



U.S. Department of Energy
Energy Efficiency and Renewable Energy



UNITED STATES COMBINED
HEAT & POWER ASSOCIATION

federal energy management program

The Advantages of Combined Heat and Power

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By

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A Presentation to

**Workshop on Distributed Generation and
Combined Heat and Power**

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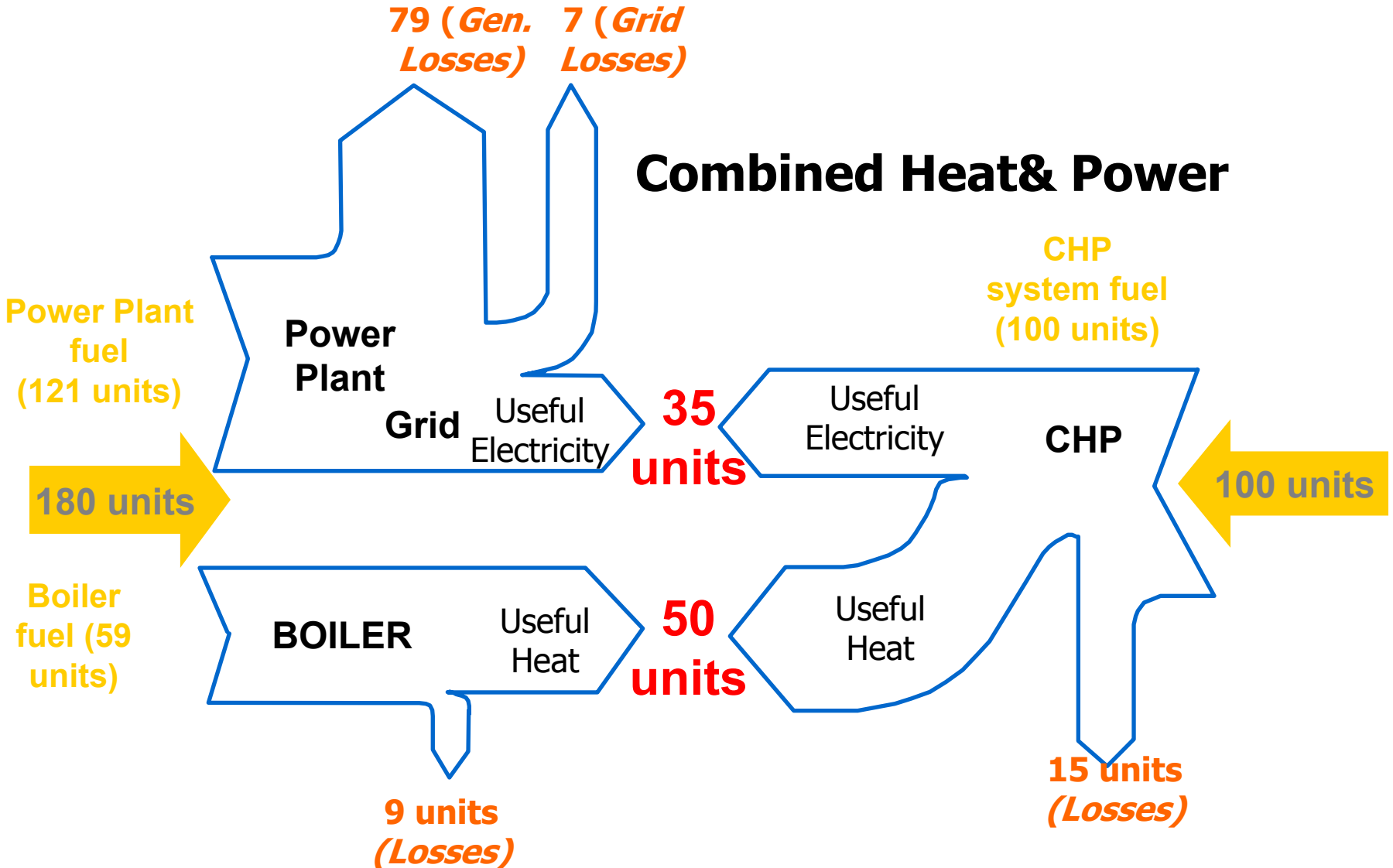
Outline

- What is CHP?
- Why now for CHP in the U.S.?
- What are the advantages of CHP?
- Why aren't we taking full advantage of CHP?
- What are the key issues to resolve?
- What can you do?



CHP: the "Crown Jewel" of Distributed Generation

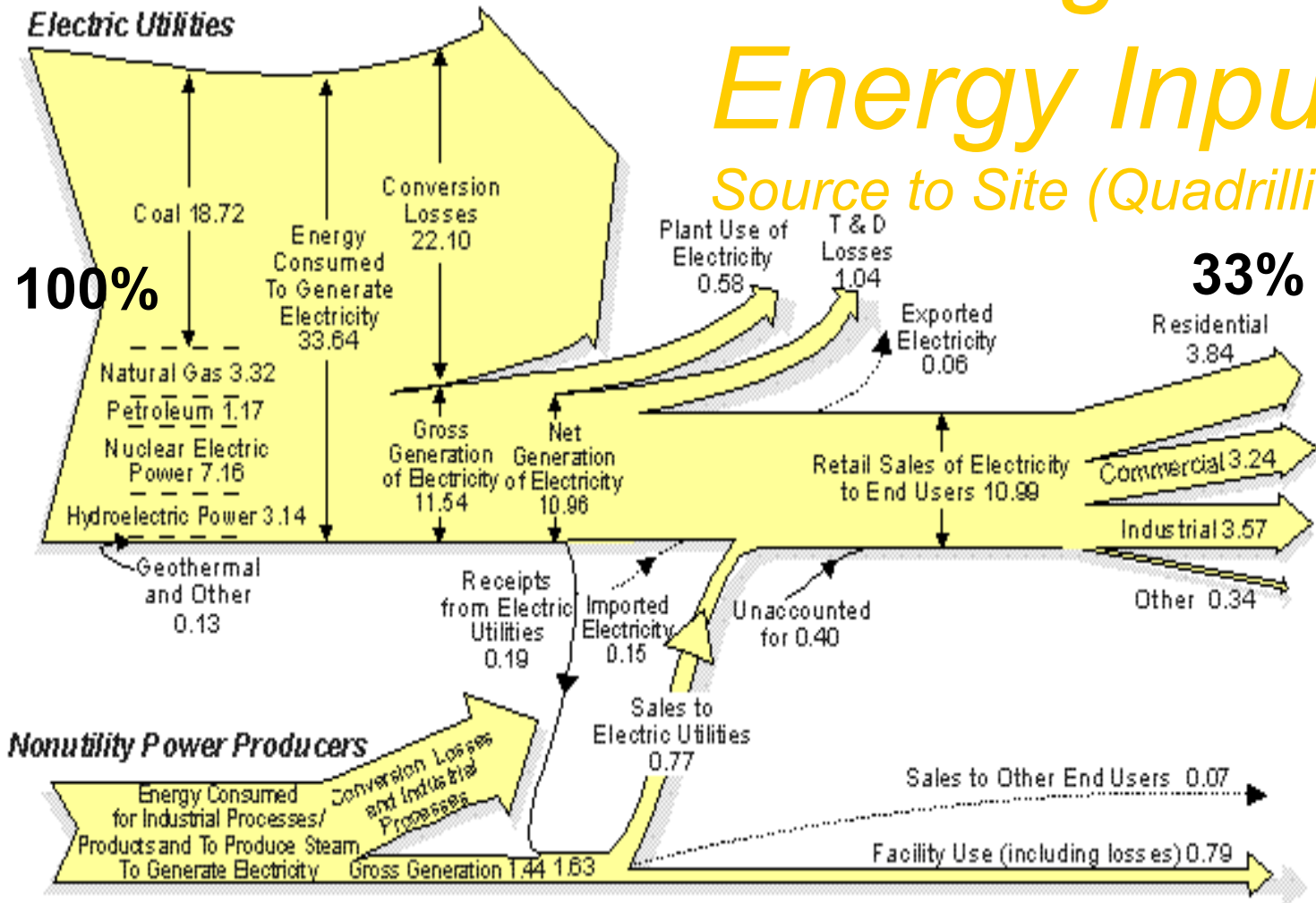
Combined Heat & Power





Wasting our Energy Inputs

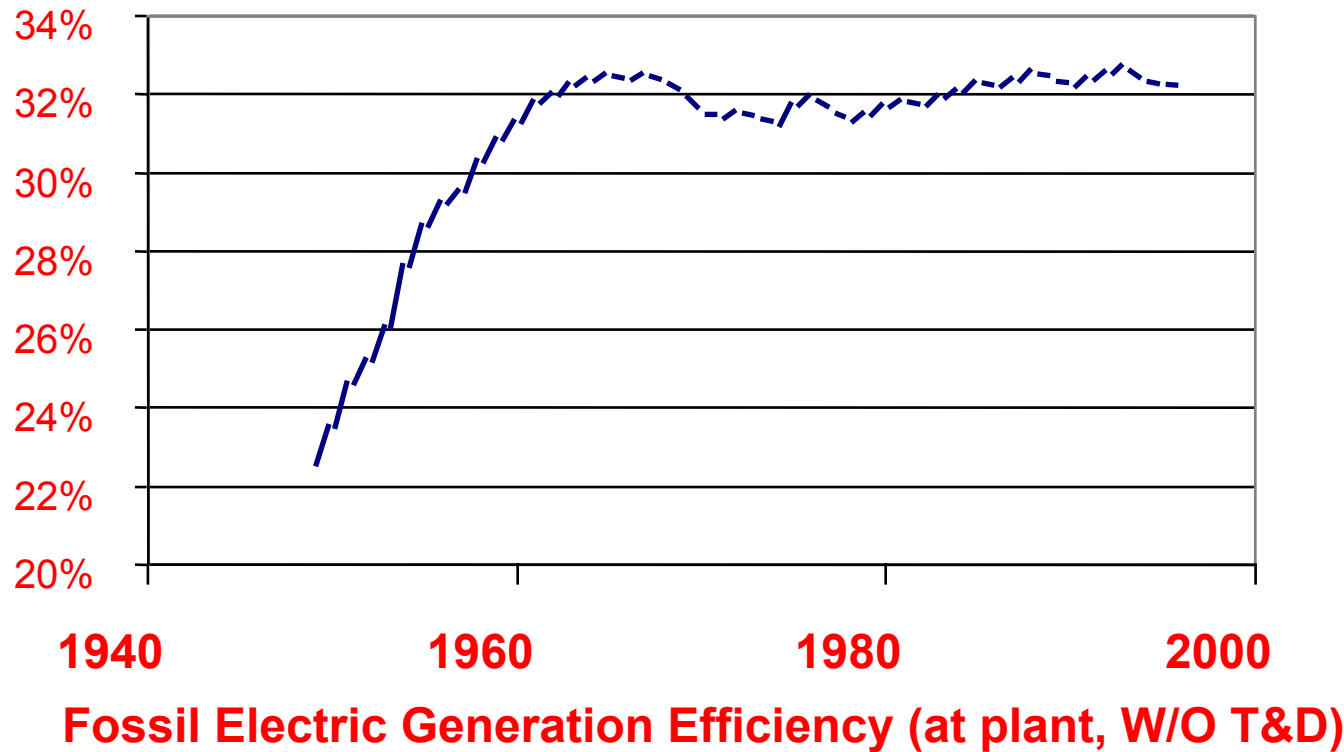
Source to Site (Quadrillion Btu)





The Need For CHP in the USA

Stagnant Efficiency of U.S. Electric System

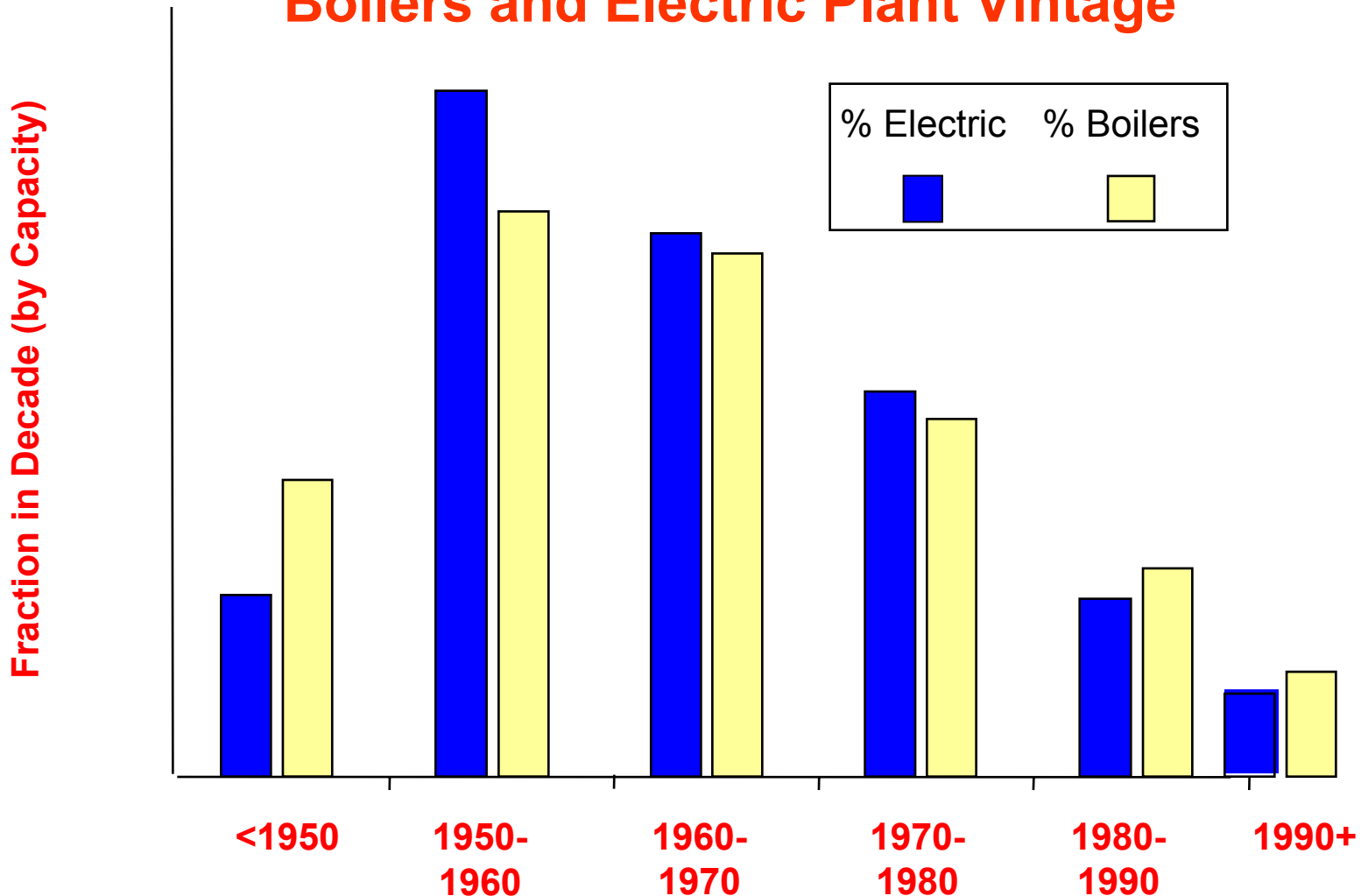


Source: EIA, Annual Energy Review 1996



Aging Heat & Power Generation

Boilers and Electric Plant Vintage





The Advantages of CHP/DG

- **Improved fuel efficiency (fuel economy)**
- **Improved power quality/reliability**
- **Reduced emissions per unit of useful output**
- **Reduced grid congestion (deferred T&D investment)**
- **Lower capital cost per KW than central system (but only by avoiding new T&D)**
- **Creates new high-tech manufacturing & service sector**
- **Reduced system vulnerability**
- **Short lead-time, off-the-shelf, load-following modular technology**
- **Optimization of scarce natural gas supply and infrastructure**
- **Supports competitive electric industry structure**
- **Eliminates line losses**
- **Reduced land-use impact**



*If CHP has so many
advantages....*

How come we're
not building CHP
everywhere?



Who Gains from These Advantages?

- **Improved fuel efficiency (fuel economy)**
- **Improved power quality/reliability**
- **Reduced emissions per unit of useful output**
- **Reduced grid congestion (deferred T&D investment)**
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Private parties usually cannot justify investments in CHP in order to achieve public goals ...

- Their competitors, their bankers, and their shareholders all require potential CHP project owners and developers to focus on the financial and operational results, not the benefits to society of their projects.



It takes public policy to achieve public benefits...

- USCHPA's fundamental mission is to create a policy and market environment conducive to CHP.
- That means finding ways to reward those who create CHP for the benefits they provide to the public.
- Without such rewards, the benefits will not be realized.



How do we gain these benefits?

- **Fuel efficiency (fuel economy) – individual investment**
- **Improved power quality/reliability – individual investment**
- **Reduced emissions per unit of useful output – crediting thermal output in emission allowances**
- **Reduced grid congestion (deferred T&D investment) – revised utility rates**
- **Lower capital cost per KW than central system (by avoiding new T&D) – revised utility rates**
- **New high-tech manufacturing & service sector -- follows from success**
- **Reduced system vulnerability -- follows from success**
- **Short lead-time, off-the-shelf, load-following modular technology -- follows from success**
- **Optimization of scarce natural gas supply and infrastructure -- follows from success**
- **Supports competitive electric industry structure -- follows from success**
- **Eliminates line losses -- follows from success**
- **Reduced land-use impact -- follows from success**



The Key Issues

- Monetizing the public benefits of CHP/DG so they can provide incentive to private CHP/DG developers
- Achieving certainty in electric industry regulatory structure
- Solving remaining technical issues of interconnection, operations, control, performance
- Making permitting, building codes, zoning, planning, CHP friendly.



USCHPA was founded in 1998, looking forward to 2010

- The DOE Challenge: Double the amount of CHP in the US economy by 2010.
- CHP installations were estimated to equal 46 GigaWatts of capacity in 1998.
- The goal for 2010 is 92 GigaWatts.
- As of year end 2002, we had reached 77 GW installed CHP



The Roadmap Process

CHP Challenge Initiative Goal: The Path to 92 GW





Following the Roadmap

- Three prime directions from the process:
 - Raise CHP Awareness
 - Eliminate Regulatory and Institutional Barriers
 - Develop CHP Markets and Technologies
- 2004 marks the half-way point of the challenge period (1998 – 2010).



What USCHPA Wants from You

- Raise your own CHP awareness – examine your facilities for potential to use CHP
- Help us eliminate regulatory and institutional barriers
- Support developing CHP markets and technologies
- Take credit for the public benefits you create