
 - heating
 - cooling
 - dehumidification
- can utilize a variety of technologies and fuels
- is also referred to as cogeneration

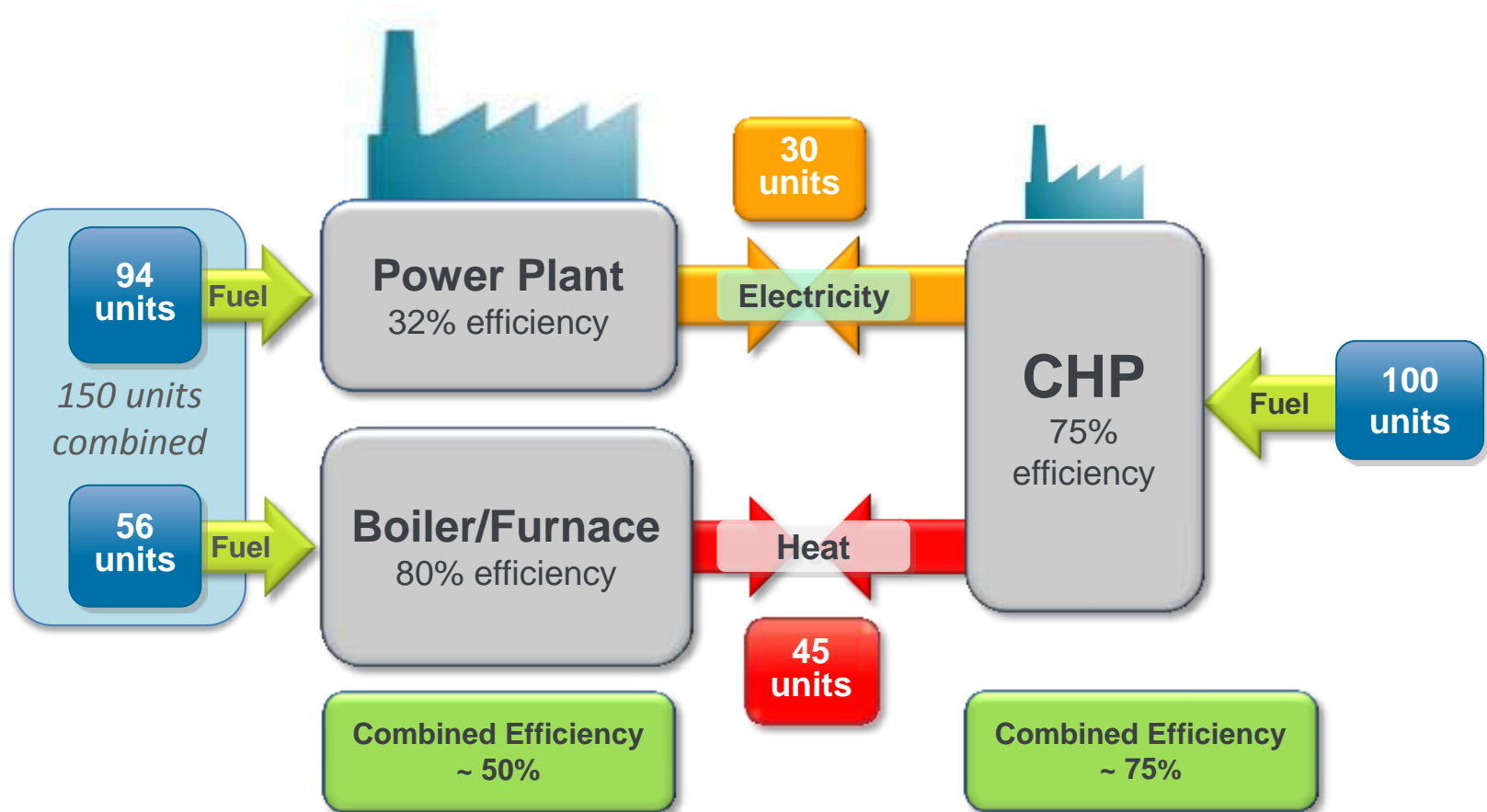


The on-site simultaneous generation of two forms of energy (heat and electricity) from a single fuel/energy source

Over Two-Thirds of the Fuel Used to Generate Power in the U.S. Is Lost as Heat



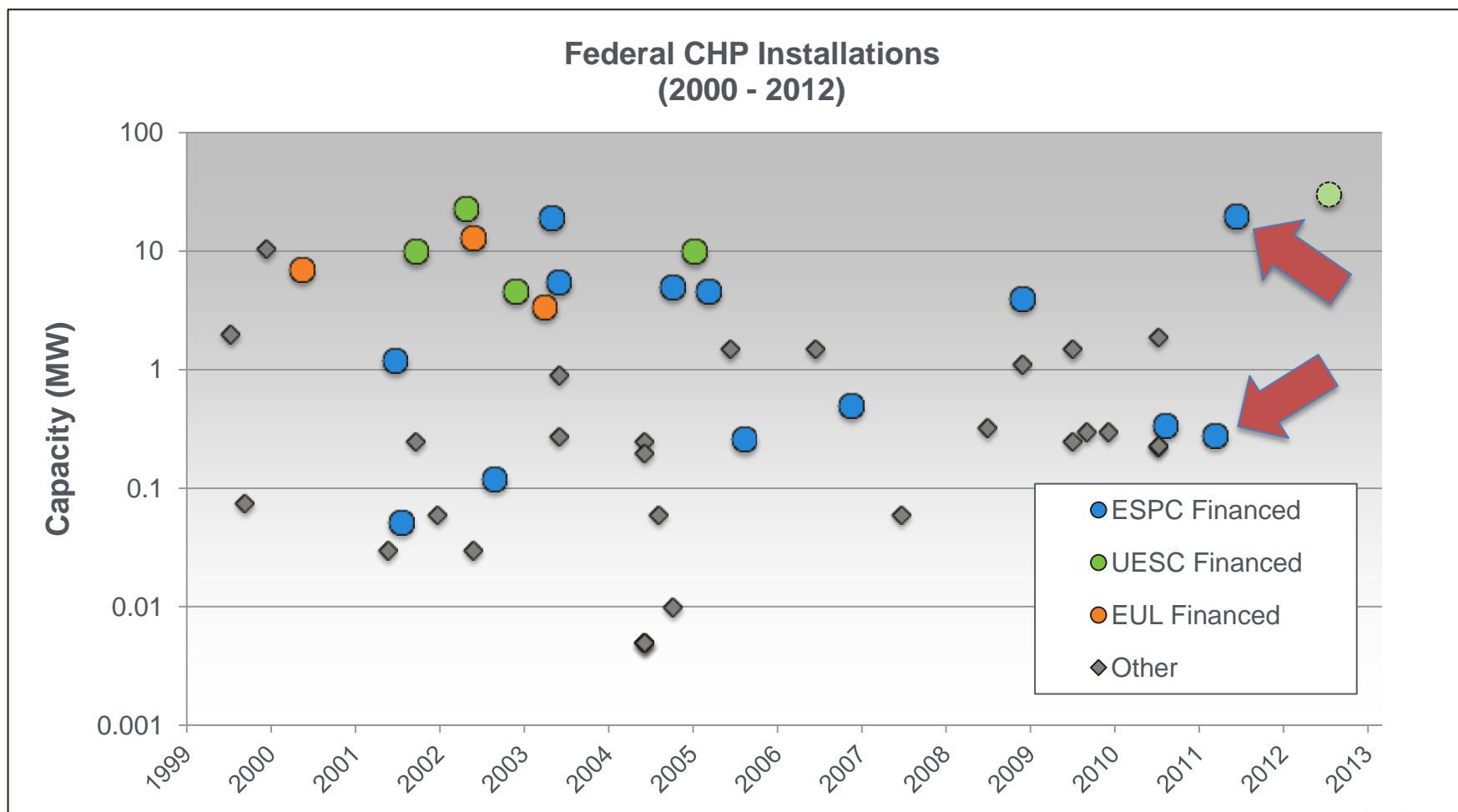
CHP Recaptures Much of that Heat, Increasing Overall Efficiency of Energy Services



- 30% less fuel
- 30% to 55% less greenhouse gas emissions

CHP at Federal Sites & Funding Approach

Financing of CHP at Federal sites has been prevalent for several years and across a broad spectrum of system capacities.



Project #1: DOE Savannah River Site

Site Overview

- 310 square-mile facility in South Carolina (near Aiken)
- Employs more than 10,000 people
- Built in the 1950's to refine nuclear material for nuclear weapons
- Operates nation's only tritium extraction facilities
- Major focus on clean-up operations from nation's nuclear build-up

Agency Project Focus

- Replacement 1950's vintage coal fired boilers
- Meet requirements of Clean Air Act
- Address mandates for energy efficiency and use of renewable energy



Solution: Biomass CHP via ESPC

New Biomass Energy Center

- New 34 acre site
- Biomass driven CHP plant
- 240,000 pph steam
- 20MW electrical generation capacity

Two Smaller Biomass Steam Plants

- Smaller steam plants across site
- 10,500 pph steam each



CHP Technology

- (2) Biomass fueled fluidized bed steam boilers
 - 850 psi steam (385 psi after turbine)
- (1) 20MW Steam condensing turbine
- Biomass fuel: wood chips (regional forest residues)

Fuel Consumption and Management

Plant Fuel Requirements:

- Up to 325,000 tons of woodchips/yr
- Up to 50 truckloads/day @ 40 tons/truck
- Stockpile ~32,000 tons (800 truckloads)

Additional Fuels/Back-up:

- Plant equipped with chipper
 - reduces whole logs at 100 tons/hr
- Shredded automobile tires/wooden pallets
- Full capacity fuel oil back-up burners

Fuel Purchase:

- Per contract ESCO will acquire all fuel
- Wood chips typically sourced within 50 miles radius



Project Benefits

Project Benefits

- 30% of site's electricity needs (77,000,00 kWh of “green” electricity generation)
- 100% of site's required steam (2,000,000 MMBtu/yr)
- Significant emissions reductions (Eliminates burning of 161,000 tons of coal/yr.)
 - ✧ 400 tons/yr particulate matter
 - ✧ 3,500 tons/yr SO₂
 - ✧ 100,000 tons/yr of CO₂
- Generation of Renewable Energy Credits (RECs)
- 1.4 billion gal/yr reduced water intake from the Savannah River

ESPC Structure

- Contract value: \$795M, 19 yr. contract term
 - ESCO operates and maintains biomass facilities
 - ESCO acquires all fuel
- Annual Cost Savings: \$35M (energy and O&M)



And here's what it all looks like...



Image credit: ESI Inc. of Tennessee

Project #2: Glenn Anderson Federal Building, Long Beach, CA

Site Overview:

- 275,000 sq-ft, 9 story office building
- GSA Owned, Opened 1991
- Electrical usage:
 - ~700kW summer day
 - ~600kW winter day
 - ~300kW nights
- Cooling Demand: 600 tons peak
- Existing cooling, centrifugal chillers:
 - 300 ton primary
 - 400 ton auxiliary (peak usage)
 - 400 ton back-up



Agency Project Focus

- Address mandates for energy efficiency and green house gas reductions
- Improve operational and maintenance efficiencies

Solution: CHP System with Cooling via ESPC

Project Elements

- CHP system w/absorption chiller
- Lighting and Water Improvements
- Project bundled with 2nd building
 - Ronald Reagan Courthouse (Santa Ana, CA): Lighting, Water and Chiller Improvements



CHP Technology:

- Natural Gas fired reciprocating engine with 335 kW generator (roof installation)
- Heat recovery generator (engine jacket, oil cooler, gas compressor, exhaust)
- 75-ton absorption chiller (roof installation)
- Emissions controls (satisfies California Air Resources Board 2007 standards)

System Operation & Benefits

CHP System Operation

- Integrated with existing cooling system to reduce electrical consumption at peak rate hours
- Generator operates in a “load following” mode to prevent net export of electricity to grid per interconnect agreement.

Project Benefits

- Total project savings of \$336K/yr. (~40% from CHP measure)
- ESPC allowed GSA to leverage CHP technology for subsequent savings in relatively new building.
- Example of federal deployment of smaller scale CHP in an office building site

ESPC Structure

- Total contract value: \$8.4M, 17 year contract term
- ESCO responsible for CHP O&M and R&R, including 60,000 hr. overhaul of engine.

Now for something completely different...

ESPC ENABLE

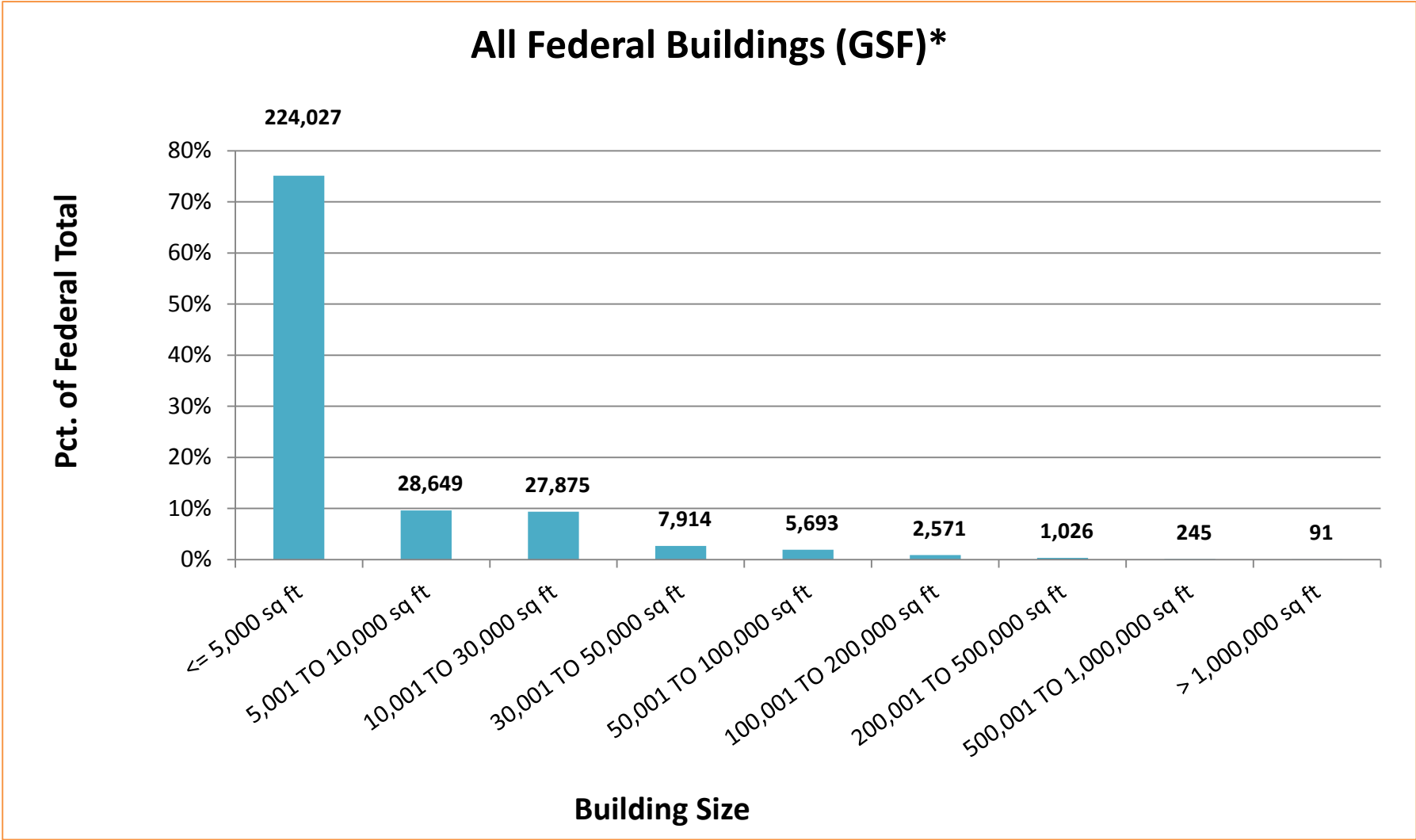
ESPC ENABLE: What is it?

ESPC ENABLE is DOE's new project-funding offering intended to fill existing program gaps at select federal sites

- Specifically designed to support the needs of small Federal sites through a reduced ECM scope and streamlined process for project award
- Intended for facilities with buildings under 200,000 square feet (traditionally an underserved market)
- Establishes a standardized approach to savings calculations, M&V and annual savings verification
- Seeks to reduce development and performance period costs as compared to larger DOE IDIQ project contract requirements

ESPC ENABLE is essentially aiming to standardize and expedite ESPC project implementation at underserved federal sites

ESPC ENABLE Potential Market – Federal Government



*Data extracted from GSA Federal Real Property Profile (FRPP) 2011



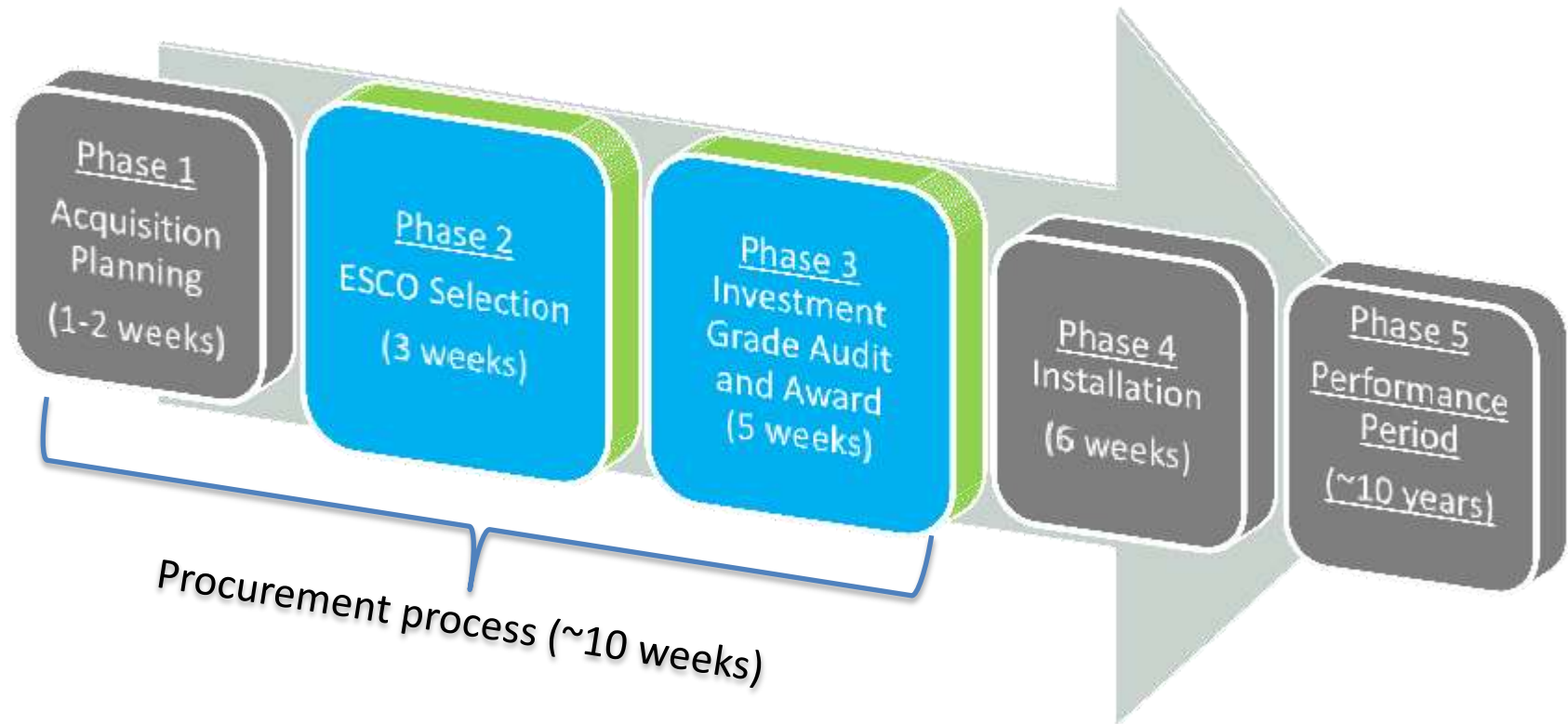
ESPC ENABLE: Program Components

- **Guaranteed savings, no up-front costs for Federal agencies**
- **Standardized and streamlined process** to quickly award projects
 - GSA Schedule 84 (Contract vehicle – ESCO's pre qualified)

FEMP-provided tools and templates assist agencies and ESCOs with project development and contracting tasks.

- Developing Notice of Opportunity, Scope of Work
- ESCO evaluation and selection, Award notification
- FEMP provided Investment Grade Audit Tool, M&V Plan, Project Acceptance Guidelines
- Targets **straight-forward ECMs** including lighting upgrades, water conservation, and basic HVAC controls.
- Prescribed **basic measurement and verification (M&V)** for each ECM.

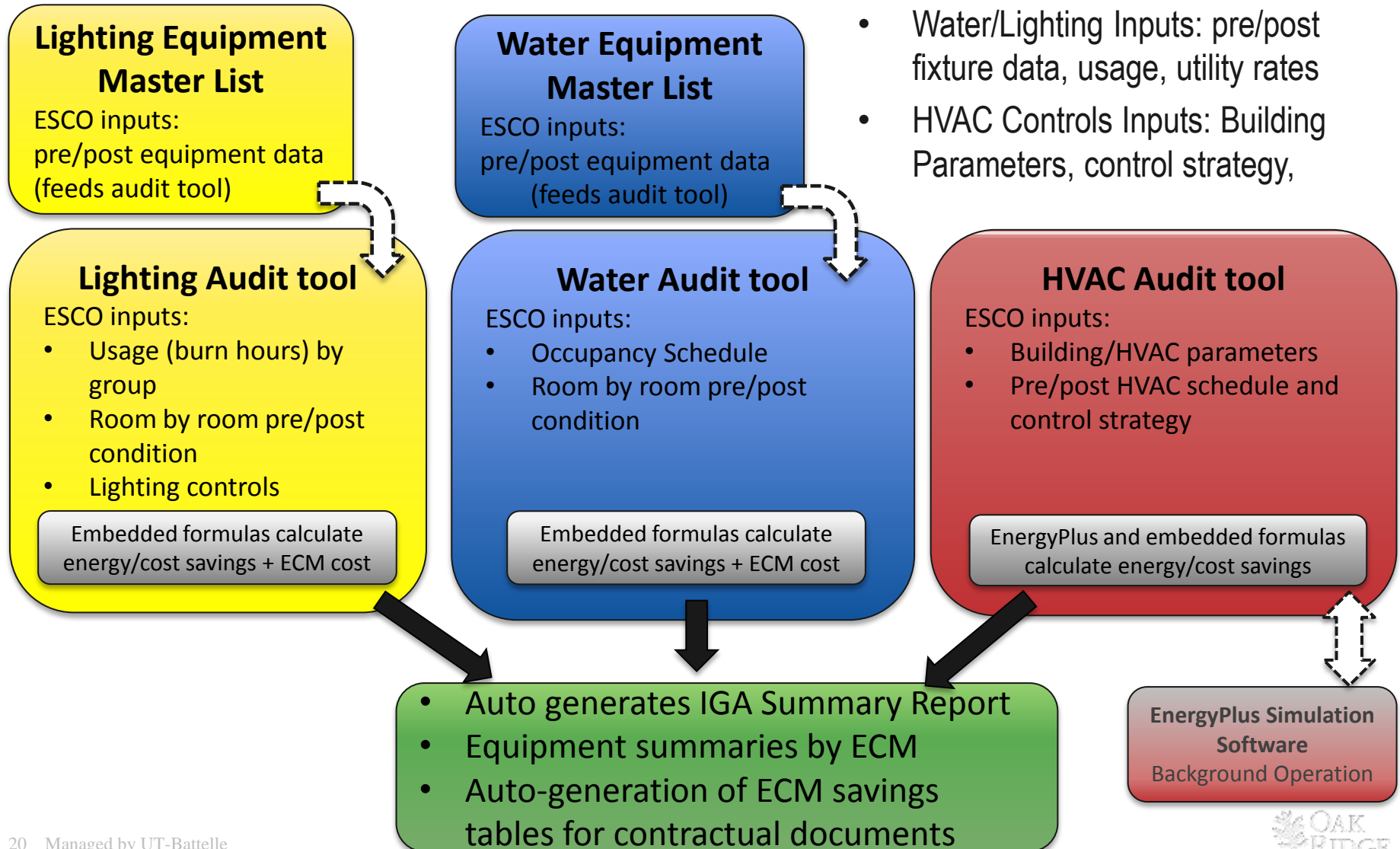
ESPC ENABLE: Procurement Process



Targeting

- ***Award of projects in as little as 8 weeks from release of “Notice of Opportunity”***
- ***Project can achieve energy/cost savings in less than 6 months.***

IGA Tool Structure



ESPC ENABLE: Summary

Pilot Phase

- Officially launched in June 2012
- Pilot projects underway with growing pipeline
- DOE FEMP offering technical and contracting resources for all projects in pilot phase

Going Forward:

- ECM scope expansion under review
 - HVAC Equipment
 - Solar PV



Questions

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