

# DOE Industrial Technologies Program



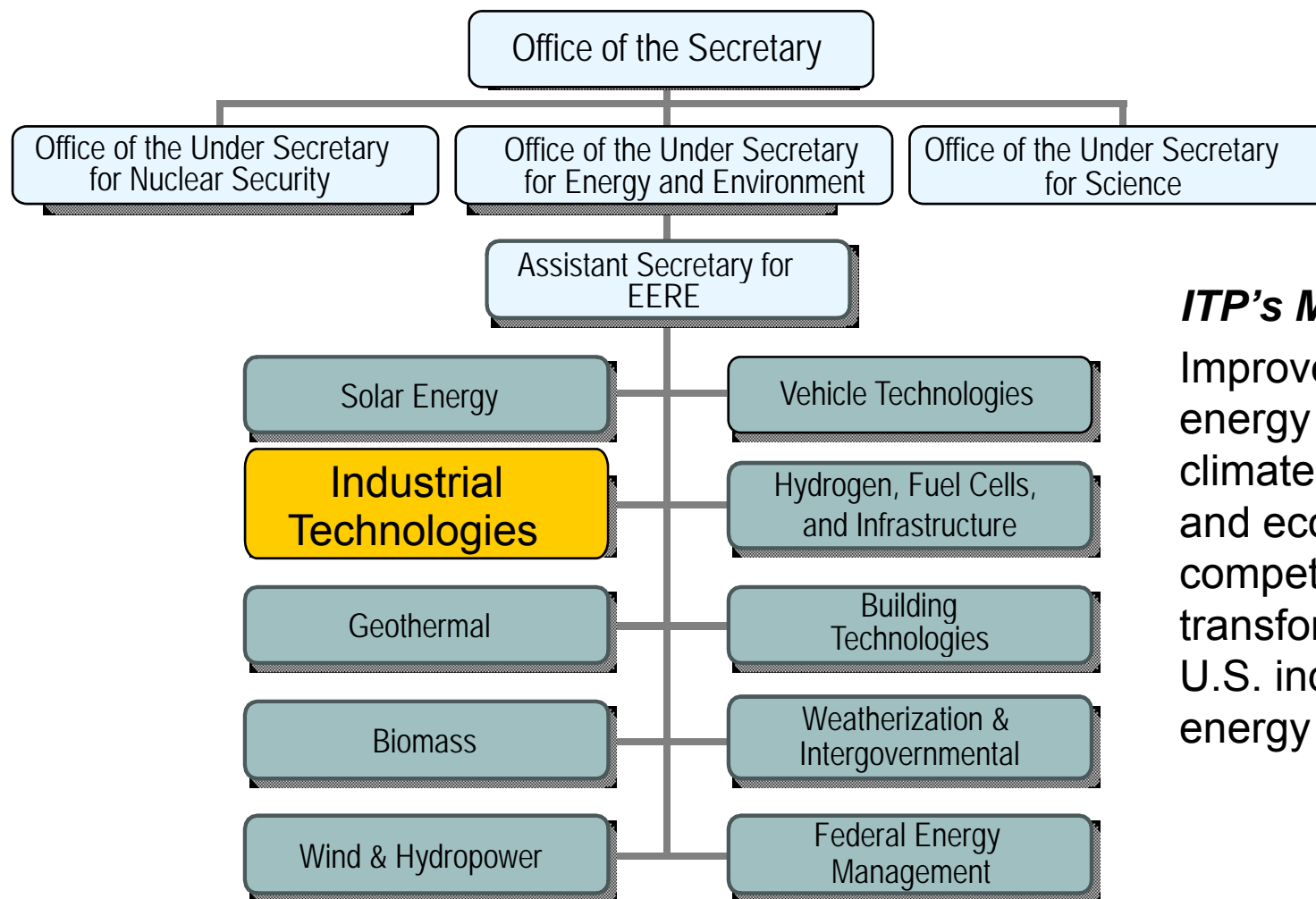
## Cement Opportunity: *Energy and Carbon*

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# Industrial Technologies Program in DOE



## ***ITP's Mission:***

Improve national energy security, climate, environment, and economic competitiveness by transforming the way U.S. industry uses energy

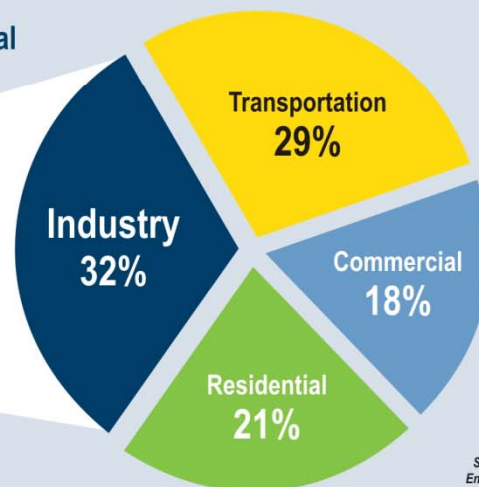


# Industry Consumes 1/3 of Energy in U.S.

Reducing U.S. industrial energy intensity is essential to achieving national energy and carbon goals

Petroleum	38.3%
Natural Gas	32.2%
Electricity*	13.8%
Coal and Coke	7.6%
Renewable Energy	8.0%

\* Excludes losses



Source: EIA Annual Energy Review 2007.

## ITP Objectives

- Reduce industrial energy intensity 25% in 10 years
- Contribute to 2050 goal of 80% reduction in GHG emissions from 2005 levels
- Establish the U.S. as the global leader in energy management

In addition to being the largest energy-using economic sector, U.S. industry...

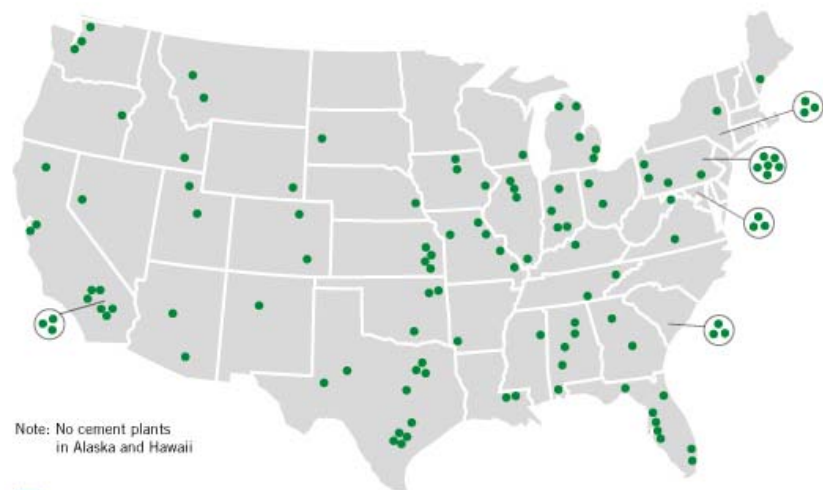
- Has >200,000 sites
- Spurs job creation and investment
- Produces nearly 1/4 of world manufacturing output
- Produces \$6+ trillion in goods; \$1 trillion in exports
- Is responsible for ~1,660 MMTCO<sub>2</sub> per year from energy consumption
- Makes the highest contribution to U.S. GDP (12% from manufacturing alone)



# U.S. Cement Industry

- Globally, the United States ranks 3<sup>rd</sup> in cement production.
  - Just behind India and China—the world's leading producer.
- Cement is a small but significant component of the U.S. economy.
  - 39 companies operate 115 cement plants in 36 states.

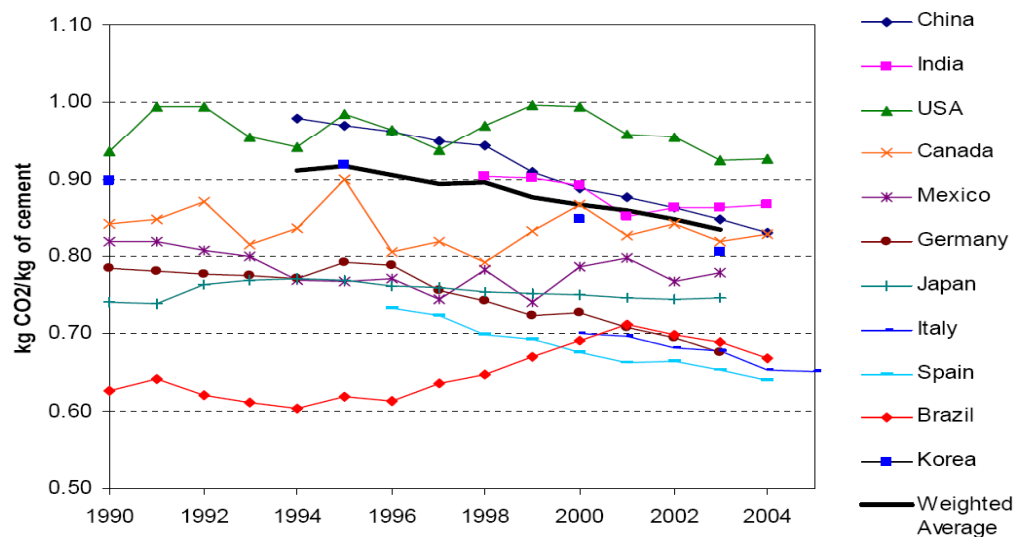
## Location of U.S. Cement Plants



Note: No cement plants in Alaska and Hawaii

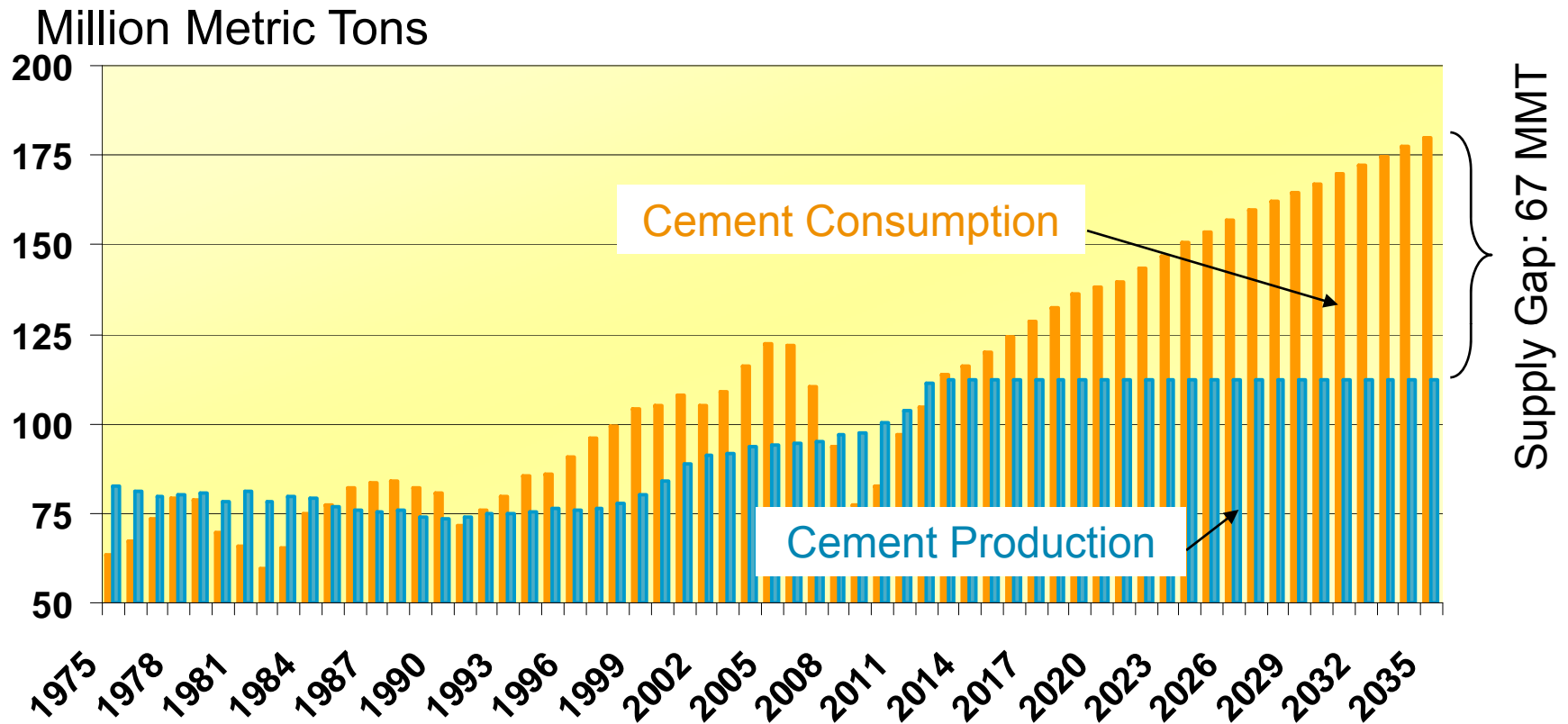
Source: The Portland Cement Association (PCA)

## Carbon Emissions per kg Cement



Source: Cecilia Tam, IEA: Tracking Industrial Energy Efficiency and CO<sub>2</sub> Emissions

# U.S. Cement Production and Consumption



Source: PCA Cement Outlook: 2009-2030 Ed Sullivan IEEE Conference 2009

Roles of energy efficiency upgrades & investments in revolutionary technologies?

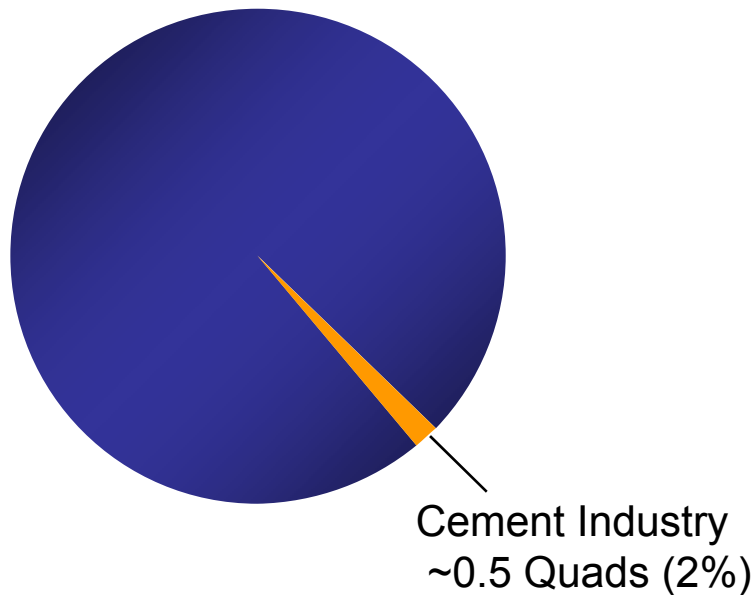
- Help close the 67 MMT supply gap
- Lead to long term job creation and long term economic benefit for the U.S.
- Help meet national climate change goals

# Cement Industry Share of U.S Energy Use and CO<sub>2</sub> Emissions, 2005



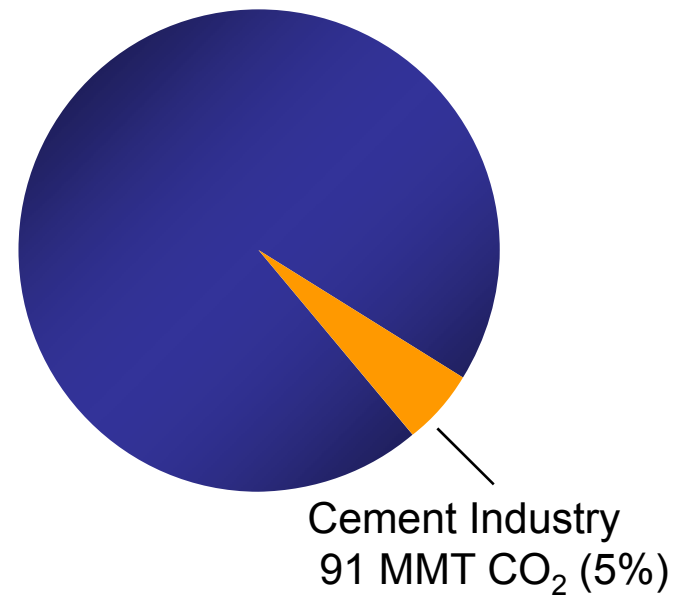
Total Industrial Energy Use

32.5 Quads



Total Industrial CO<sub>2</sub> Emissions  
(Combustion and Non-Combustion)

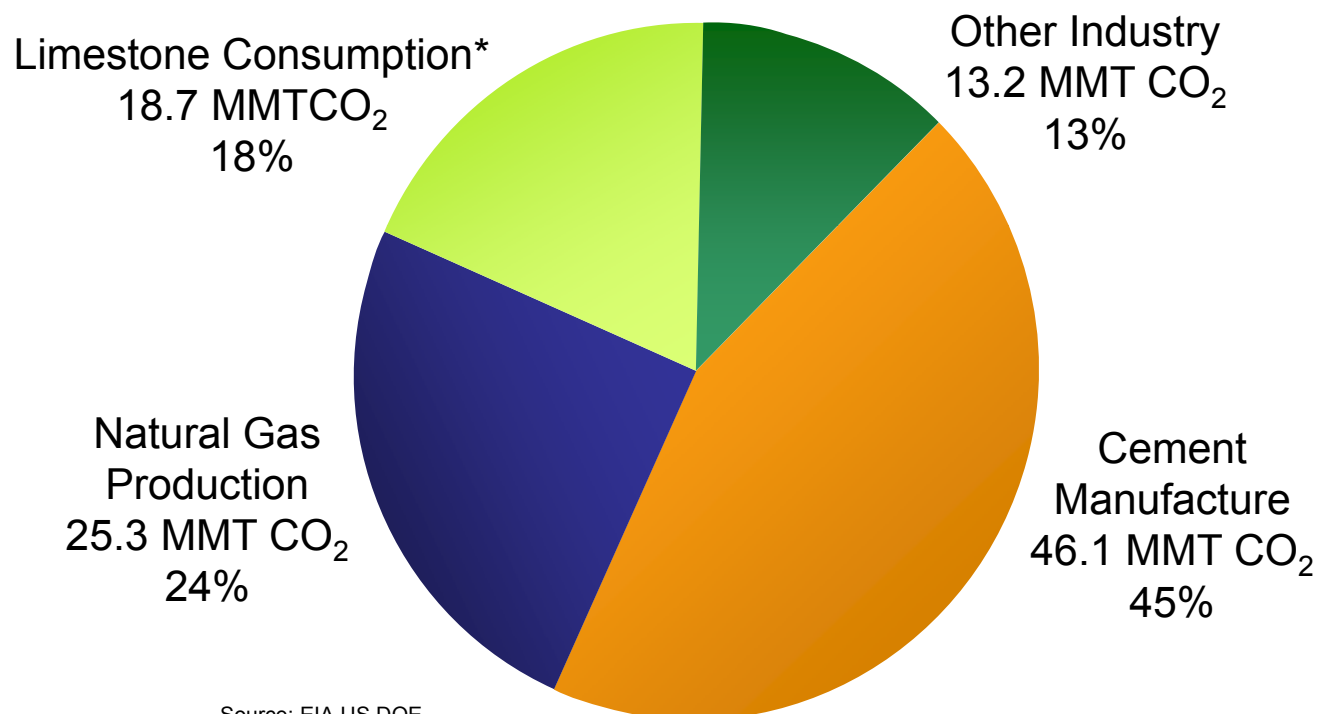
1,776 MMT CO<sub>2</sub>





# U.S. Cement Manufacturing Is a Major Contributor to Non-Combustion CO<sub>2</sub> Emissions

2005 Total: 103.3 MMT CO<sub>2</sub>

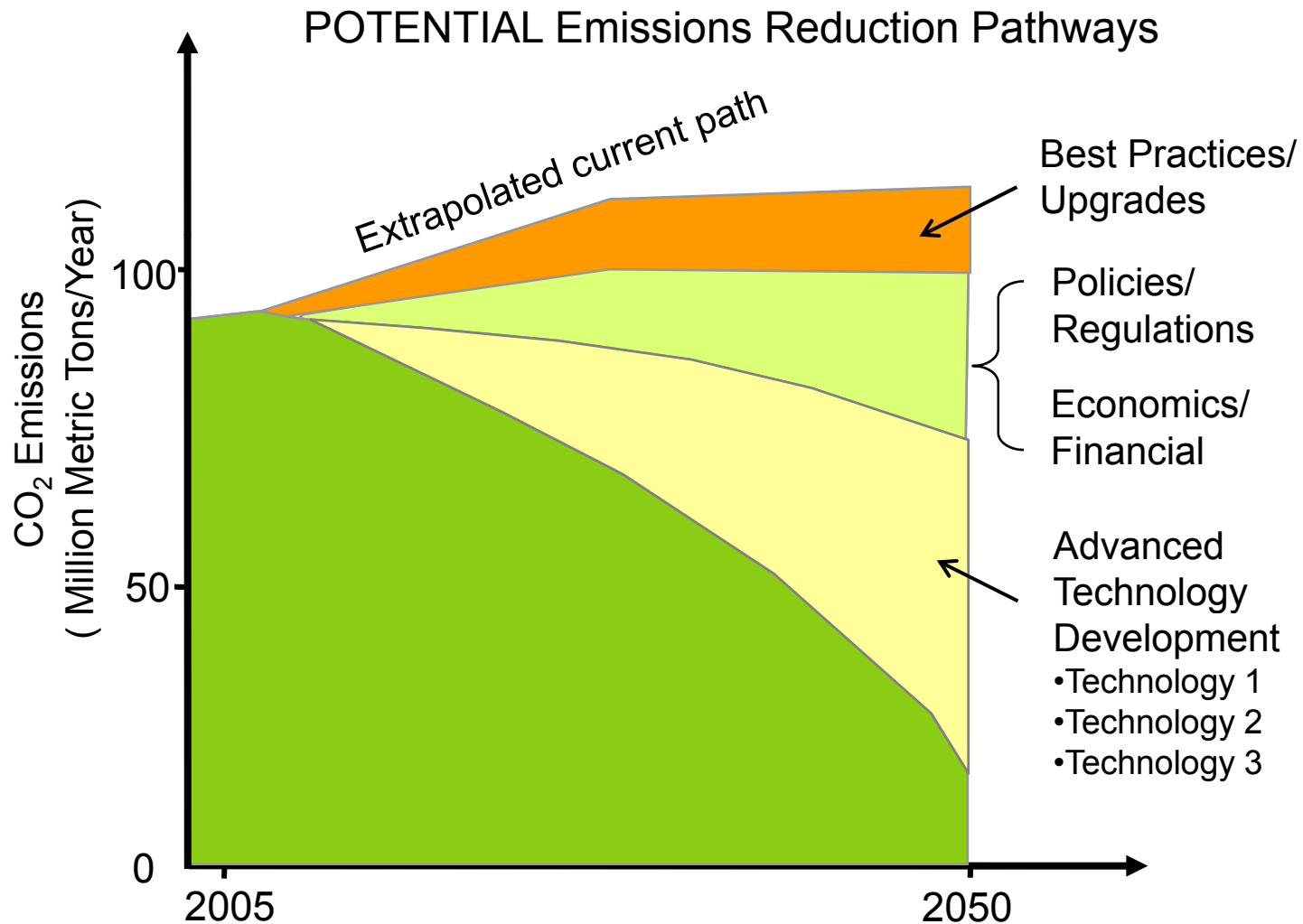


Source: EIA US DOE

Other than fossil fuel combustion, cement manufacture is the largest source of U.S. CO<sub>2</sub> emissions.

\* Limestone consumption is an EIA term that includes lime manufacture, iron smelting, steelmaking, copper refining, glass manufacture, flue gas desulfurization, and dolomite manufacture.

# Options to Improve Energy Efficiency & Reduce CO<sub>2</sub> Emissions in U.S. Cement Manufacturing





# Workshop Goals and Objectives

Identify options and pathways to meet long term energy and climate goals.

- Best practices implementation
- Policy impacts, issues, and opportunities
- R&D that lead to significant reductions in CO<sub>2</sub> emissions

