

U.S. DOE Intermountain Clean Energy Application Center

Our role in promoting
Recycled Energy in Colorado



U.S. DEPARTMENT OF ENERGY
Clean Energy Application Centers

Group Introductions





Combined Heat and Power



Waste Heat Recovery

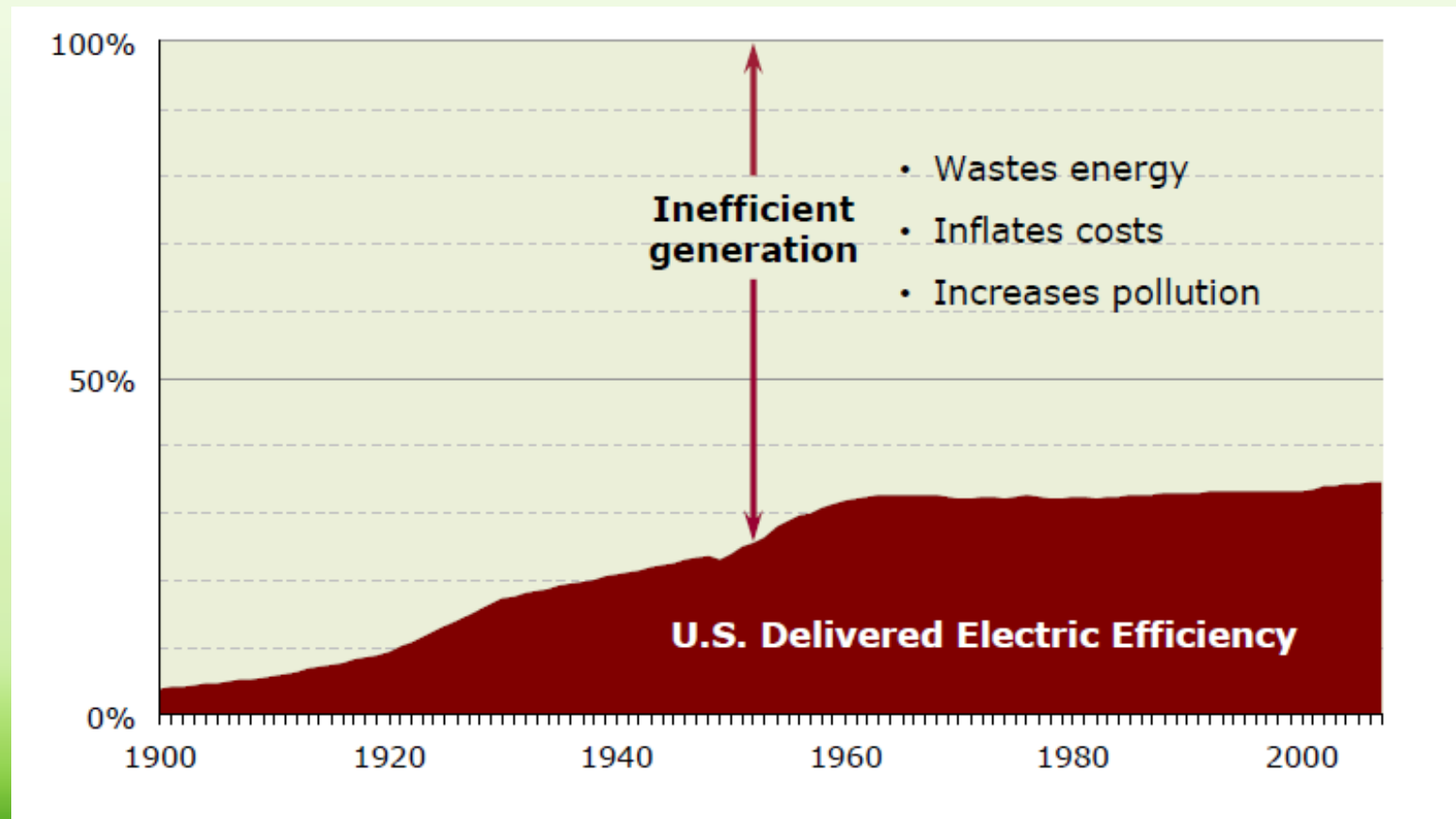
*** included in Colorado RPS*



District Energy

Why?

Efficiency = Economy = Environmental Excellence



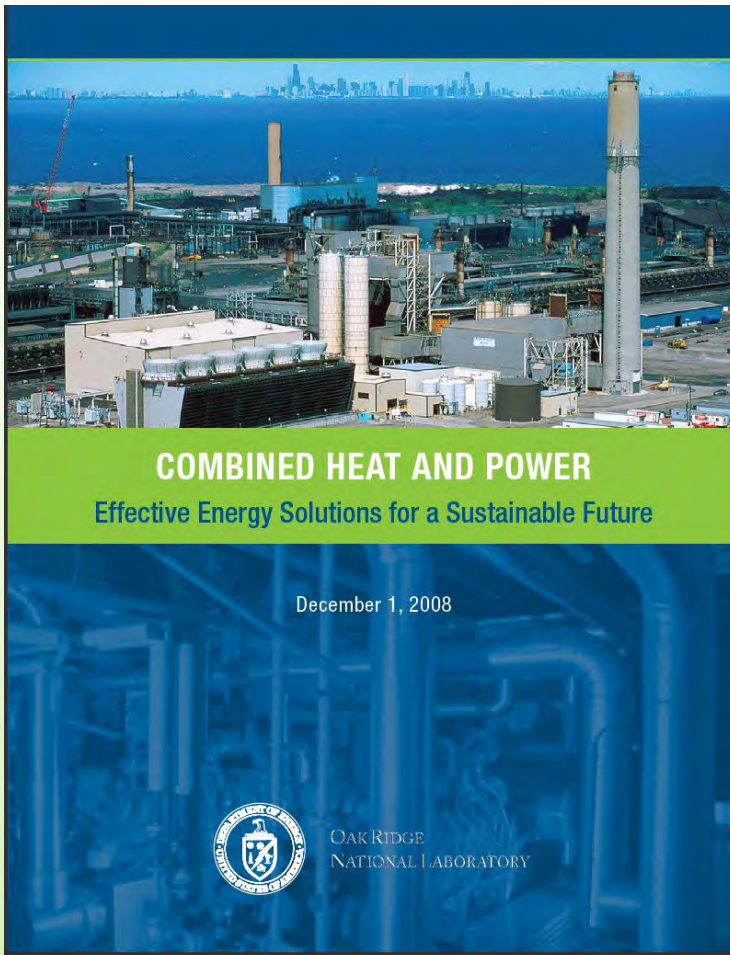
Benefits of Recycled Energy

- Reduce operational and capital expenses
 - Lower energy costs
 - Offset equipment retrofit or replacement
- Reduce environmental pollution
 - Efficiency lowers greenhouse gas emissions
- Increase on-site power reliability
 - Reduce impact of power outages
- Increase national energy security
 - Distributed generation less vulnerable to threat
 - Ex. TX law: all critical state facilities must consider CHP
- Use of renewable and waste fuels



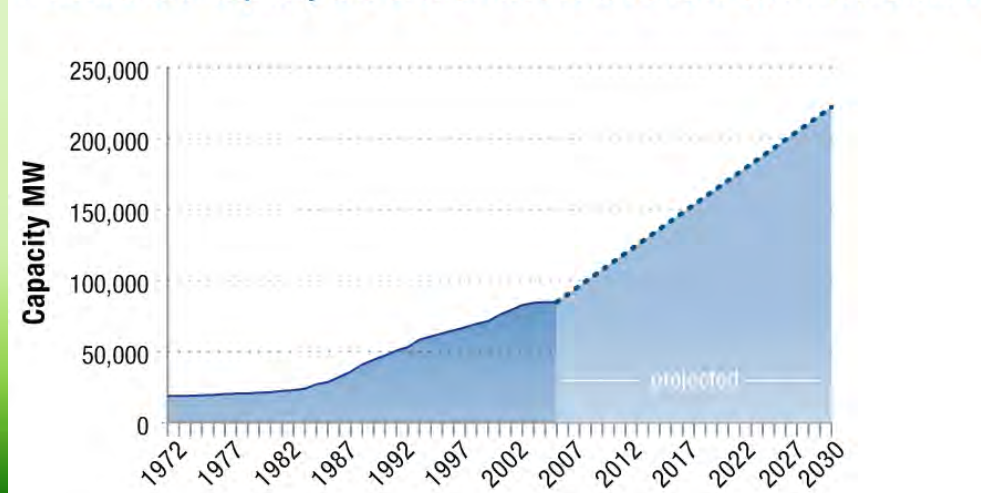
Background

- CHP already provides almost 10% of our nation's energy
- **Our New Target:** 20% of U.S. electrical capacity by 2030



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

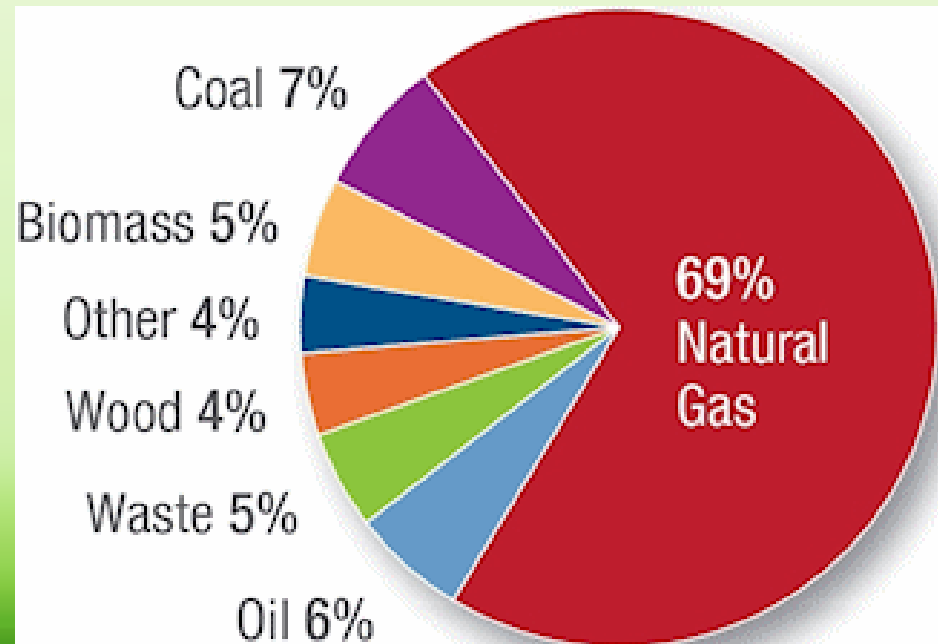
Historical CHP Capacity and Growth Needed to Achieve 20% of Generation



Fuels

- Most existing systems use natural gas
- Many/most opportunities in Colo. are biogas
 - Wastewater treatment plants
 - Breweries
 - Landfills
 - CAFOs and dairies
 - Wood waste

CHP Sites by Fuel Type (U.S.)

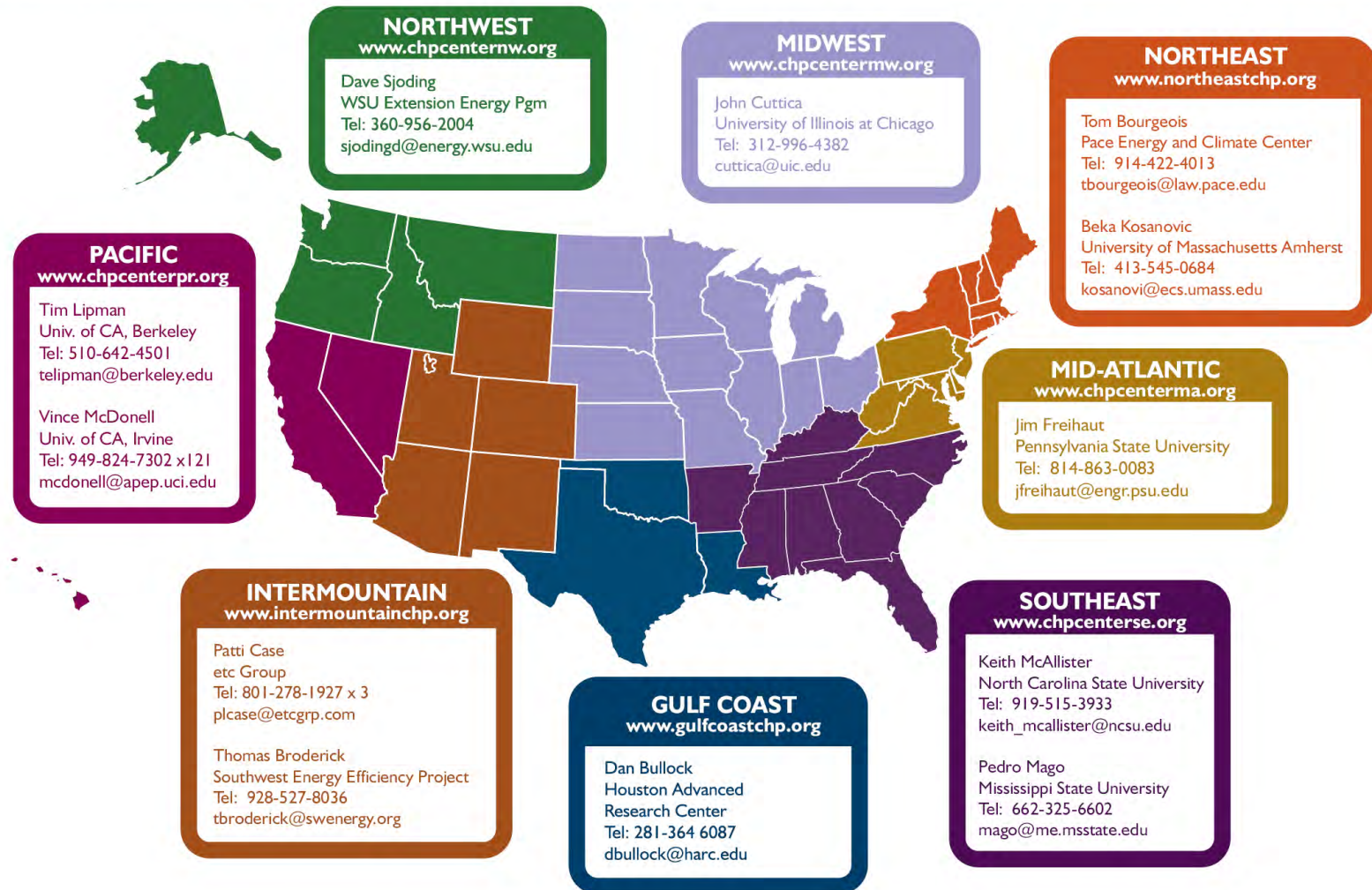


About Us

Our role in encouraging recycled energy projects



8 DOE Regional Application Centers



For more information: www1.eere.energy.gov/industry/distributedenergy/racs.html

1. Education

- Inform prospective end users on the benefits, business models, & resources available for their specific application
 - Workshops, trainings, webinars, guides, websites, advice

Trailblazer Pipeline
4-MW Waste Heat Recovery System

Site Description
The 430-mile Trailblazer natural gas pipeline winds through parts of Wyoming, Colorado, and Nebraska. The pipeline is

Quick Facts
LOCATION: Near, Colorado
MARKET SECTOR: Industrial
FUEL: Natural Gas (not only)
INDUSTRY: None
WASTE CAPACITY: 4.5 MM
AVERAGE CAPACITY FACTOR: ~70%
ENERGY OUTPUT: 27,000 MWh per year
% OF WASTE HEAT SOURCE: None
ESTIMATED YEARLY SAVINGS: Over \$1.0 million
JOINT PROJECT W/TH: Highline Electric Association, The Waste Conversion & Transformation, Kinder Morgan, and Ormat
ENVIRONMENTAL BENEFITS: 27,000 tons of CO₂, 34,000 kg of NO_x, and 124,200 kg of SO₂

Kennecott Utah Copper Smelter
32-MW Waste Heat Recovery System

Site Description
Kennecott Utah Copper, a subsidiary of Rio Tinto, produces copper, silver, gold, molybdenum and sulfuric acid. It is the second-largest copper producer in the U.S., providing about 25 percent of the country's copper needs.

Quick Facts
LOCATION: Salt Lake County, Utah
MARKET SECTOR: Primary metals
SMELTER SIZE: 300,000 tons of copper anodes produced annually
EQUIPMENT: Waste heat boiler, heat recovery system, steam turbine generator
ELECTRIC CAPACITY: 32 MW nameplate, 40-45 MW average
PERCENT OF FACILITY LOAD: ~50%
WASTE HEAT SOURCE: Smelter exhaust, acid plant
IN OPERATION SINCE: 1995
ENVIRONMENTAL BENEFITS: Pollution-free electricity from waste heat, improved energy efficiency

Reasons for Waste Heat Recovery
The smelter was re-designed and modernized in 1995 to be among the lowest-emission smelters in the world, and a pollution-free, waste-heat-to-power generation system was a key component of the modernization. The Kennecott Utah Copper smelter has the highest level of energy recovery of any smelter in the world.

Since the copper production process is energy intensive and energy is a key component of Kennecott's costs, the company strives for continual improvement in how it manages, generates, and uses energy. Based on forecasts of rising energy costs, the company determined that it would be a wise long-term investment to generate power from thermal energy that would otherwise be wasted. The company's on-site engineers continue to improve the system design to optimize the energy output and reliability.

11 intermountain project profiles; 100+ nationally



2. Technical Assistance

- Help potential projects “take the next step”
 - Free project feasibility screenings
 - Help on permitting issues, tariffs/rate assessments, equipment questions, convincing upper management, 3rd party review of proposals...

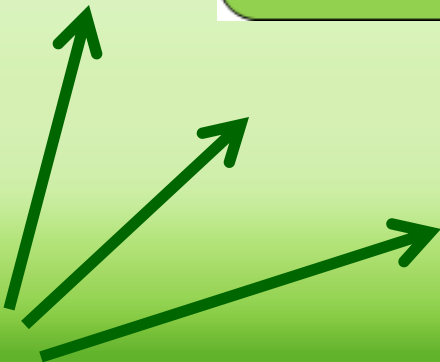
1.
PRE-SCREEN /
SITE QUALIFICATION

2.
LEVEL 1
SCREENING ANALYSIS

3.
LEVEL 2
CONCEPTUAL & FINANCIAL

4.
LEVEL 3
INVESTMENT GRADE ANALYSIS

5.
PROCUREMENT, OPERATION,
& MAINTENANCE



3. Policy

- Promote recycled energy as an effective clean energy **policy** solution:
 - Educate state policymakers and regulators,
 - Remove barriers
 - Explain how waste heat recovery is just as pristine as wind and solar, and should be treated as a renewable
 - Explain how CHP is an energy efficiency measure and should receive similar incentives/programs



4. Other

- Any other activity that promotes efficient and well-designed recycled energy in our states



On the Lookout for Good Projects

How to help us identify them



**Yes to 3 or more questions =
Good candidate for recycled energy**



11 Screening Questions

1. Do you pay more than \$.06/kWh on average for electricity?
2. Are you concerned about the impact of current or future energy costs on your business?
3. 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?



11 Screening Questions cont'd

4. Does your facility operate for more than 5000 hours per year?
5. Do you have thermal loads throughout the year (steam, hot water, chilled water, hot air, etc.)?
6. Does your facility have an existing central plant?
7. Do you expect to replace, upgrade, or retrofit central plant equipment within the next 3-5 years?



11 Screening Questions cont'd

8. Do you anticipate a facility expansion or new construction within the next 3-5 years?
9. Have you already implemented energy efficiency measures and still have high energy costs?
10. Are you interested in reducing your facility's impact on the environment?
11. Do you have access to on-site or nearby biomass resources (i.e. landfill gas, farm manure, food processing waste, etc.?)



Work with Utilities

- Recent co-op interest in waste heat recovery projects (Tri-state incentive helps)
 - List of potential by co-op territory, city, facility name, etc.
 - Also some interest in biomass projects
- CO needs major improvement in standby rates – a big barrier



Thank you

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