



U.S. Department of Energy

OAK RIDGE NATIONAL LABORATORY

# CHP Subcontractors Coordination Review Meeting

*Analysis of Industrial and Commercial  
CHP Markets*

Joel Bluestein  
Energy & Environmental Analysis, Inc.



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# Analysis of Industrial and Commercial CHP Markets

Joel Bluestein

Energy and Environmental Analysis, Inc

1655 N Fort Myer Dr, Suite 600

Arlington, VA 22209

(703) 528-1900

[jbluestein@eea-inc.com](mailto:jbluestein@eea-inc.com)

[www.eea-inc.com](http://www.eea-inc.com)

# Description of Tasks

- Inventory of Existing Commercial/Industrial Boiler Population
- Evolution in the Demand for Steam
- Changing Applications for CHP
- Forecast of New and Conventional Industrial CHP

# Inventory of Boiler Population

**Overview: Develop a current inventory of commercial industrial boilers.**

**Coordination: Work with boiler manufacturers and users.**

**Deliverable: Public report**

**Timeline: Finalizing**

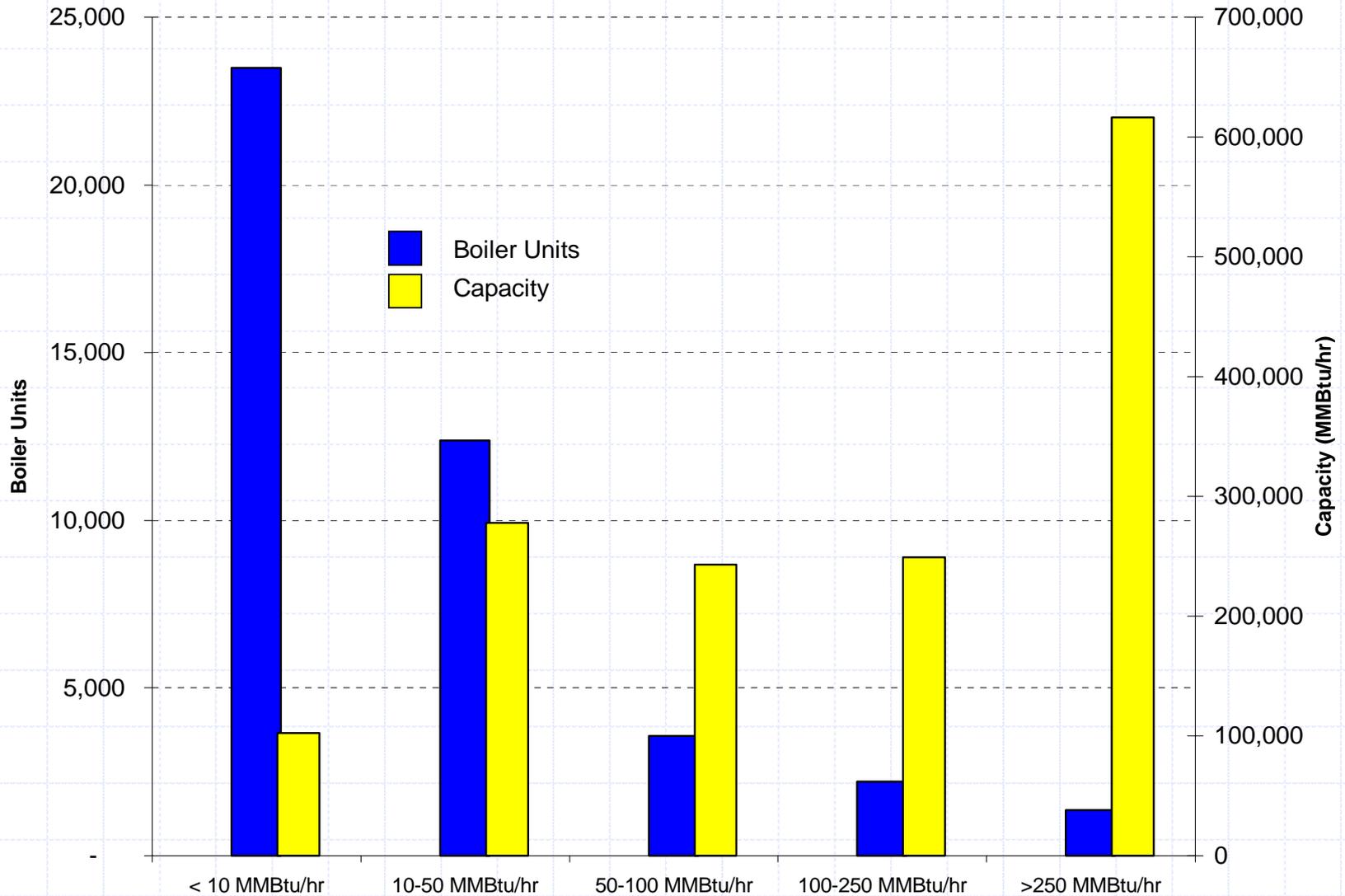
# Overview

- Updates a 1996 report prepared for GRI.
- Characterizes U.S. boiler population by size, capacity, fuel, use, region, age.
- Not a survey or inventory.
  - Estimated from a combination of public and private databases and other sources.

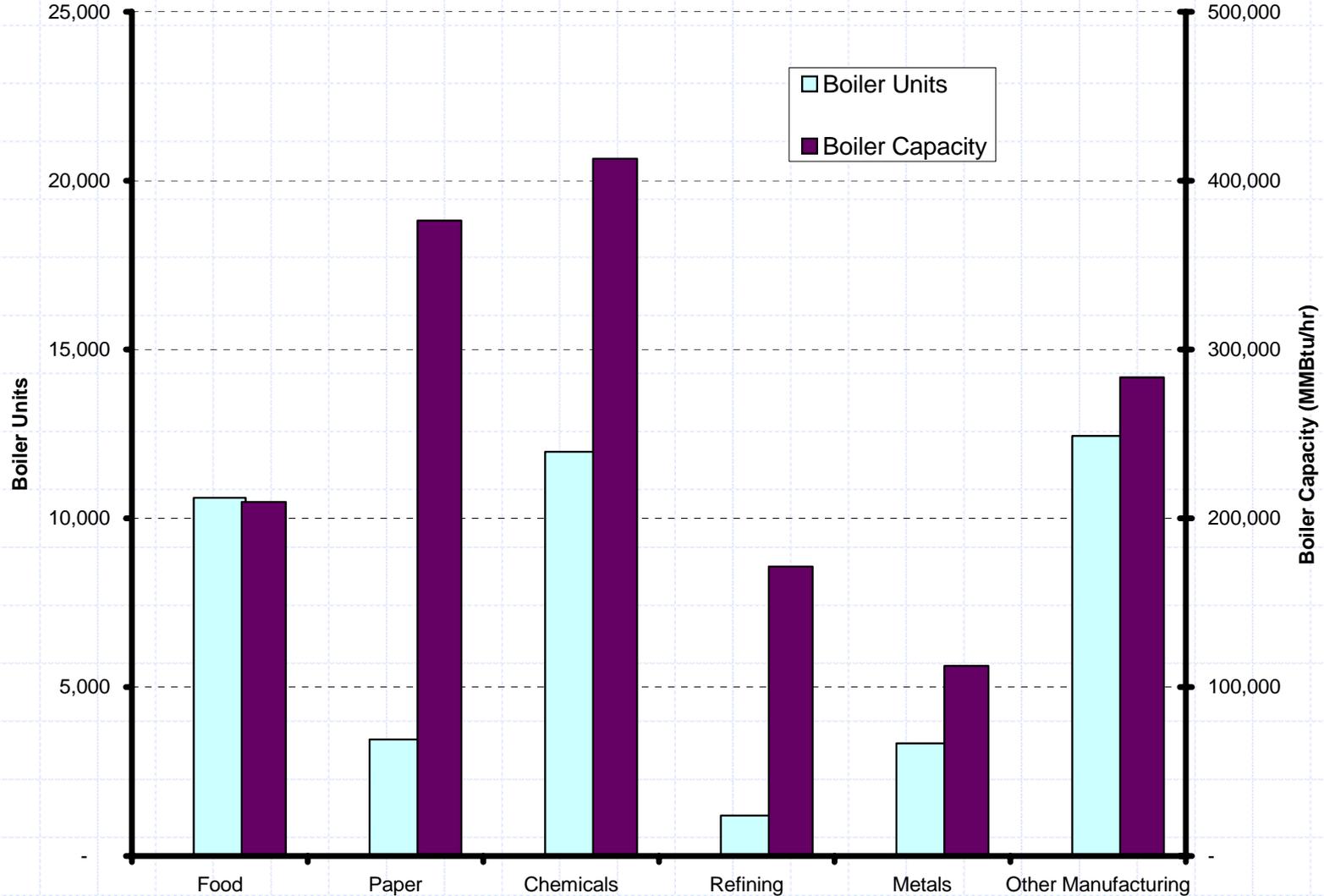
# Summary

	Industrial	Commercial	Total
Boilers	43,105	119,790	162,805
>10 MMBtu/hr	19,520	26,140	45,660
Capacity (MMBtu/hr)	1,556,780	1,147,617	2,714,397
>10 MMBtu/hr	1,464,474	846,415	2,310,889

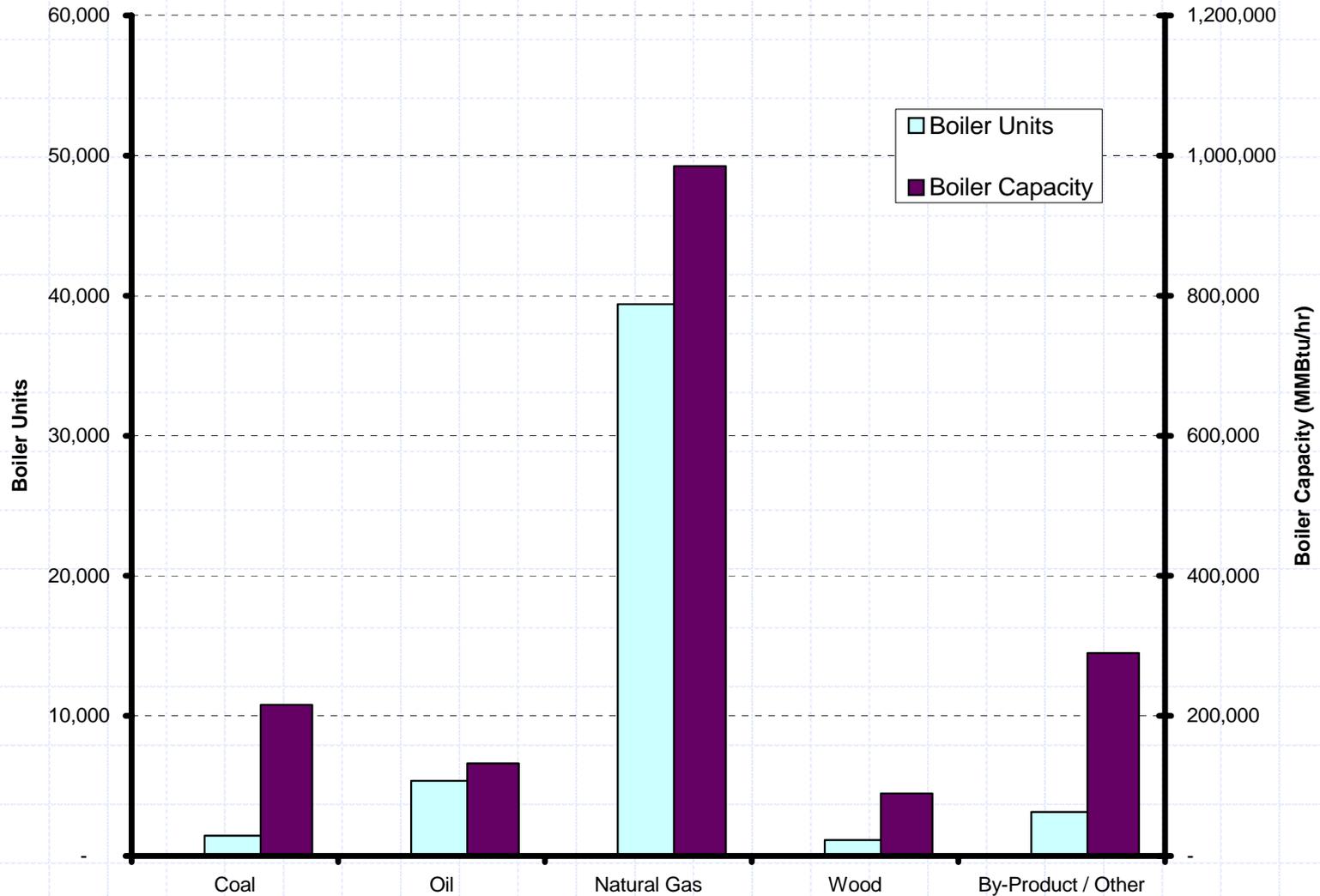
# Industrial Boiler Units and Capacity



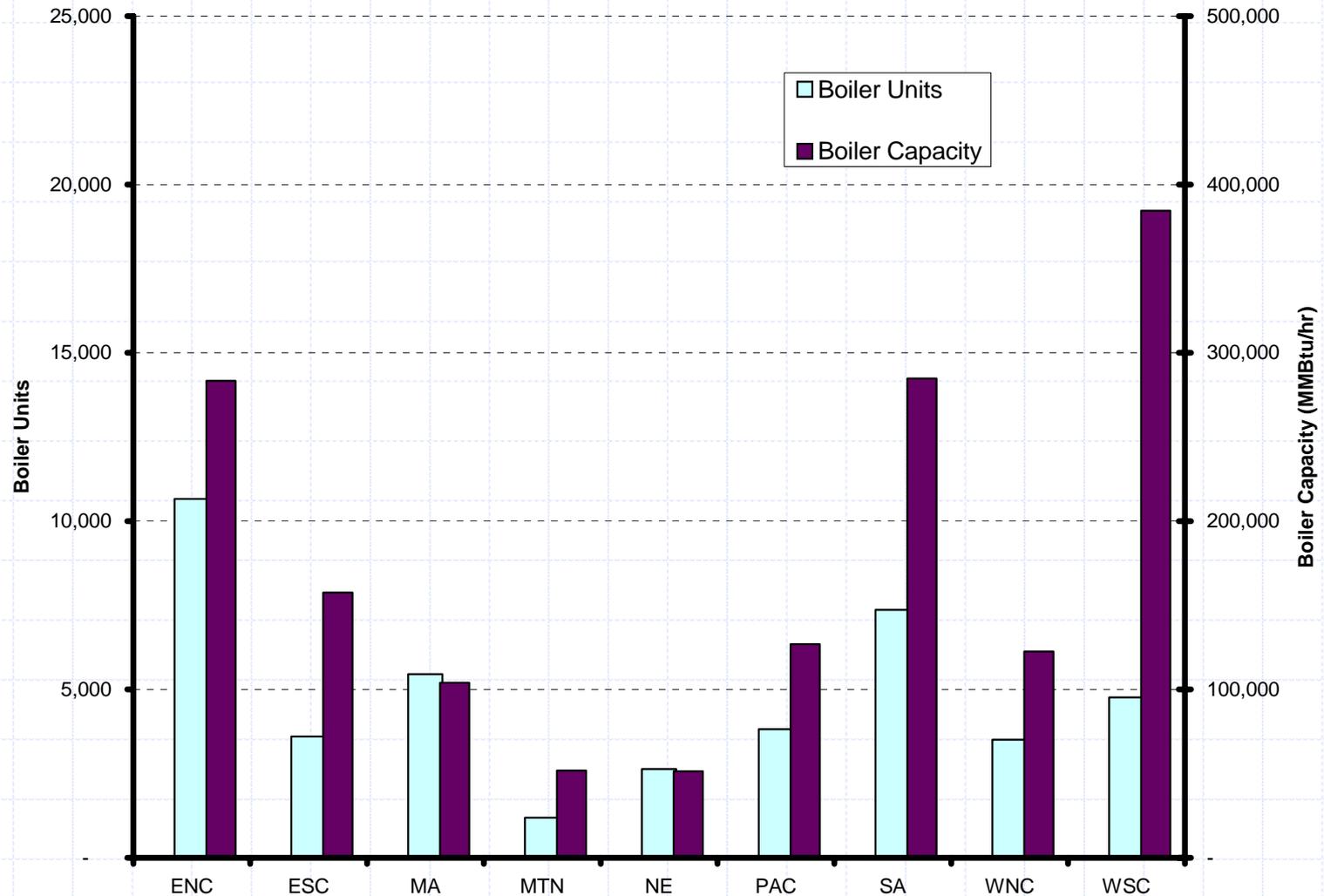
# Industrial Boilers by Industry



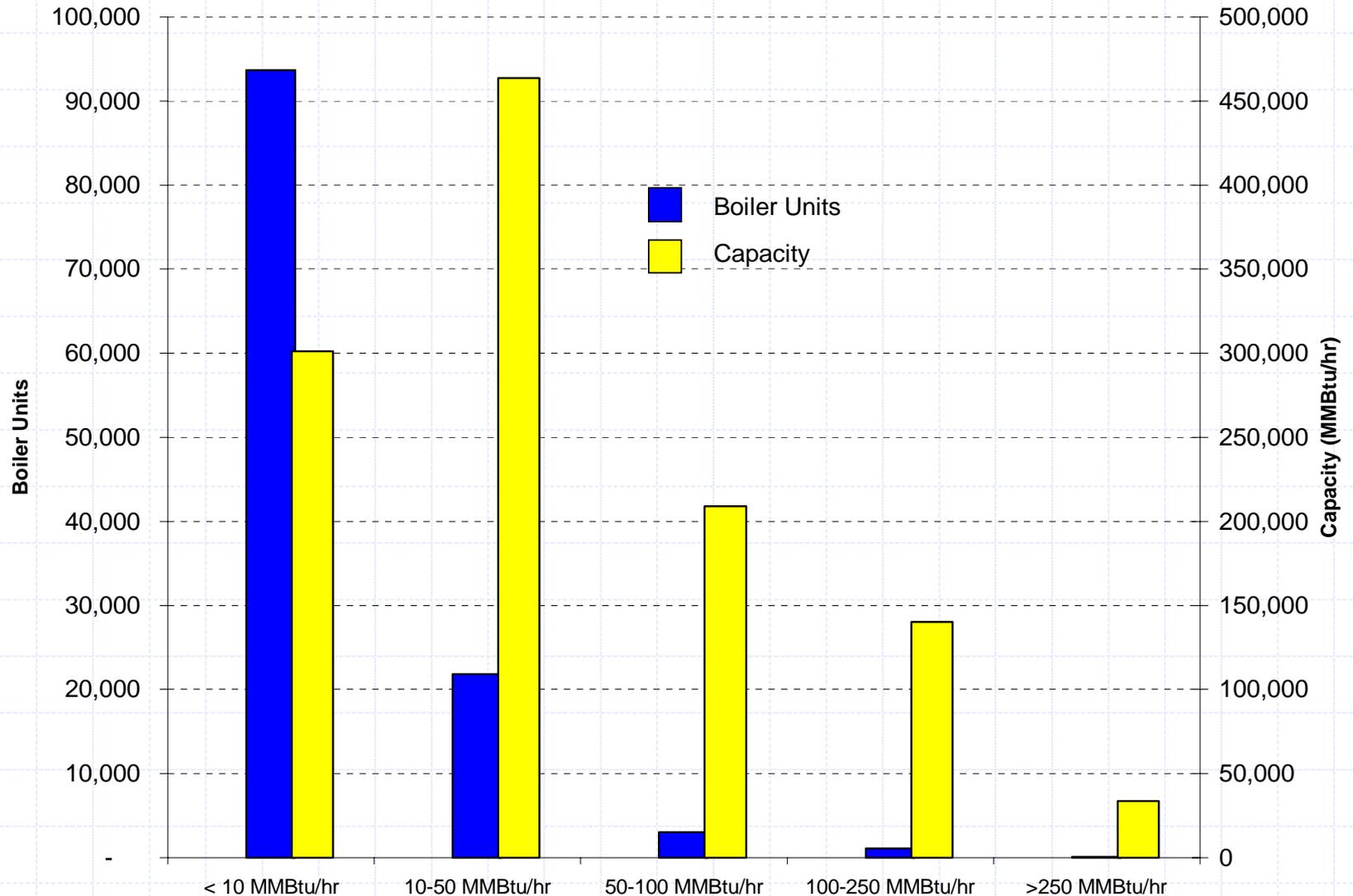
# Industrial Boilers by Fuel



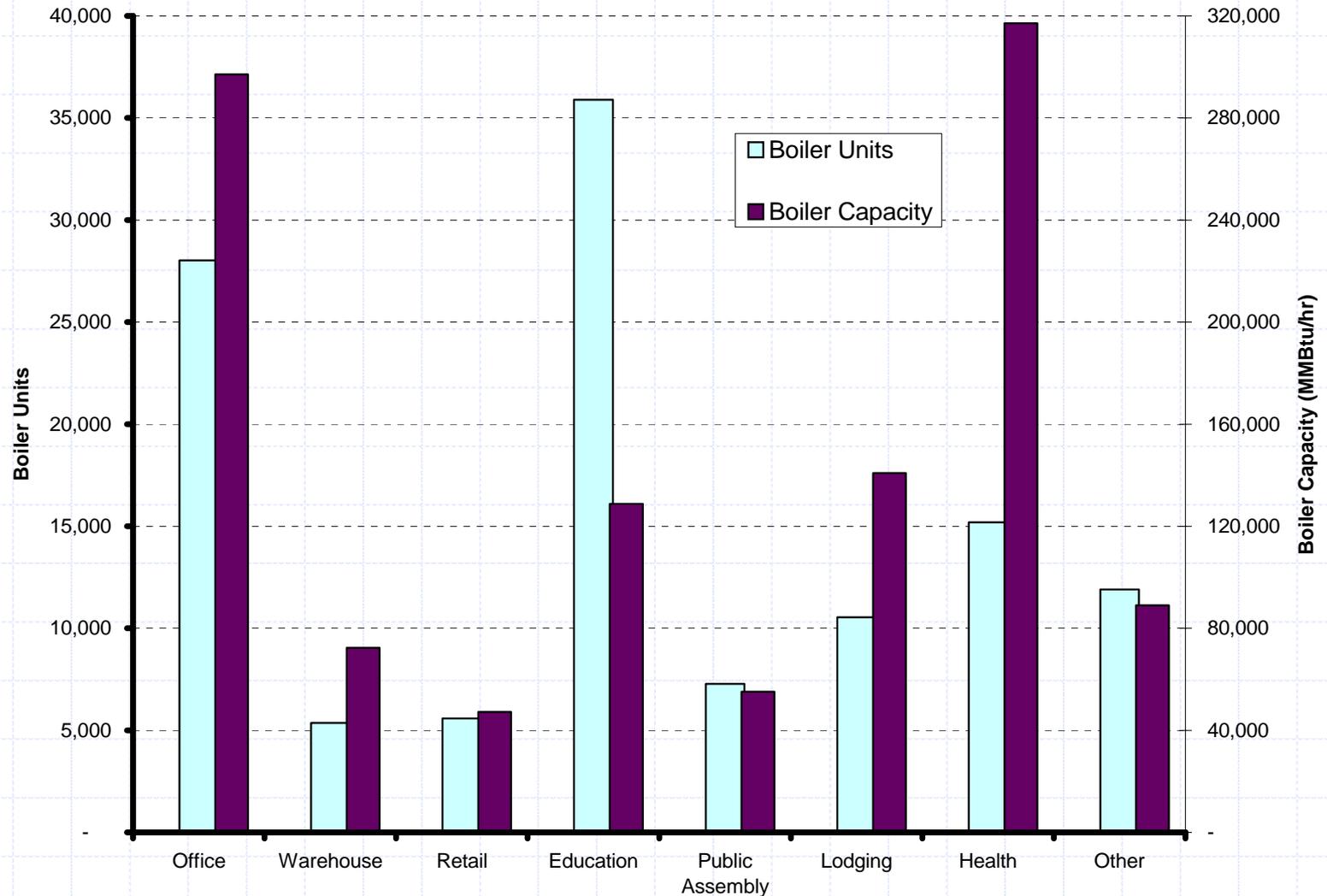
# Industrial Boilers by Region



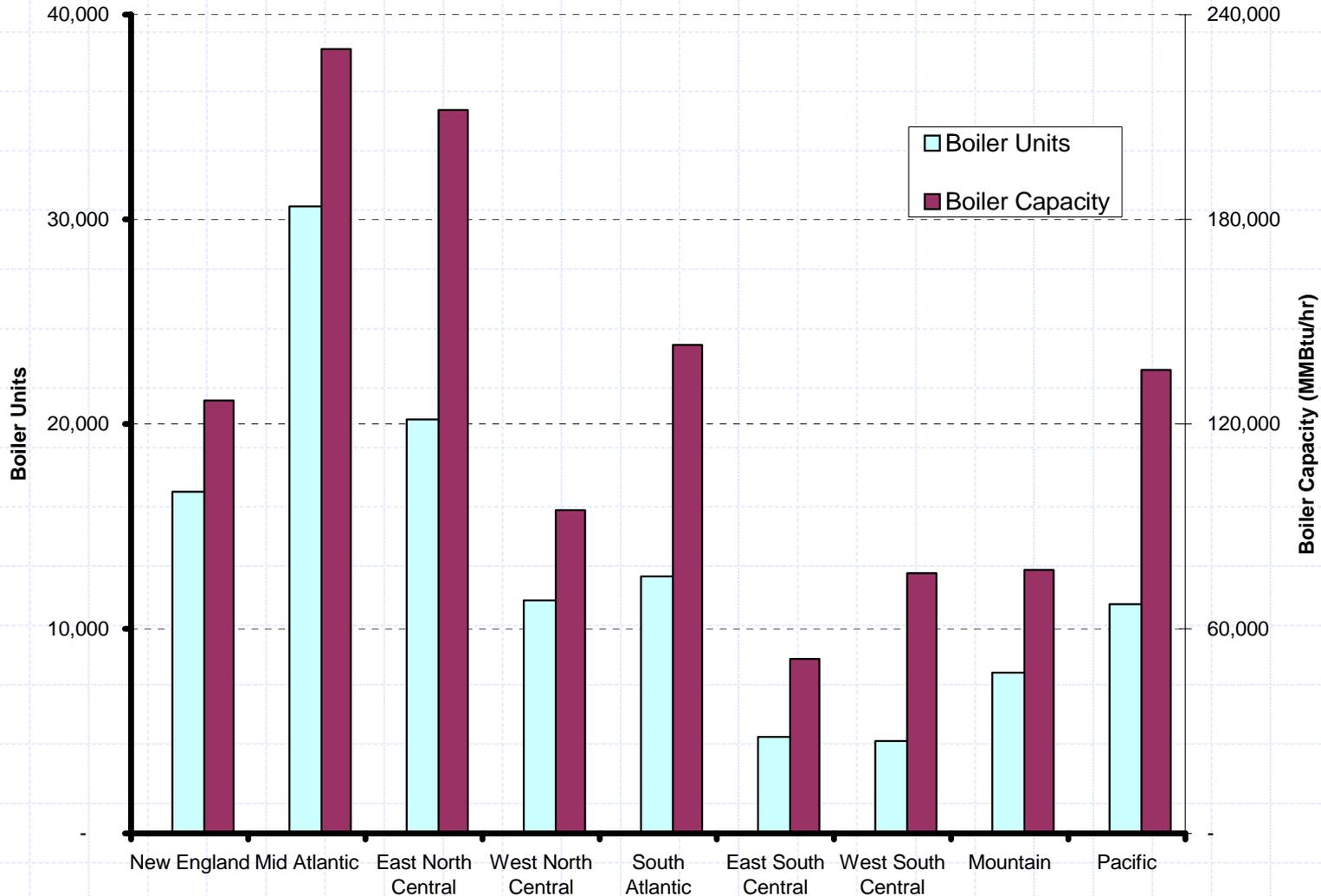
# Commercial Boiler Units and Capacity



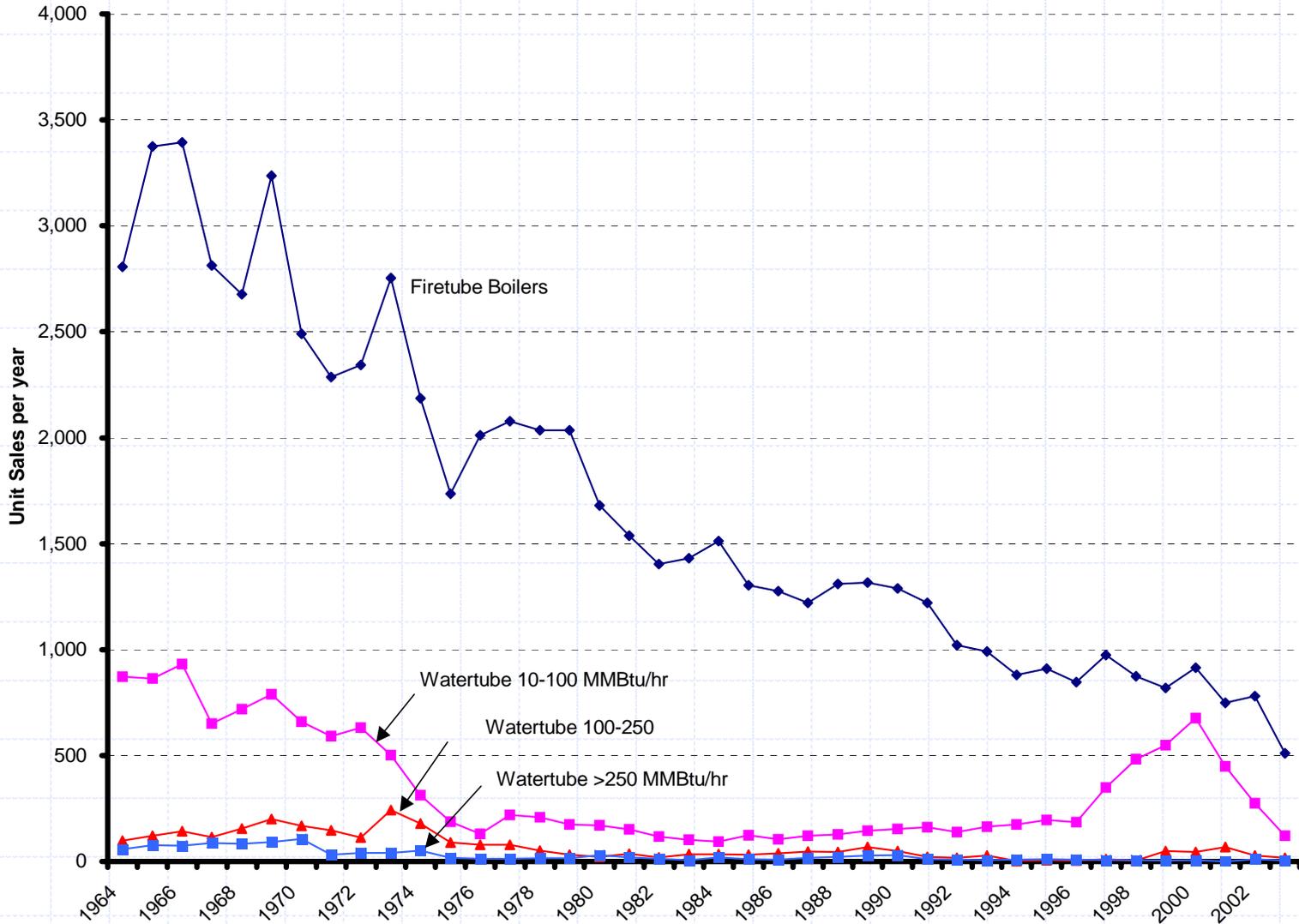
# Commercial Boilers by Segment



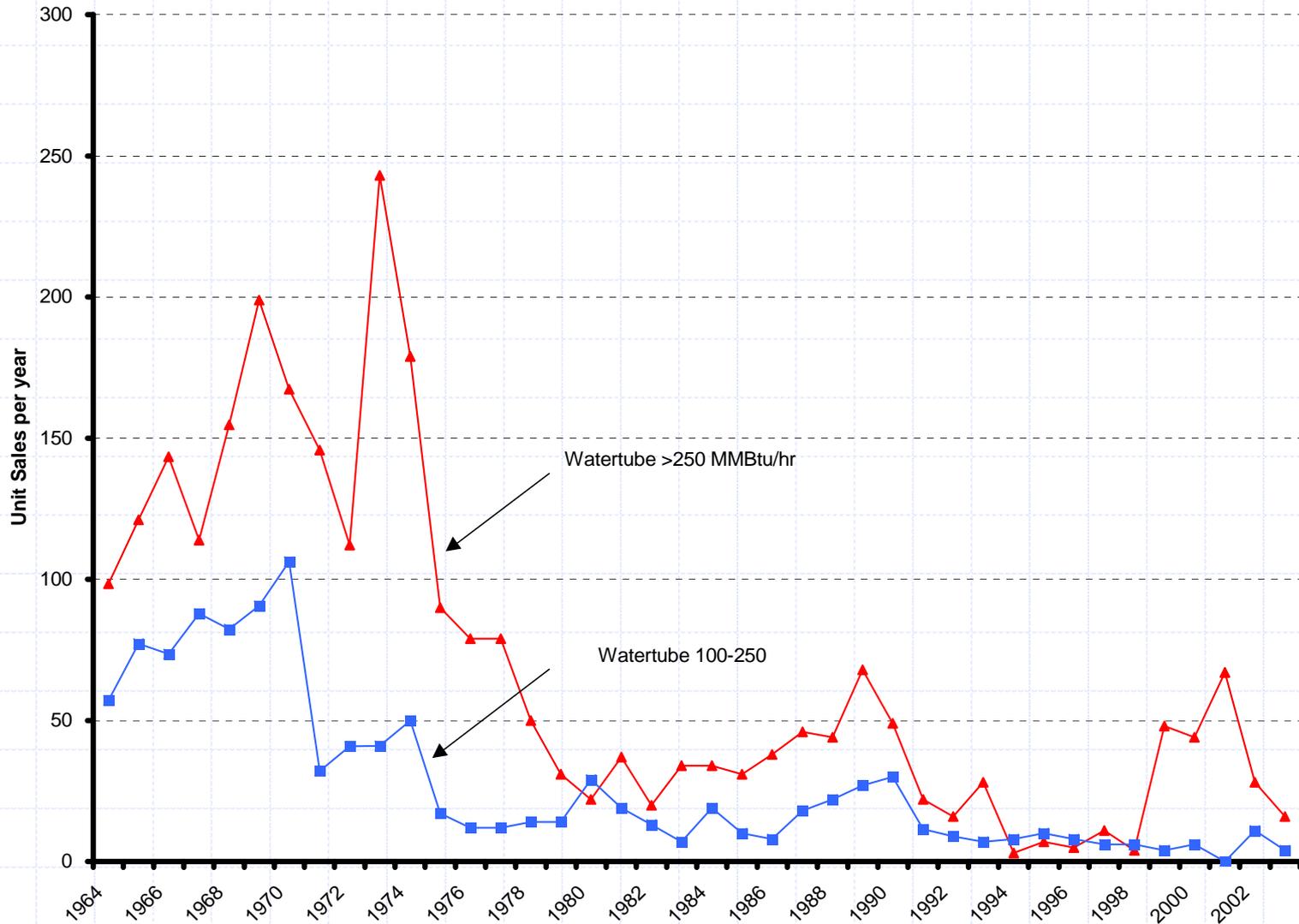
# Commercial Boilers by Region



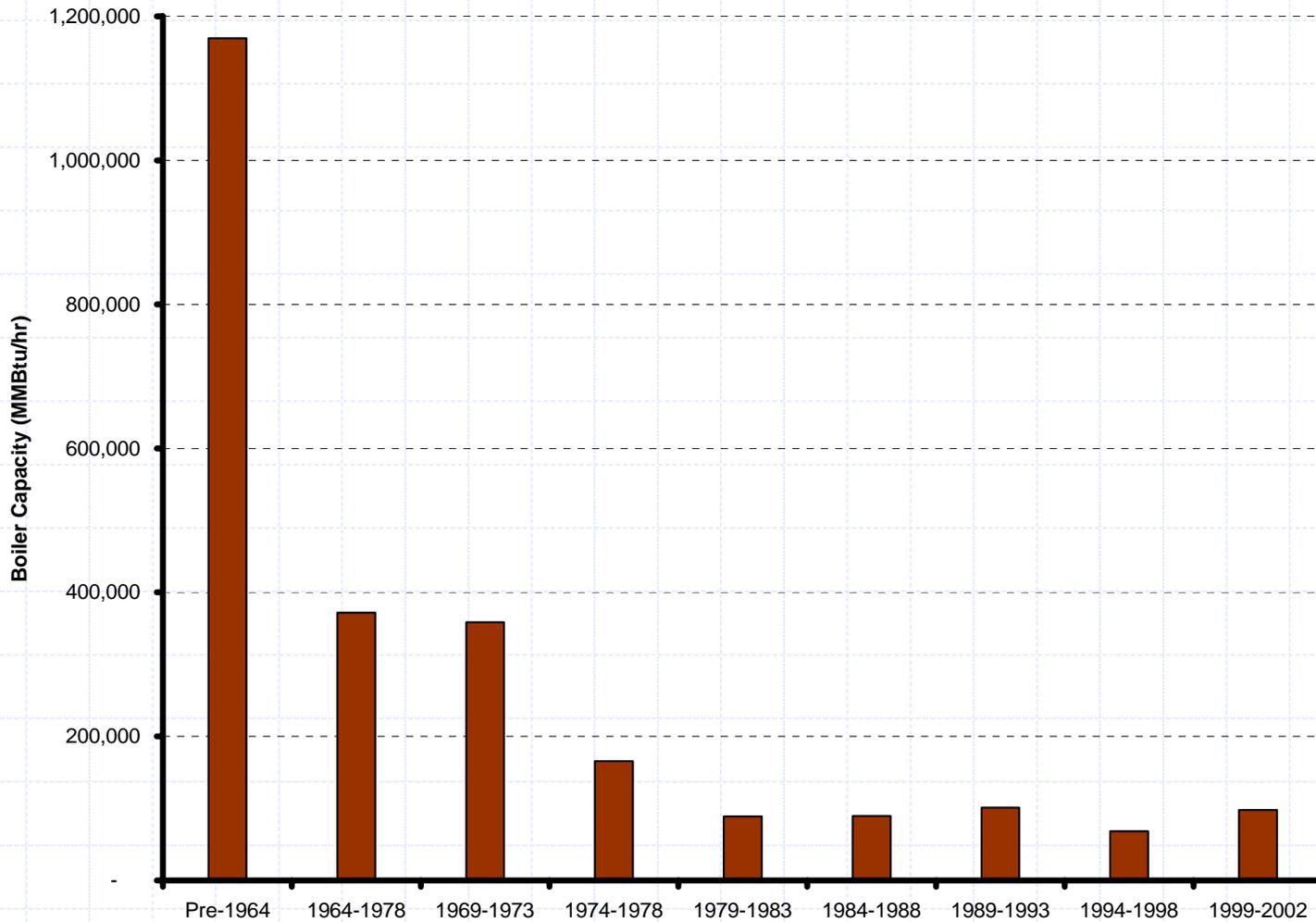
# Boiler Sales History



# Historical Large Boiler Sales



# Age Distribution of Boilers



# Evolution in the Demand For Steam

**Overview:** Analyze and document the changing uses for and demand for steam. Analyze implications for boilers and CHP.

**Coordination:** Work with boiler manufacturers and users.

**Deliverable:** Public report

**Timeline:** Draft report in review.

# Past and Future of Boilers

- What explains the recent trend in boiler sales?
- Are we due for a big upturn in boiler sales?
- What can we expect for future boiler use?

# In the beginning...

- Large-scale boiler use developed to provide steam for engines.
- Engines facilitated the development of modern industrial facilities.
- Boiler fuel was coal, wood or other bulk fuel.

# The Steam Age

- Boilers became the heart of industrial facilities, providing mechanical drive, process heat and space heat.
- Steam was a versatile energy transfer medium, more flexible than the available bulk fuels.

# Change Begins

- Electric motors for mechanical drive became more common in the first half of the 20th century.
- Coal was still the primary industrial fuel until after WW II.
- Steam was still an important energy transfer medium.
- Much of U.S. industry was in the midwest and northeast.

# Post-War Changes

- Natural gas becomes widely available as an industrial fuel.
- Development of direct gas-fired equipment.
- Electricity becomes cheaper. Electricity industry looks for new applications.

# The 1970s - 80s

- “Energy crisis” - Industrial slowdown, especially in heavy, energy intensive industry.
- PURPA and turbine technology spur growth in cogeneration.
- Environmental regulations start to develop.

# Today

- Electricity provides mechanical drive and flexible energy transfer.
- Direct gas combustion meets many heating needs.
- Coal combustion difficult for many reasons.
- General manufacturing facilities have little need for boilers.

# Industrial Steam Use Today

- Focused on a few industries with specific process heating requirements - mostly slow-growth.
- Extensive use of waste and by-product fuels.
- Likely to cogenerate, especially if using gas.

# Future of Boilers?

- Increasingly limited number of industries/facilities.
- Continuing focus on waste/byproduct fuel use.
  - Gas firing will continue to shift towards CHP.
- Wild card - will high gas prices cause a return to coal?

*How does this affect boiler/CHP industry priorities?*

# Changing Applications for CHP

**Overview: Identify new and innovative applications and approaches for CHP.**

**Coordination: Work with developers, equipment manufacturers and end users.**

**Deliverable: Public report.**

**Timeline: Draft report under internal review.**

# Changing Applications for Steam

- Surveys direct process heat applications by industry.
- Matches potential demand to CHP technologies.
- There are many potential non-steam applications.

# Priority Industries Reviewed

- Food: Frying, Baking, Powder Milk Drying, Fruit and Vegetable Drying
- Lumber: Particleboard Drying
- Paper: Lime Calcining
- Chemical and Petroleum Refining: Fluid Heating
- Stone Clay and Glass: Preheat for glass and cement making, lime manufacturing, brick making, gypsum manufacturing
- Primary Metals: Preheat for various metal heating processes

# Forecast of New and Conventional Industrial CHP

**Overview:** Draw on earlier tasks to develop a forecast of industrial CHP through 2025 including conventional and innovative applications and technologies.

**Coordination:** Draw on R&D plans, technology characterizations and industrial growth forecasts.

**Deliverable:** Public report.

**Timeline:** Results under review.

# FY05 Timeline



- All deliverables complete by June

# Questions?

