

# Energy Efficiency and Co-Benefits Assessment Public Reports Workshop

June 30, 2015

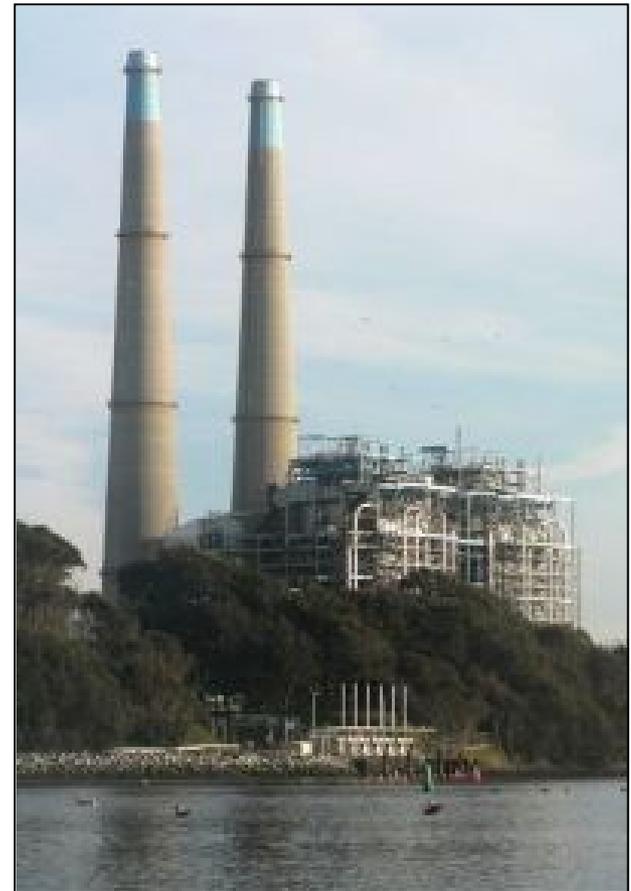
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Sacramento, CA

**California Environmental Protection Agency**

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**Air Resources Board**



# Overview

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- Background
- Public Report Data
- Third-Party Review
- Summary and Next Steps





# Background

# Energy Efficiency and Co-Benefits Assessment (EEA) Regulation

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- ◆ Applicability:
  - ◆ Large industrial sources with GHG emissions in 2009:
    - ◆  $\geq 0.5$  MMTCO<sub>2</sub>e
    - ◆ Transportation fuel refineries and cement plants with  $\geq 0.25$  MMTCO<sub>2</sub>e
- ◆ Requirements:
  - ◆ Identify energy efficiency improvement opportunities/projects
  - ◆ Estimate associated GHG, criteria pollutant, and toxic air contaminant reduction benefits, costs, and cost benefits

# EEA Assessment Reports Submitted for 43 Facilities

Emissions  $\geq 0.5$  MMTCO<sub>2</sub>e

Sector	Number of Facilities	Total 2009 Carbon Dioxide Equivalent Emissions (MMTCO <sub>2</sub> e)	Number of Projects Identified	GHG Emission Reductions Identified (MMTCO <sub>2</sub> e)
Petroleum Refineries*	12	31.4	401	2.78
Electricity Generation	14	12.3	118	1.91
Oil & Gas/Mineral Production	6	6.5	129	1.59
Cement Plants*	8	5.7	79	0.68
Hydrogen Plants	3	1.8	23	CBI
<b>Totals</b>	<b>43</b>	<b>57.7</b>	<b>750</b>	<b>6.96</b>

\* Also includes transportation fuel refineries and cement plants  $\geq 0.25$  MMTCO<sub>2</sub>e

Based on 2009 GHG reporting data; GHG emissions for individual facilities may be accessed at:

<http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm>

# Public Report Prepared for Each Sector

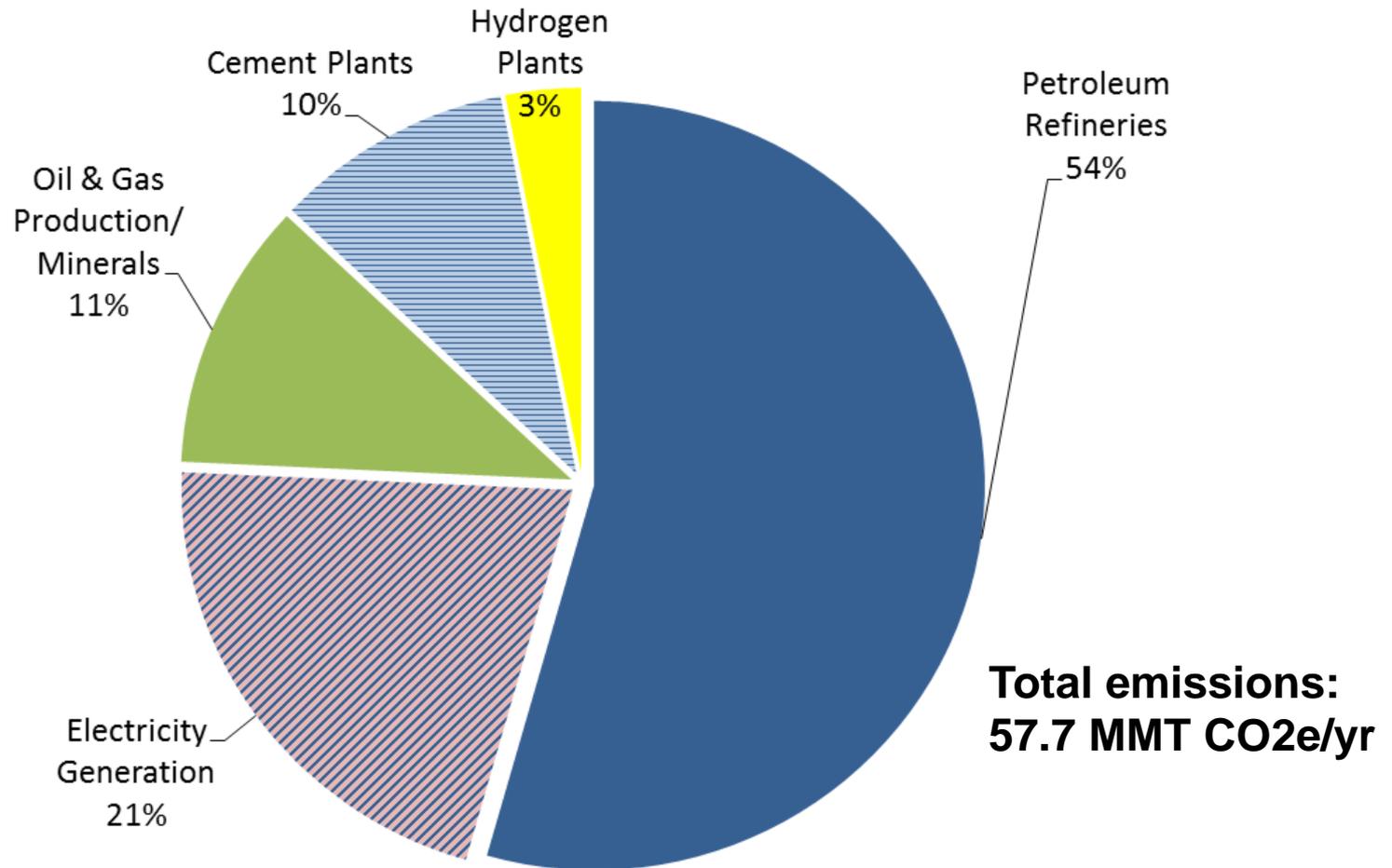
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- ◆ Summarize data provided in facility EEA Reports
  - Emissions
  - Energy use
  - Identified projects
- ◆ Public report format:
  - Introduction and Summary
  - Part I – Sector Summary
  - Part II – Facility Specific Data
- ◆ All data aggregated consistent with public disclosure requirements under CCR section 95610

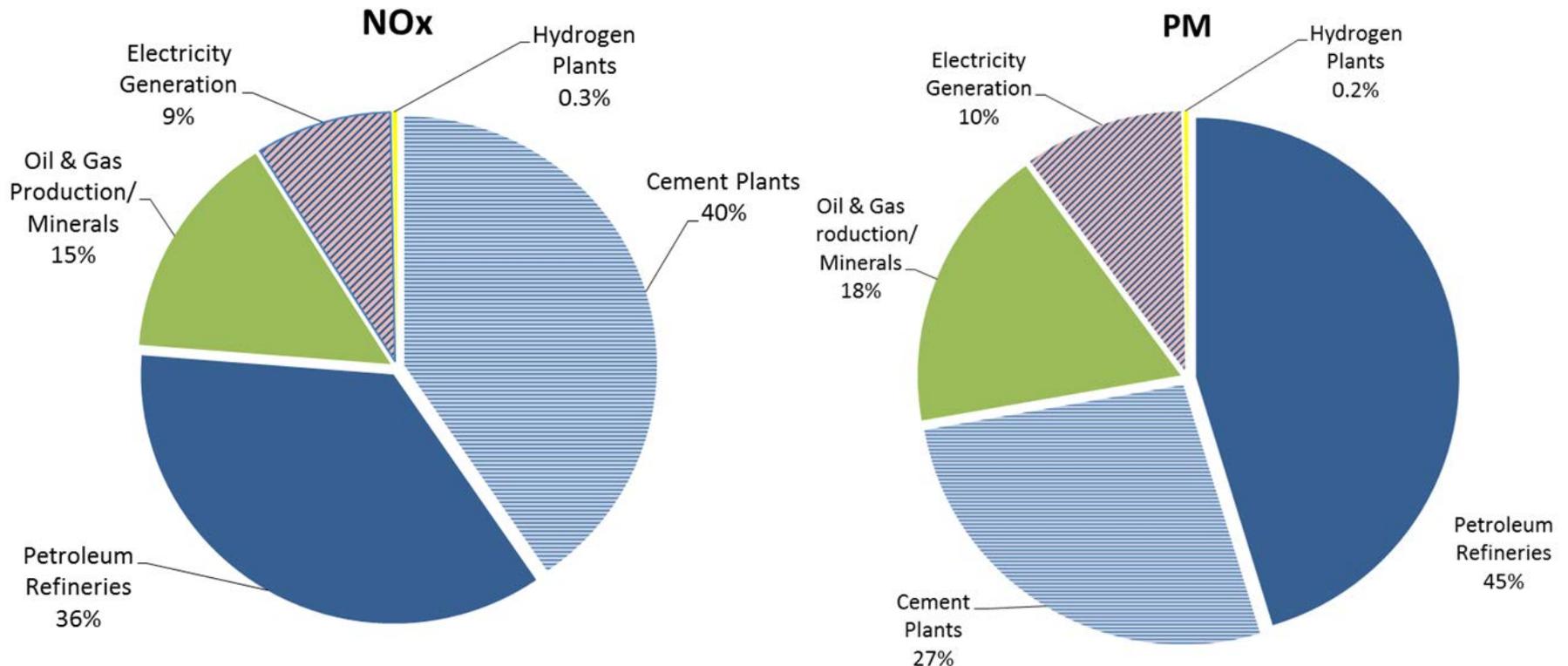
# Public Report Data



# Sector 2009 GHG Emissions



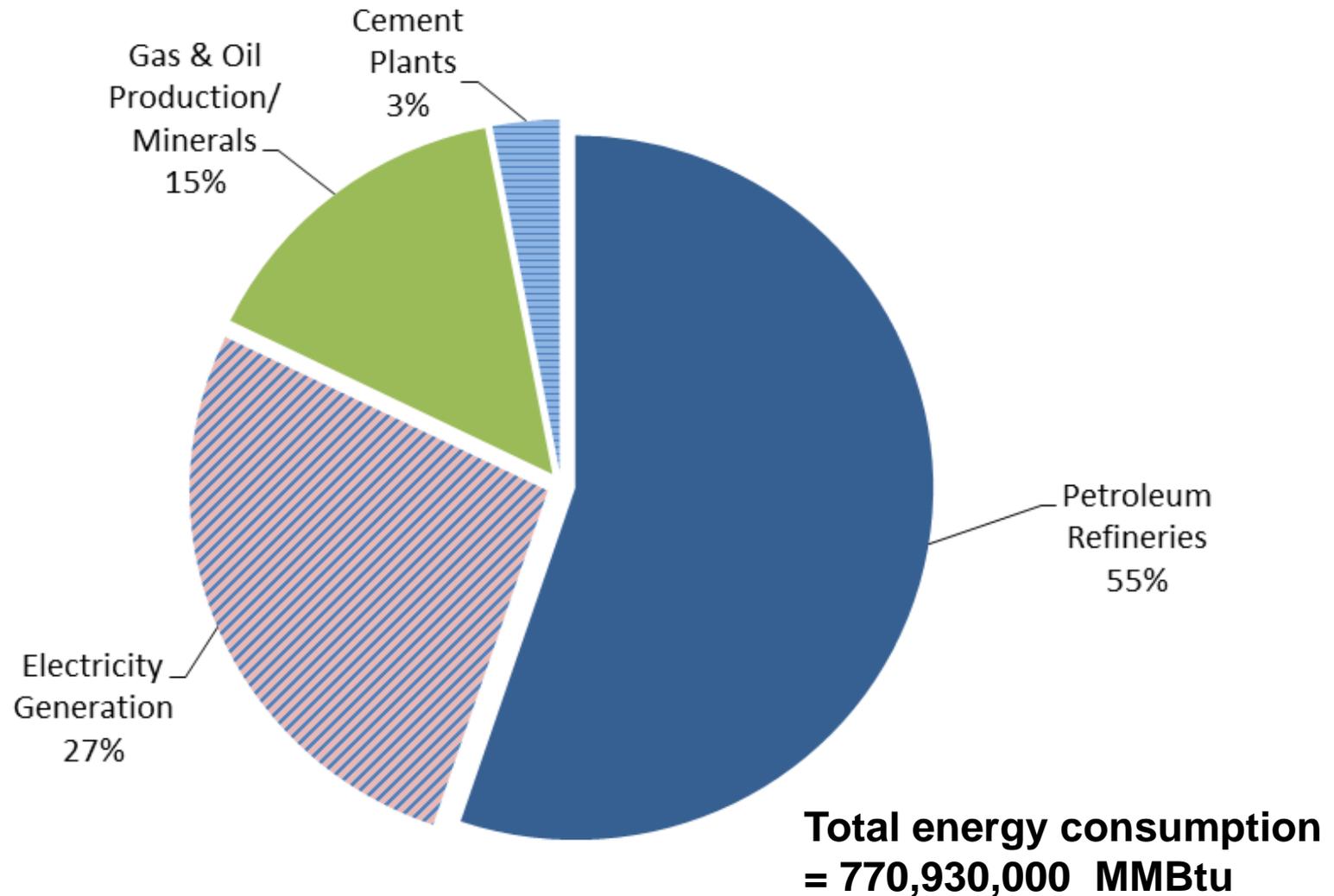
# Sector 2009 NOx and PM10 Emissions



**Total NOx emissions =  
69 tons/day**

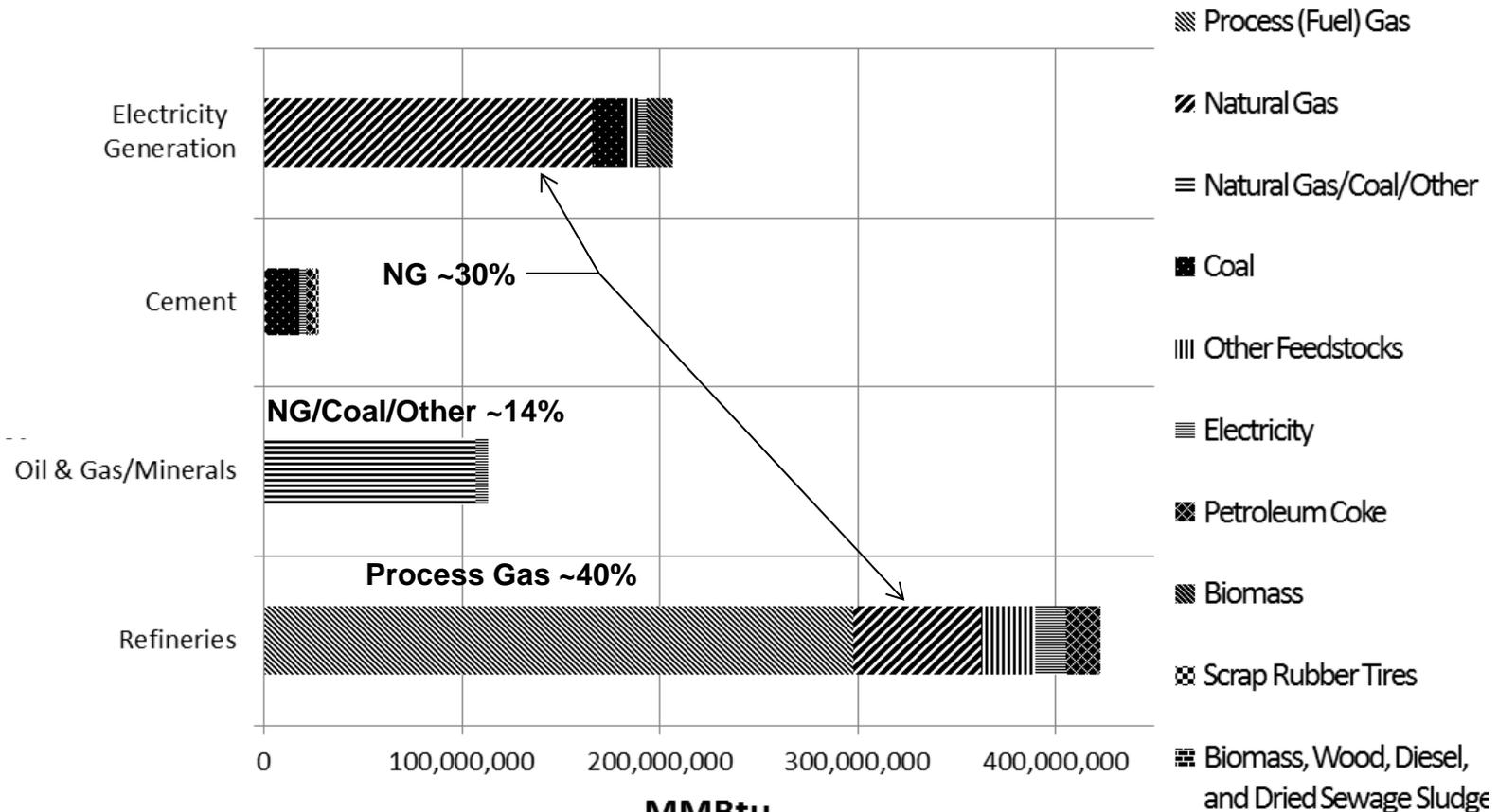
**Total PM10 emissions =  
16.3 tons/day**

# Sector 2009 Energy Consumption



# Refinery Process Gas and Natural Gas Account for Over 70% of 2009 Energy Use

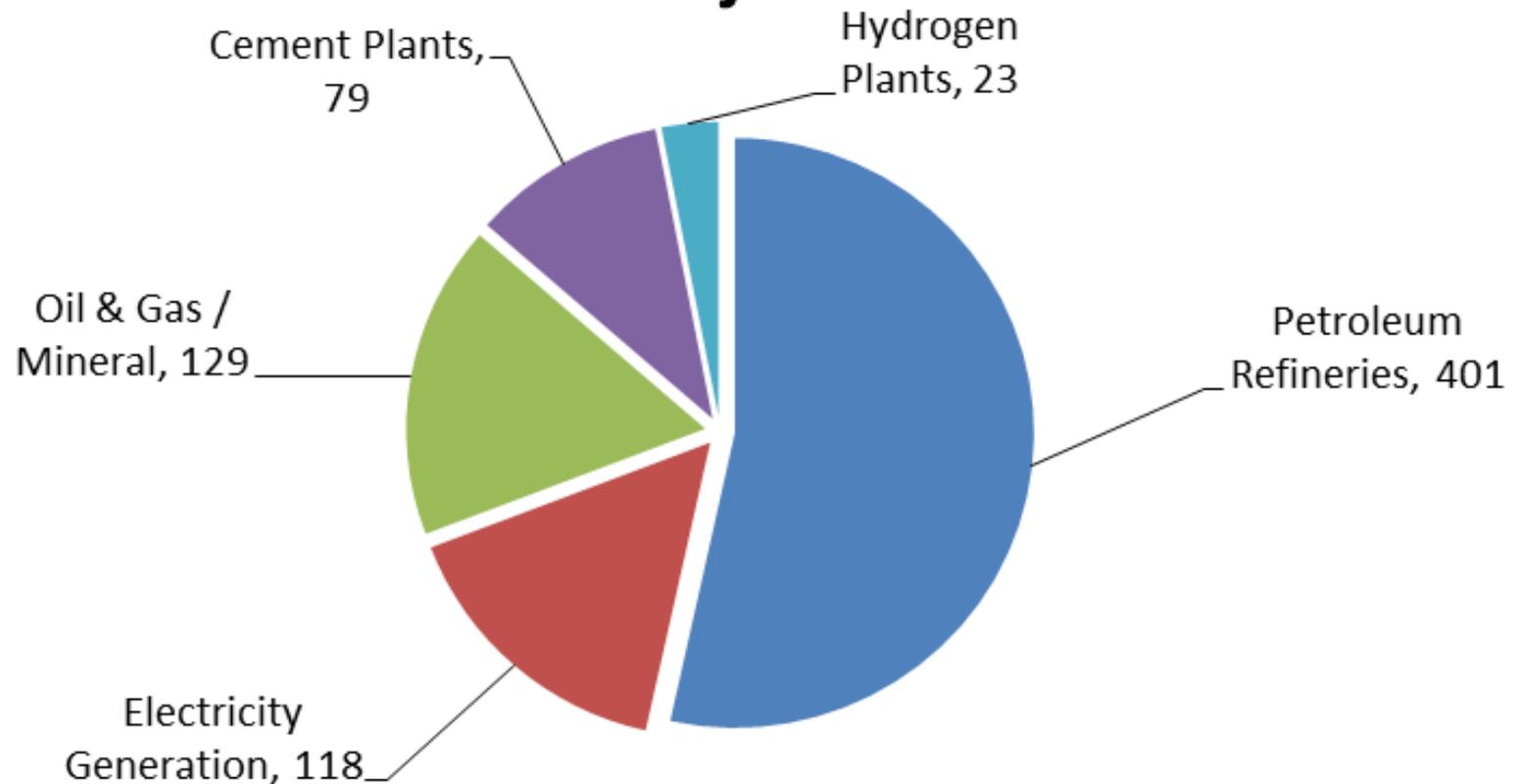
Energy Consumption by Sector



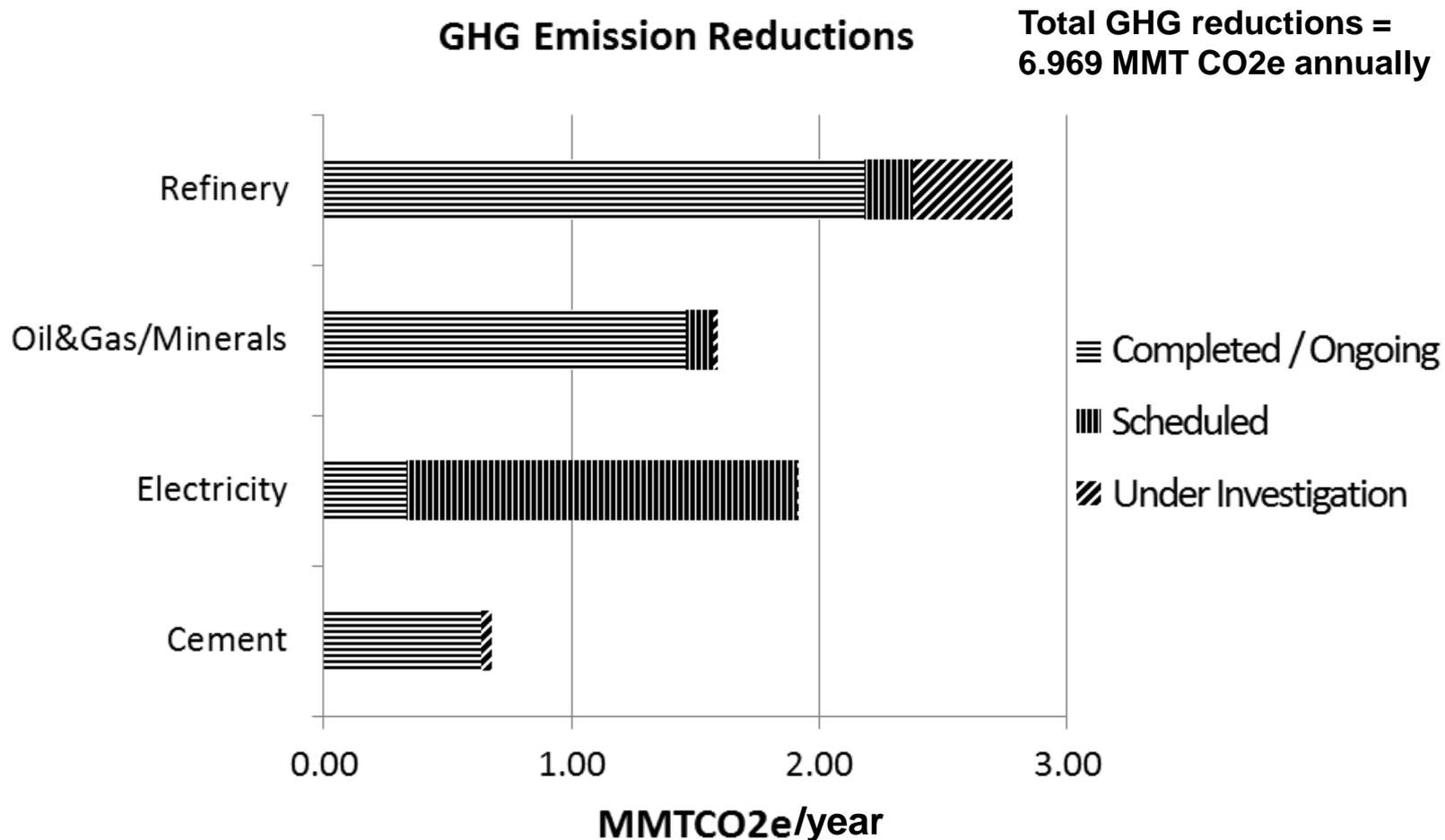
# 750 Energy Efficiency Projects Identified

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## Number of Projects Identified



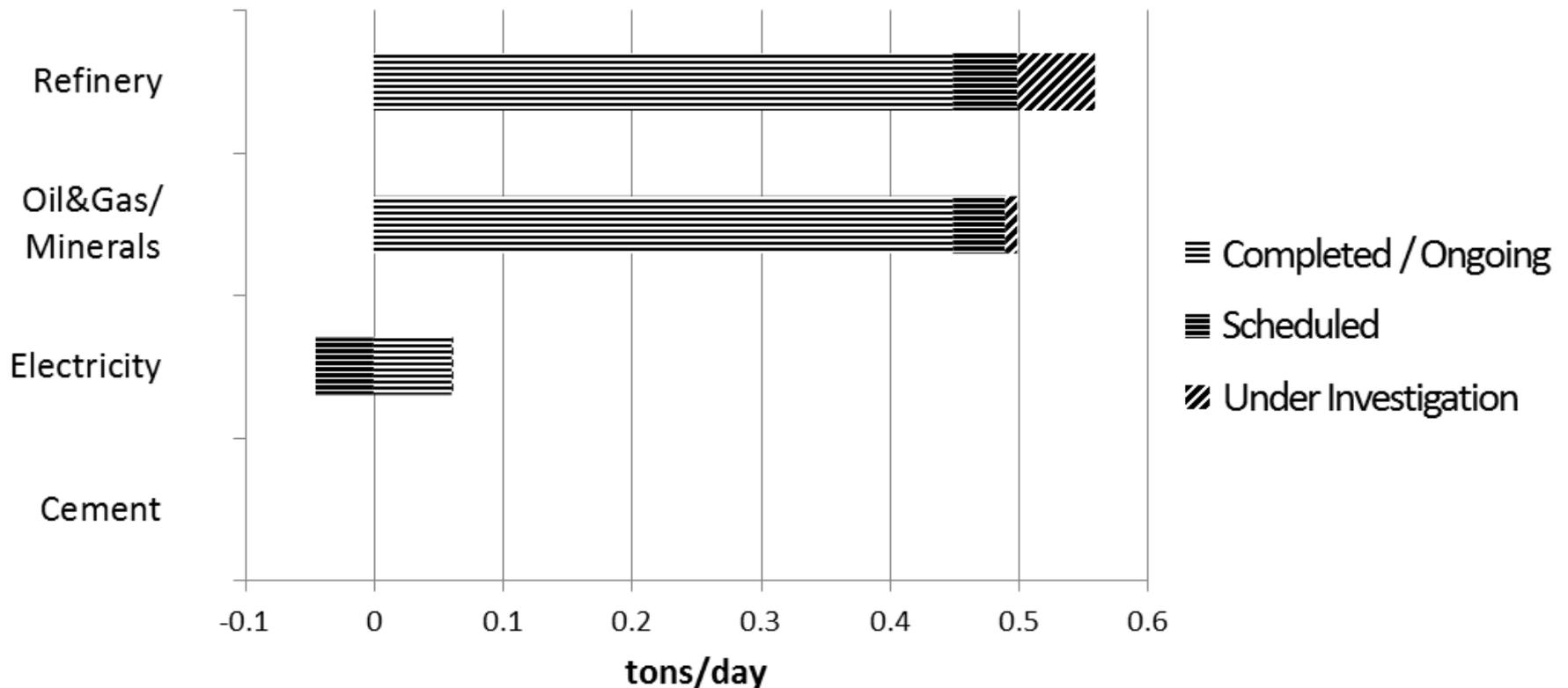
# Most GHG Emissions Reductions Identified as Completed/Ongoing or Scheduled



# Nearly All PM10 Emissions Reduction Co-Benefits Identified as Completed/On-going

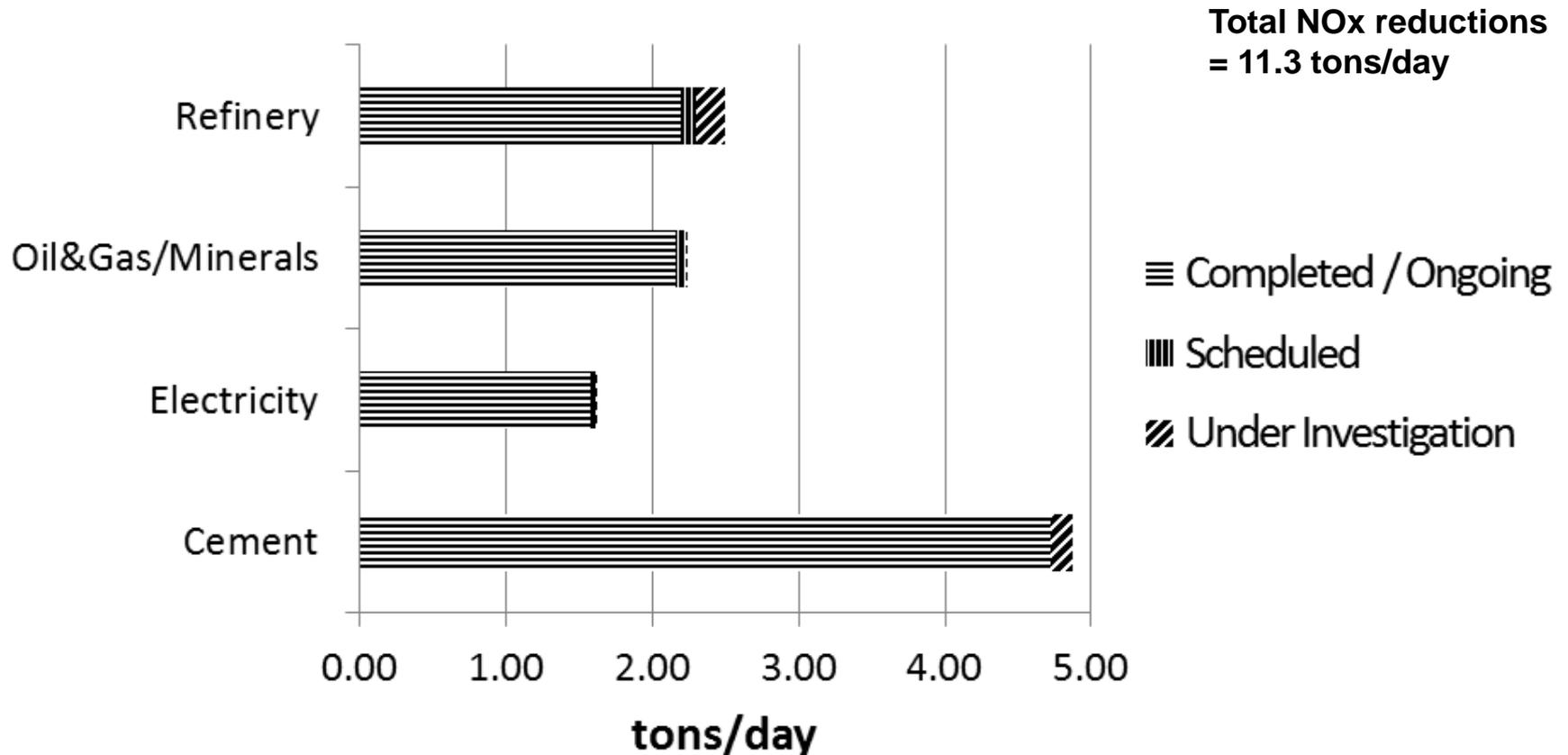
PM Emission Reductions

Total PM10 reductions = 1.08 tons/day



# NOx Emission Reduction Co-Benefits Primarily Identified as Completed/On-going

NOx Emission Reductions

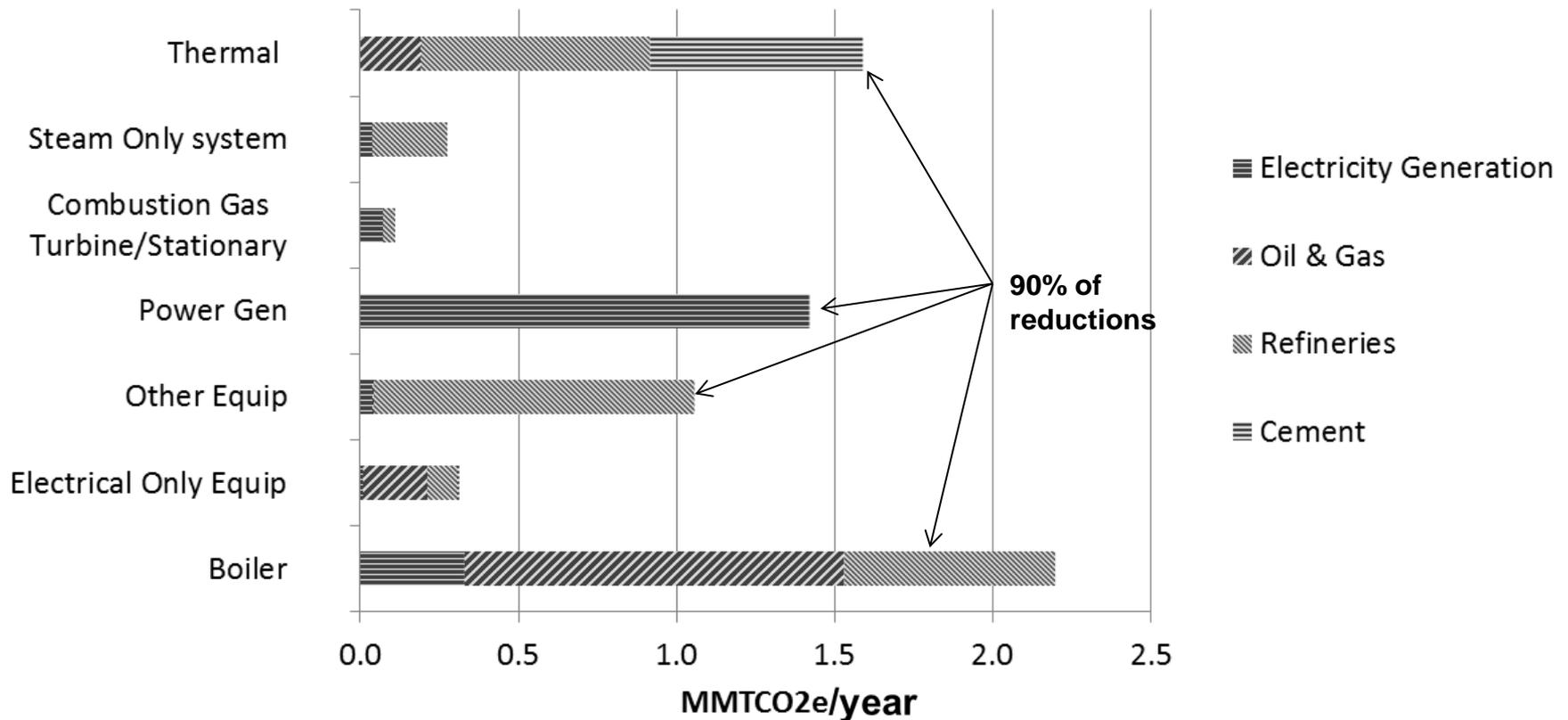


## Public Report Data

Equipment Category	Description of Types of Projects
Boilers	Projects associated with boilers and auxiliary equipment used for cogeneration, steam, and combined cycle plants
Electrical Only Equipment	Projects dealing with electric motors powering air compressors, HVAC equipment, refrigeration equipment, pumps, fans, and other types of electric equipment
Other Equipment	Projects that did not fall into another category including auxiliary equipment, plant control systems, and facility-wide projects and flare systems
Combustion Gas Turbine/ Stationary	Projects involving stationary gas turbines and other stationary engines
Steam Only System	Projects dealing with steam motors powering air compressors, fans, or pumps, steam turbines, and steam traps
Thermal Equipment	Projects dealing with furnaces and heat exchangers
Power Generation	Projects dealing with repowering generation units, and power generation unit related issues.

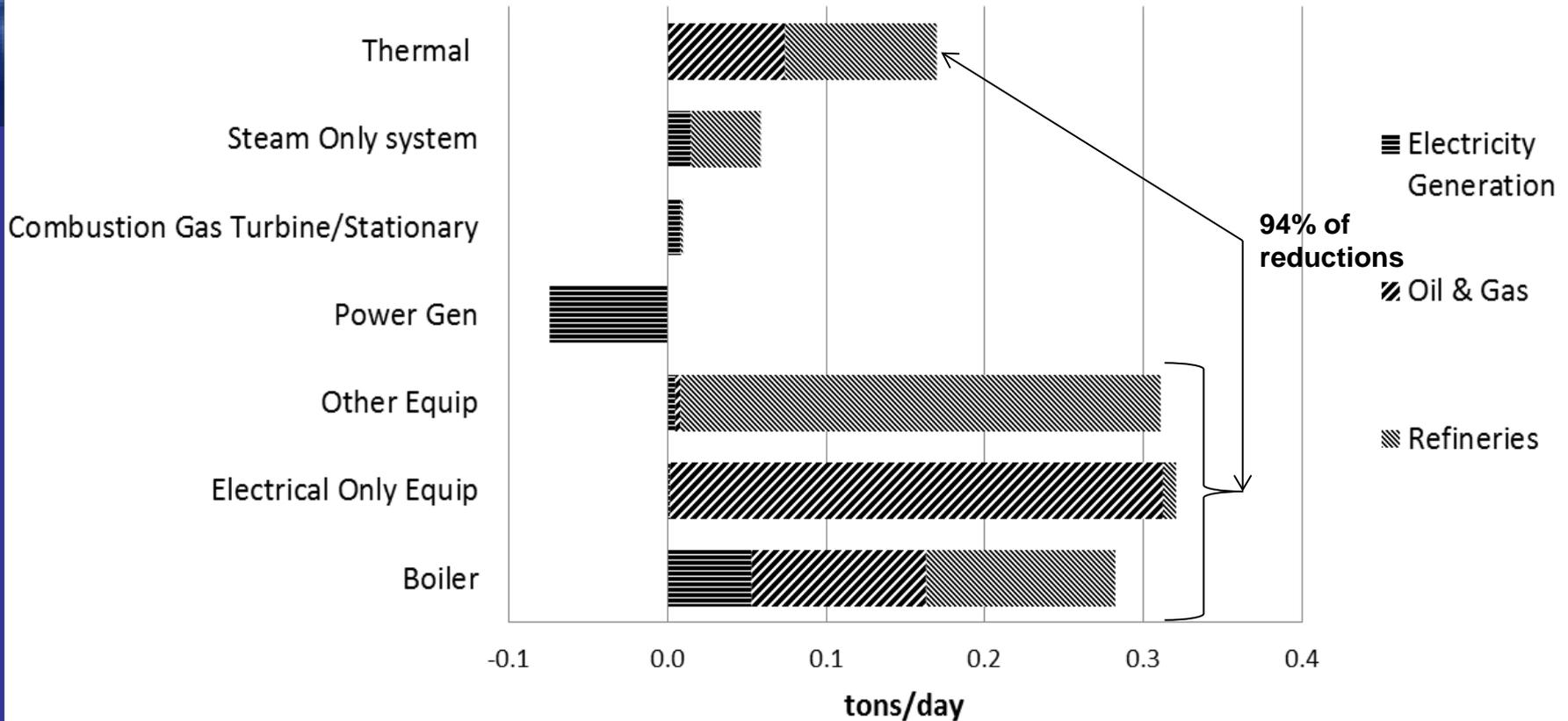
# Boilers, Thermal, Other Equipment, and Power Generation Account for 90 Percent of GHG Emissions Reductions

GHG Emissions by Equipment



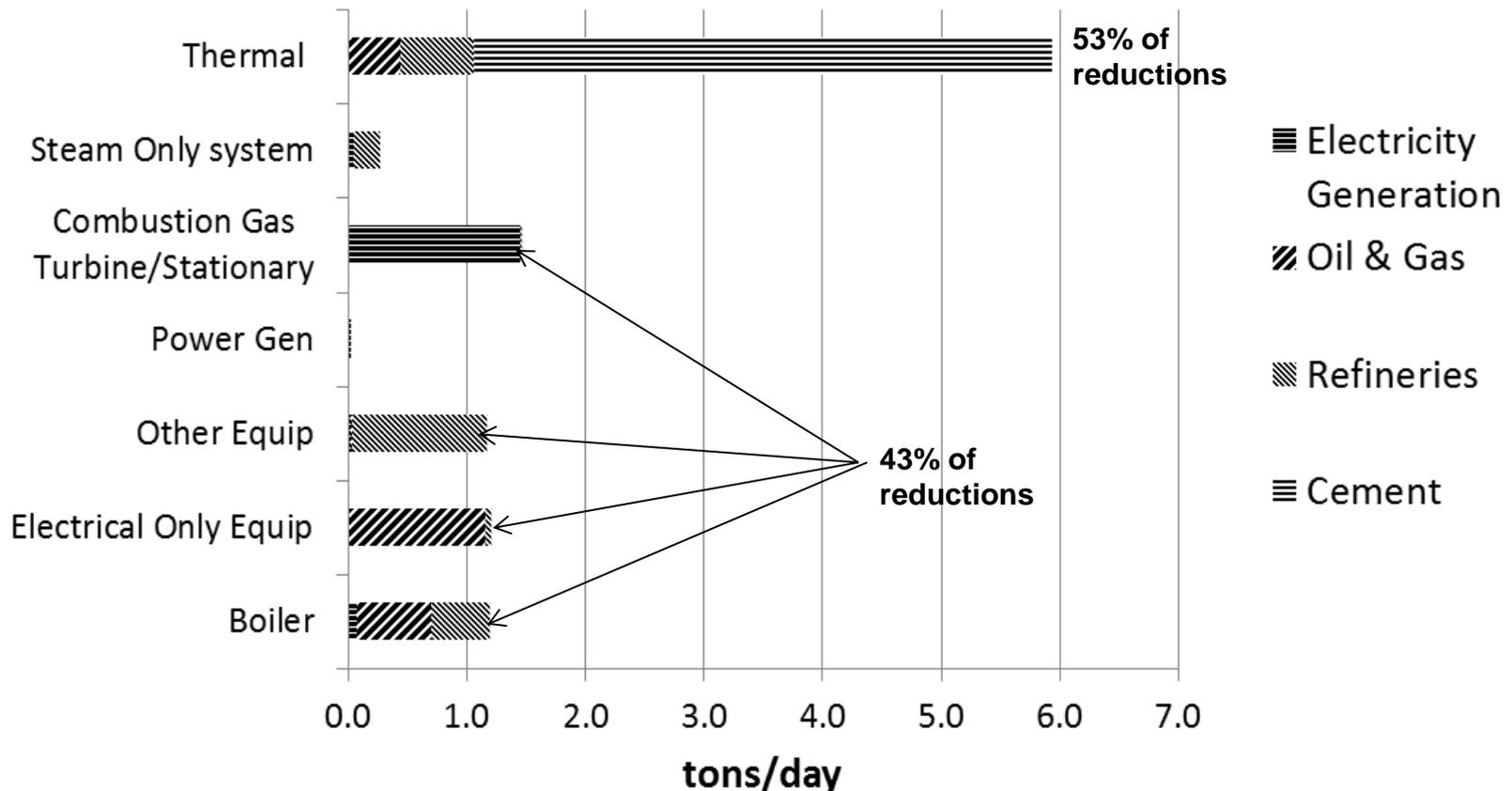
# Boilers, Thermal, Electrical, and Other Equipment Account for Over 90 Percent PM10 Emissions Reduction Co-Benefits

PM10 Emission Reductions by Equipment



# Thermal Equipment Accounts for More than 50 Percent of NOx Reduction Co-Benefits

## NOx Emission Reductions by Equipment



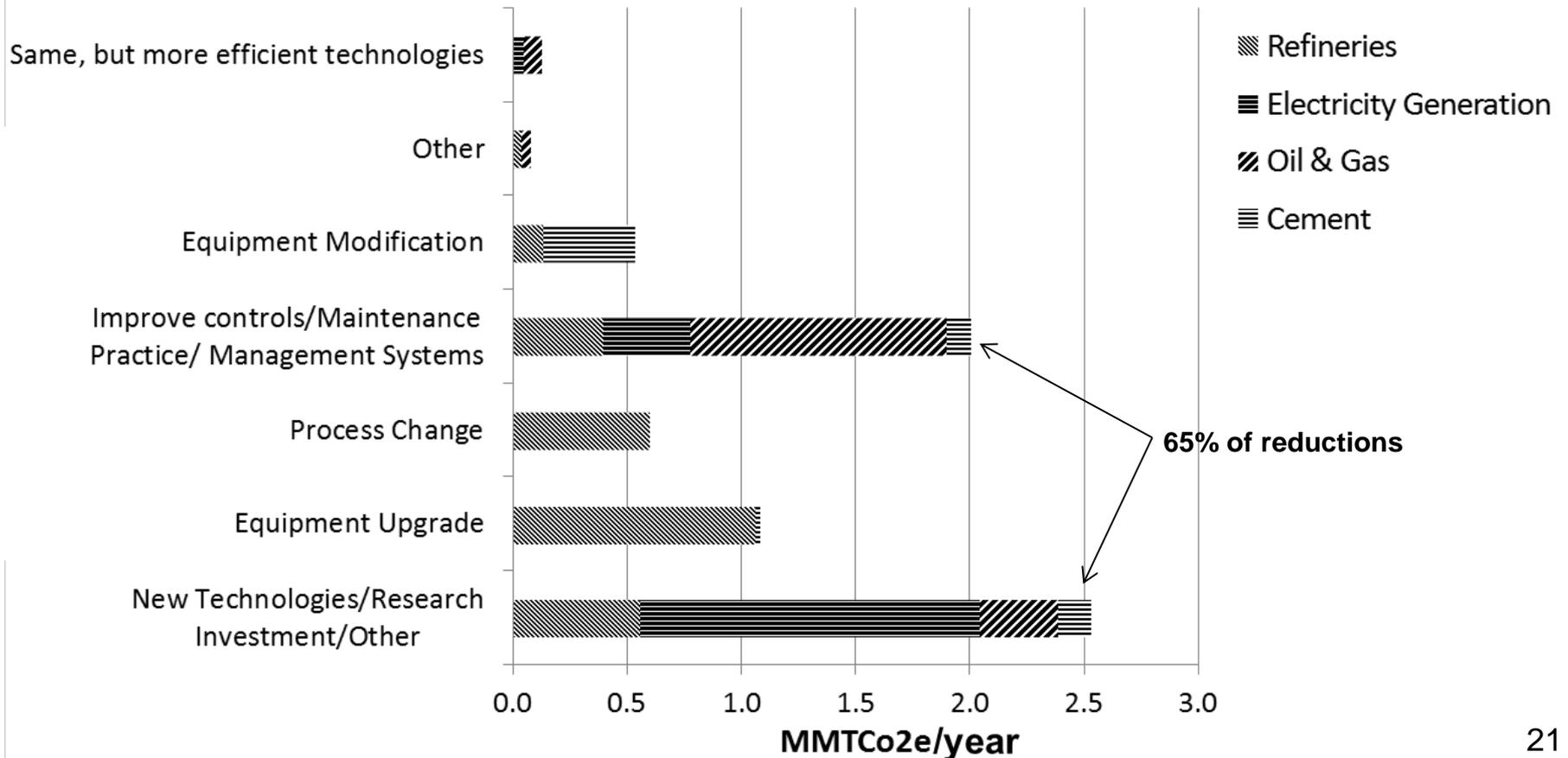
# Projects Categorized by Energy Efficiency Improvement Method

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- ◆ Equipment modification
- ◆ Equipment upgrade
- ◆ New technologies
- ◆ Process change
- ◆ Improve controls
- ◆ Maintenance practices
- ◆ Management systems
- ◆ Research investment
- ◆ Same, but more efficient technologies
- ◆ Other

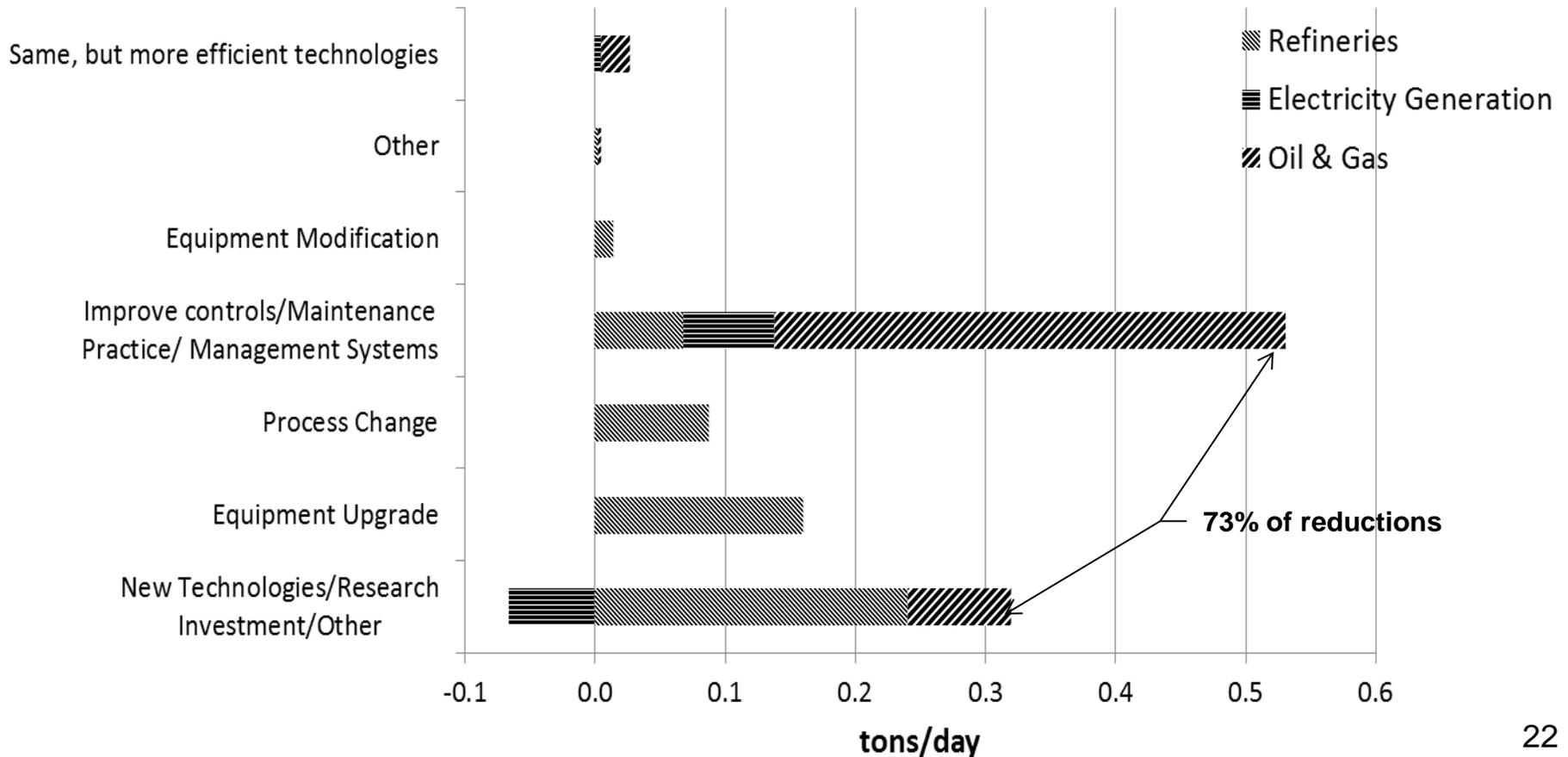
# Optimizing Operations and New and Emerging Technologies Account for Majority of Annual GHG Emission Reductions

GHG Emission Reductions by Efficiency Improvement Method



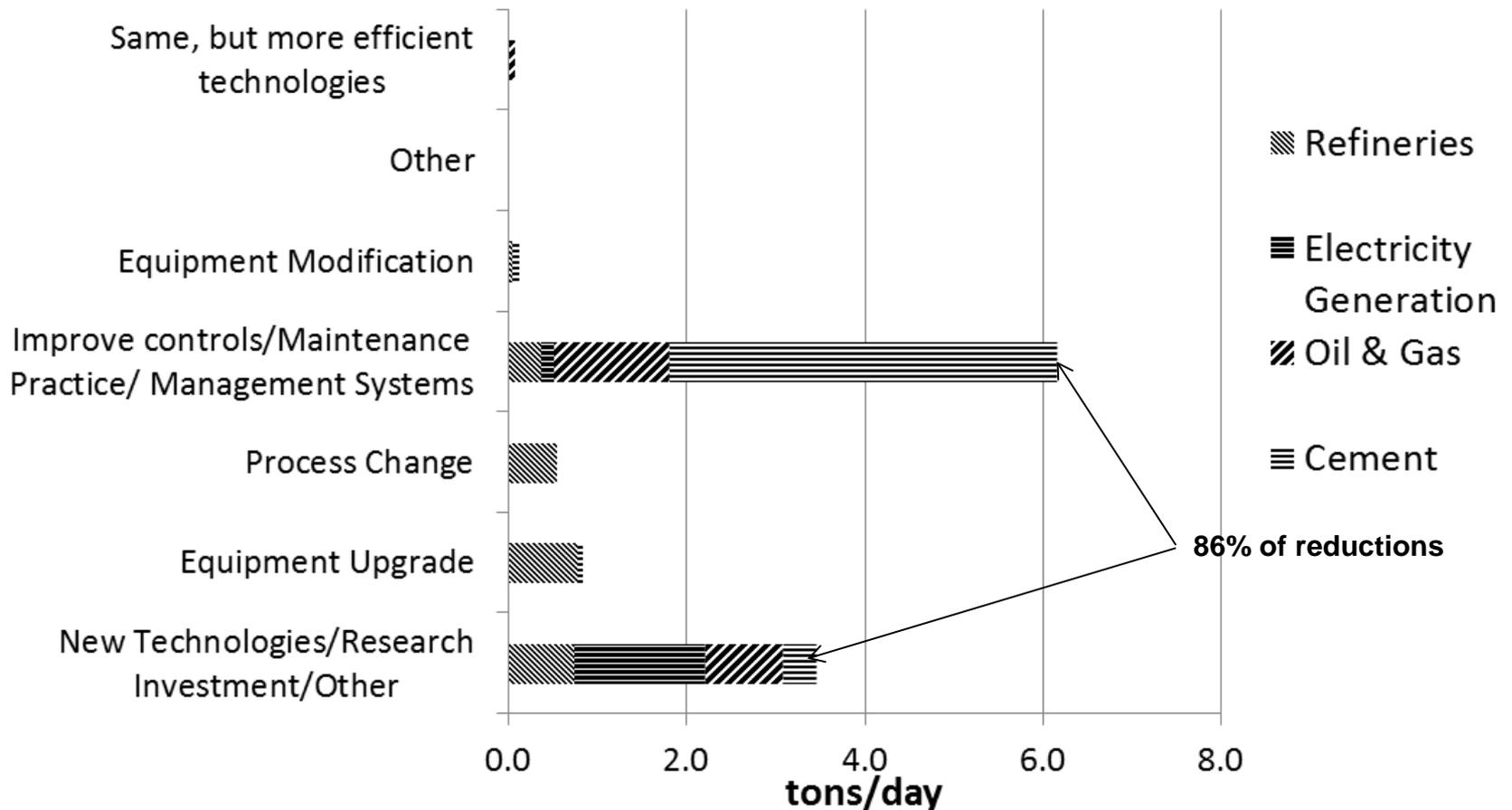
# Optimizing Operations and New and Emerging Technologies Account for Over 70 Percent of PM10 Emission Reduction Co-Benefits

PM10 Emission Reductions by Efficiency Improvement Method



# Optimizing Operations and New and Emerging Technologies Account for Over 85 Percent of NOx Emissions Reduction Co-Benefits

### NOx Emission Reductions by Efficiency Improvement Method



# Most Effective Methods

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- Improve controls/maintenance practice/management systems:
  - ~30% of GHG emission reductions
  - ~50% of PM10 emission reductions
  - >50% of NOx emission reductions
- New technologies/research investment/other
  - ~35% of GHG emission reductions
  - ~25% of PM10 emission reductions
  - ~30% of NOx emission reductions

# Third-Party Review



# Third-party Review: Industrial Assessment Center of SFSU

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- ◆ Reviewed 9 of 43 facility reports
- ◆ Obtained additional background data to facilitate review
- ◆ Conducted site visits
- ◆ Submitted third-party review reports to ARB
  - contain data not aggregated consistent with public disclosure requirements under CCR section 95610

# Third-Party Review

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## ◆ Refinery Sector

- Three reports reviewed:
  - Valero Benicia
  - Tesoro Los Angeles
  - Chevron Richmond
- Reviewed 41 of 133 total projects

## ◆ Electricity generation sector

- Two reports reviewed:
  - Los Angeles Department of Water and Power (LADWP)  
Scattergood
  - Midway Sunset Cogeneration Company (MSCC)
- 22 projects reviewed

# Third-Party Review

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- ◆ Oil & gas production/minerals sector
  - Two reports reviewed:
    - Aera Energy LLC Belridge
    - Aera Energy LLC Moco
  - Reviewed 31 projects
- ◆ Cement plant sector
  - One report reviewed:
    - CalPortland Mojave
  - Reviewed 17 projects

# Third-Party Review

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- ◆ Hydrogen plant sector
  - One report reviewed:
    - Air Liquide El Segundo
  - Reviewed 6 projects



# Third-Party Review Findings

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- ◆ General conclusions:
  - Projects are reasonable and understandable
  - Assumptions and calculation methods are appropriate
- ◆ If errors detected, corrections were requested and made if agreed upon
- ◆ A few project analyses were noted as containing a high degree of uncertainty
- ◆ Refinery reports lauded as indicating a thorough effort
- ◆ More specific details to be included in ARB Findings Report

# Summary and Next Steps

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- ◆ Identified projects that produce the greatest reductions require facilities to:
  - Optimize process/equipment operations via:
    - Controls
    - Maintenance practices
    - Management systems
  - Evaluate new and emerging technologies
- ◆ Next steps - develop ARB Findings Report
  - Comprehensive review of reported data
  - Include specific third-party review conclusions

# Contacts

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