

# Preliminary AEO2014 Macroeconomic Industrial Results



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Macro-Industrial Working Group

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*Macroeconomic Analysis Team*

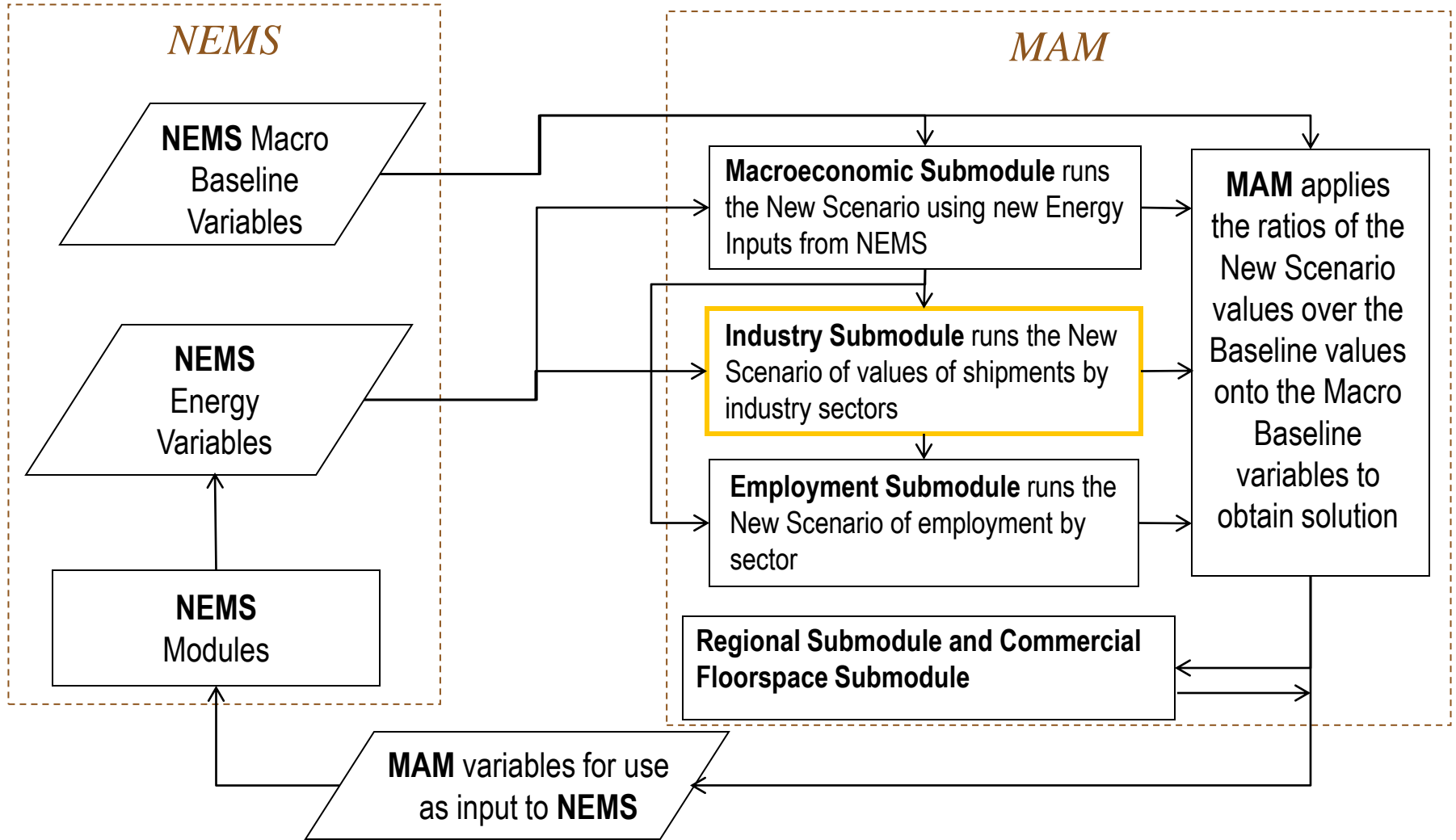
*September 26, 2013*

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# Overview

- Preliminary *AEO2014* industrial macroeconomic results; runs as of Sept. 23, 2013.
- Macroeconomic results are inputs for a variety of NEMS modules, and cover:
  - Overall economy (for example GDP, interest rates, exports, etc.)
  - Sectoral detail (for example output of goods and services, employment, etc.)
- Reference Case with the Global Insights' (GI) May Long-term Trend forecast and this year's Industrial IO changes, largest impact being:
  - Construction
  - Bulk chemicals

# Macroeconomic Modeling in NEMS



# National macroeconomic model

- Uses Global Insight's macroeconomic model, whose forecast horizon matches NEMS
- **Keynesian** model capturing short-run cyclical developments with long-run equilibrium as specified by production function
- Model of output, prices and financial conditions allows depiction of both monetary and fiscal policies.
- The level of inflation-adjusted demand is driven by the price level, income, wealth, and financial conditions. Supply is keyed to a production function combining inputs of labor hours, energy, and capital stocks of business equipment, structures and government infrastructure.
- **Major drivers:** total factor productivity, labor supply, capital stock

# Industry Submodule: value of shipments by industry

- **Econometric** equations are run for the ratio of gross output (production) and demand computed from **Input-Output basis**
- **Major drivers:** capacity utilization, interest rates, relative prices, population, other macroeconomic variables like housing starts and medical spending, and a trend variable for technological changes
  - For energy-intensive manufacturing industries, industrial **energy prices** also determine their output
- For the energy industries (coal mining, oil & gas extraction, petroleum refining, electric and gas utilities), forecasts are **replaced** by production forecasts from other NEMS Modules

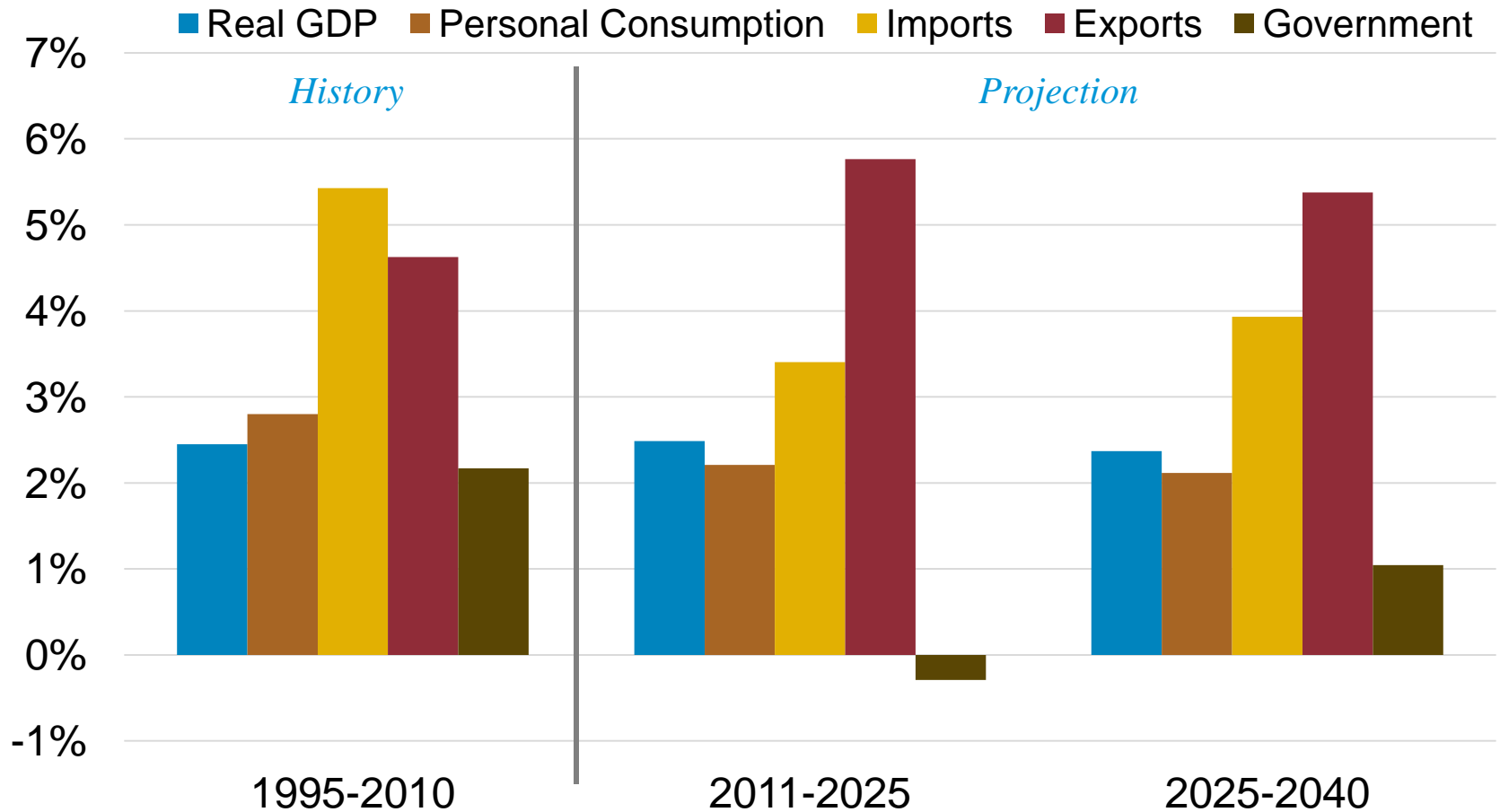
## Industries using NEMS energy prices in econometrics

NAICS Code	Industry	Price dependencies
3115	Food: Dairy	NG
322	Pulp & paper	Fuel Index
32511a9	Bulk chemicals: Organic	Feedstocks
32512t8	Bulk chemicals: Inorganic	NG
3252	Bulk chemicals: Resins	Feedstocks
3253	Bulk chemicals: Agriculture	NG
325o	Other chemicals	NG
326	Plastic products	Fuel Index
32731	Cement	Fuel Index
3311a2	Iron and steel	Fuel Index
3313	Aluminum	Electricity
331o	Other primary metals	Fuel Index
336	Transportation equipment	NG

*“Fuel Index” is a consumption weighted composite of all industrial energy prices*

# First half of projected growth driven by investment and exports; latter half more even amongst GDP Components

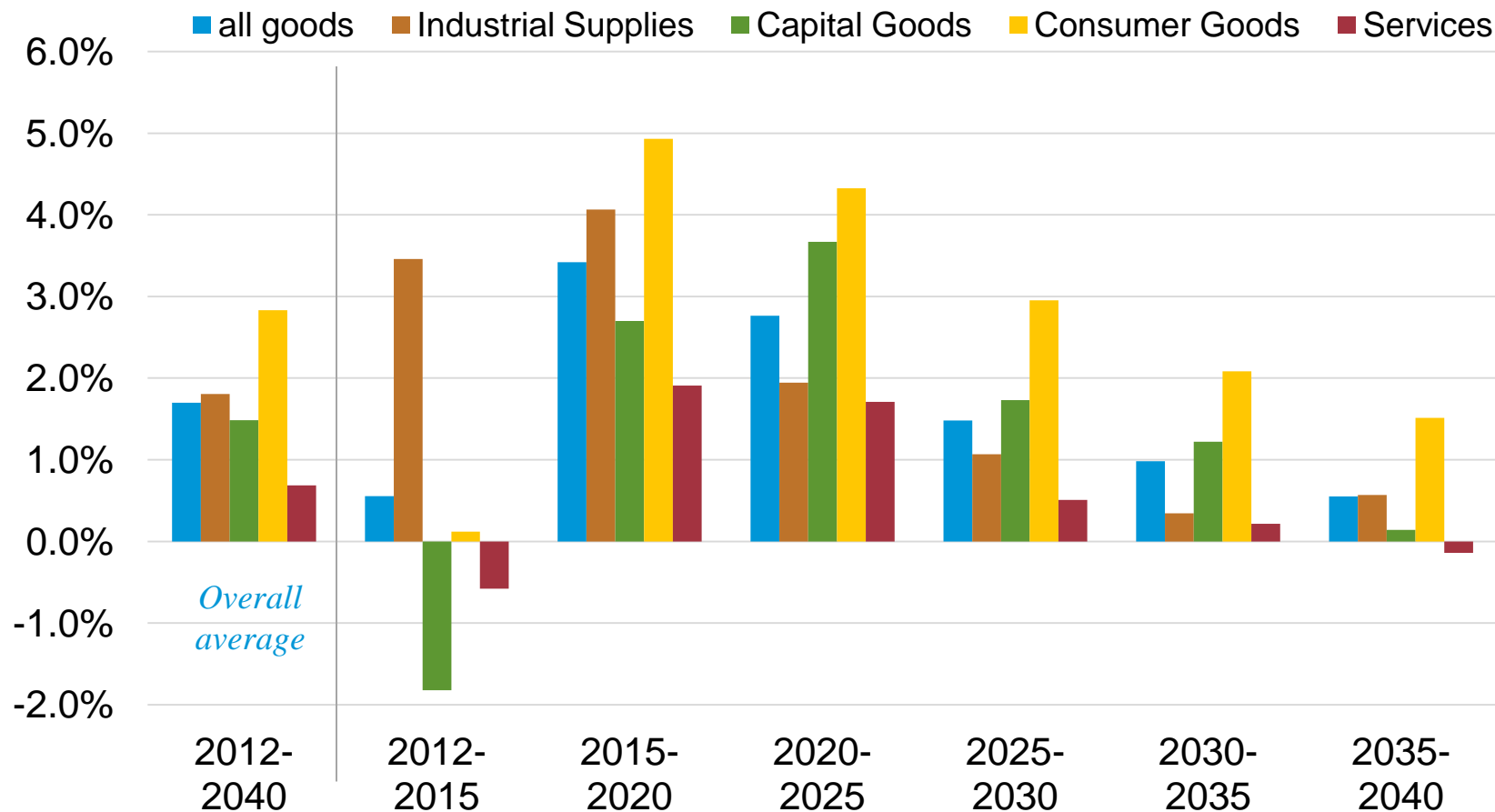
Average annual growth rate within period



Source: ref2014.d092013a

# Average growth rates of net exports by category show strong export impacts from industrial supplies early and consumer goods throughout

Net annual average growth rate

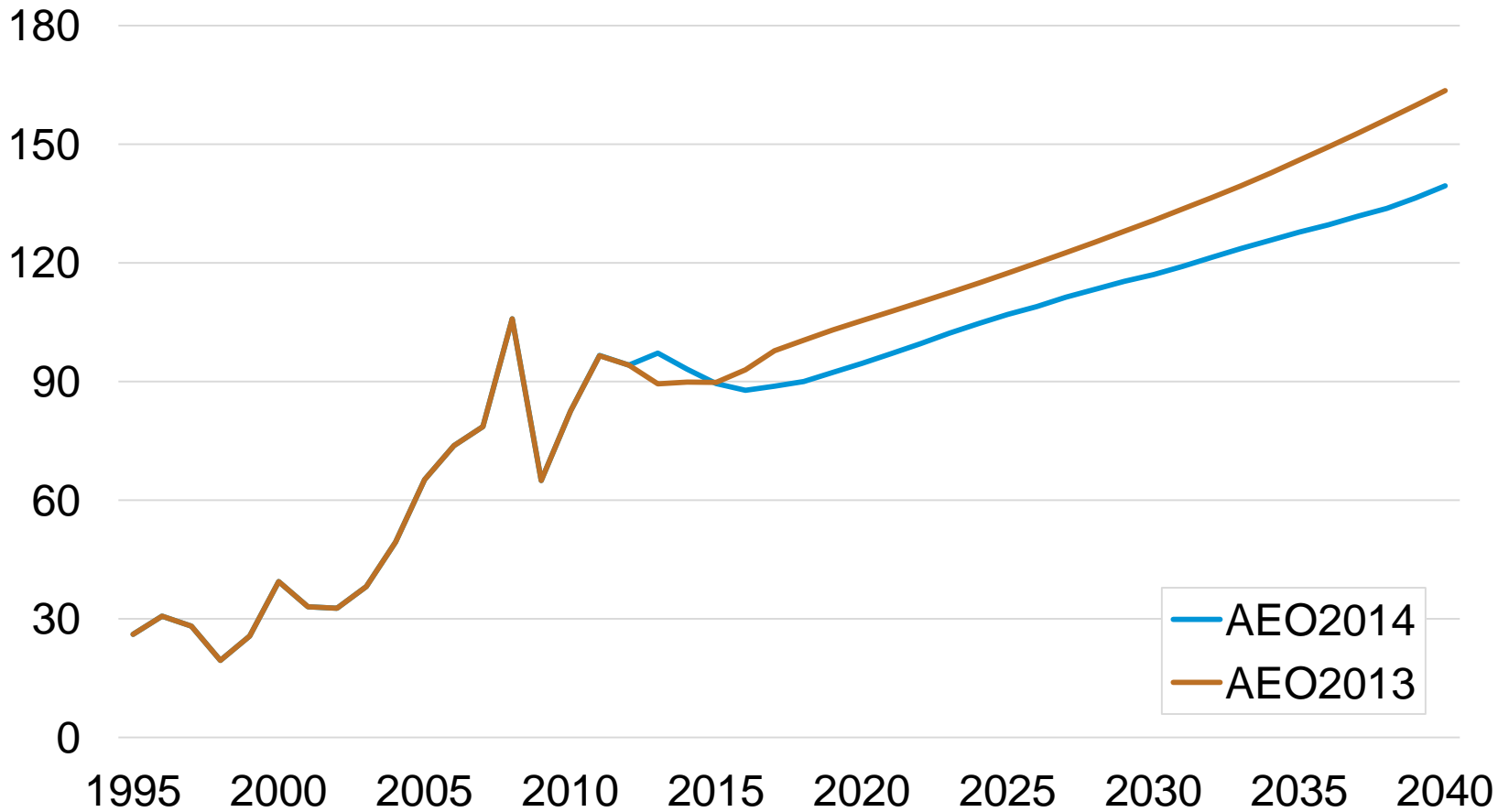


Source: ref2014.d092013a



# Oil price (WTI)

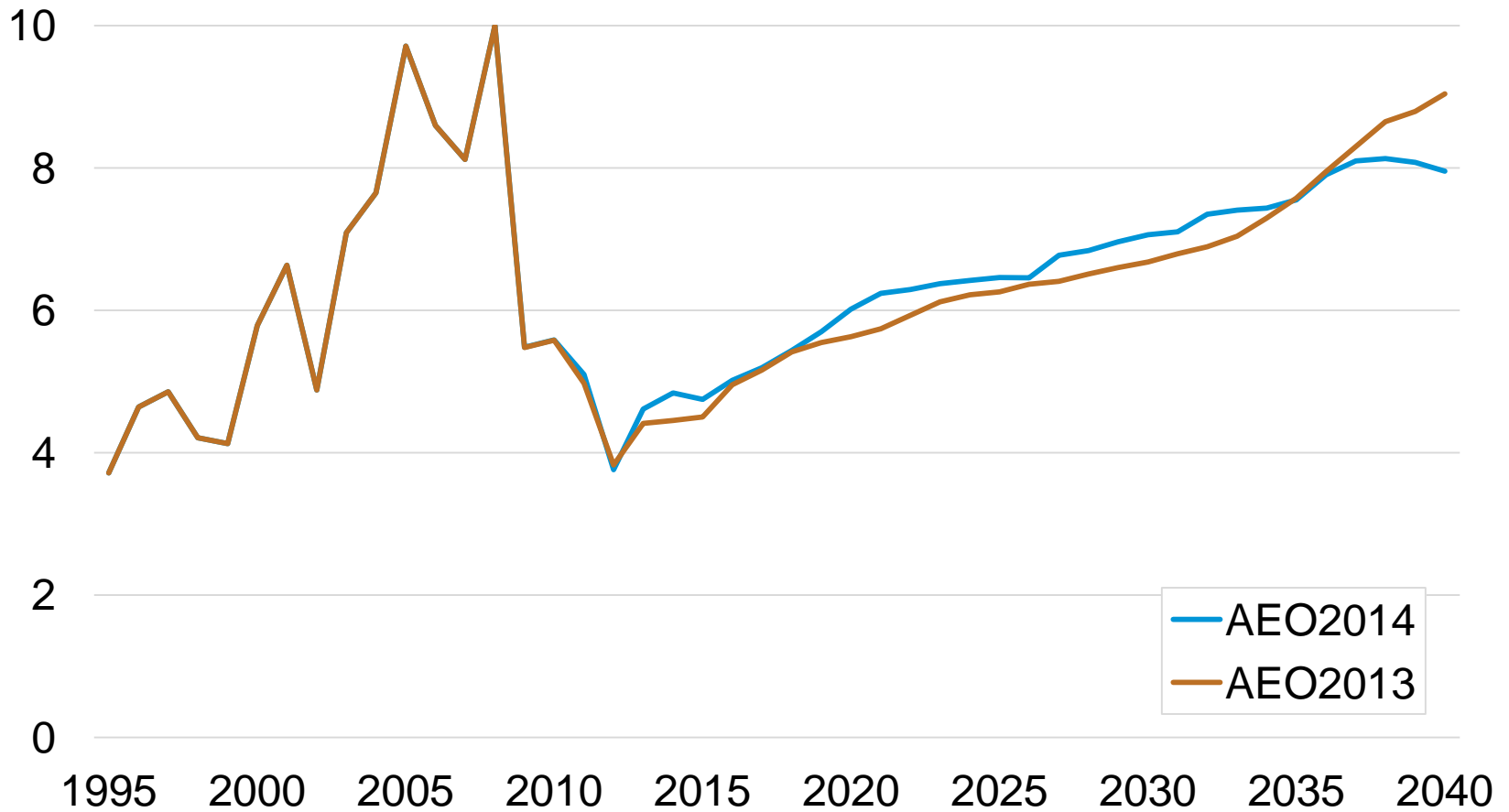
Real 2012 dollar per barrel



Source: ref2014.d092013a

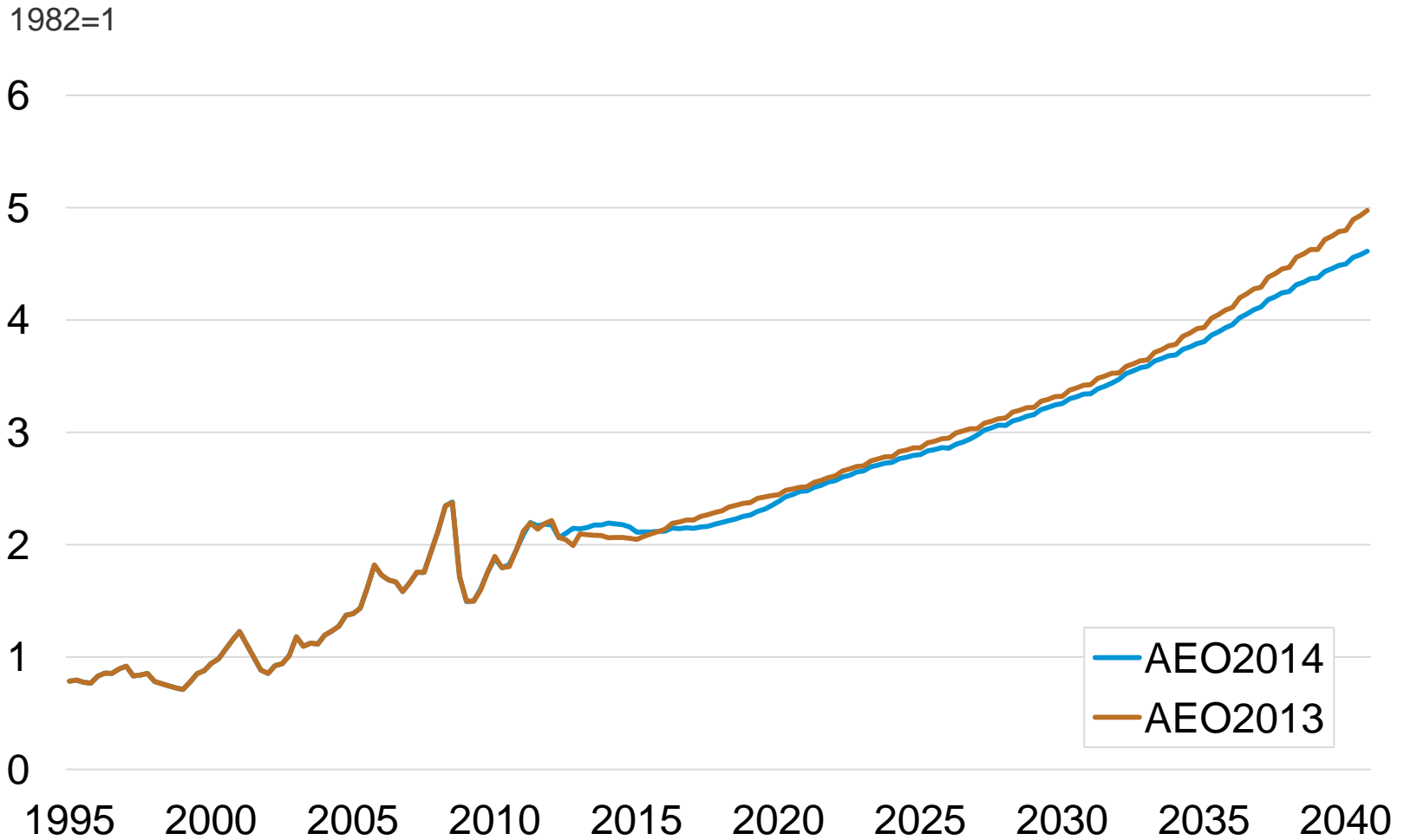
# Natural gas price

Real 2012 dollar per million BTU



Source: ref2014.d092013a

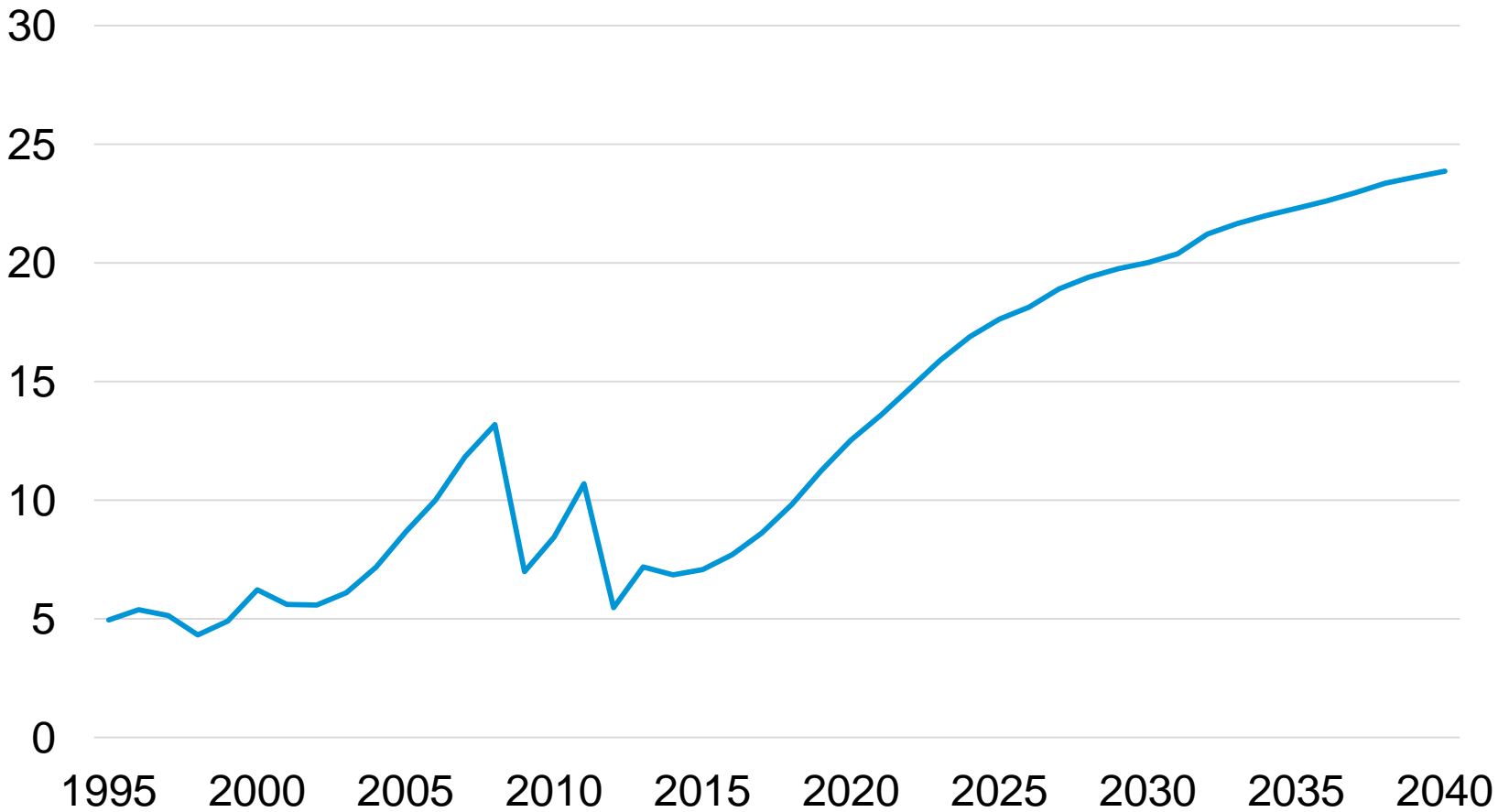
# Combined fuel price index



Source: ref2014.d092013a

# New ethane price

Real 2012 dollar per million BTU

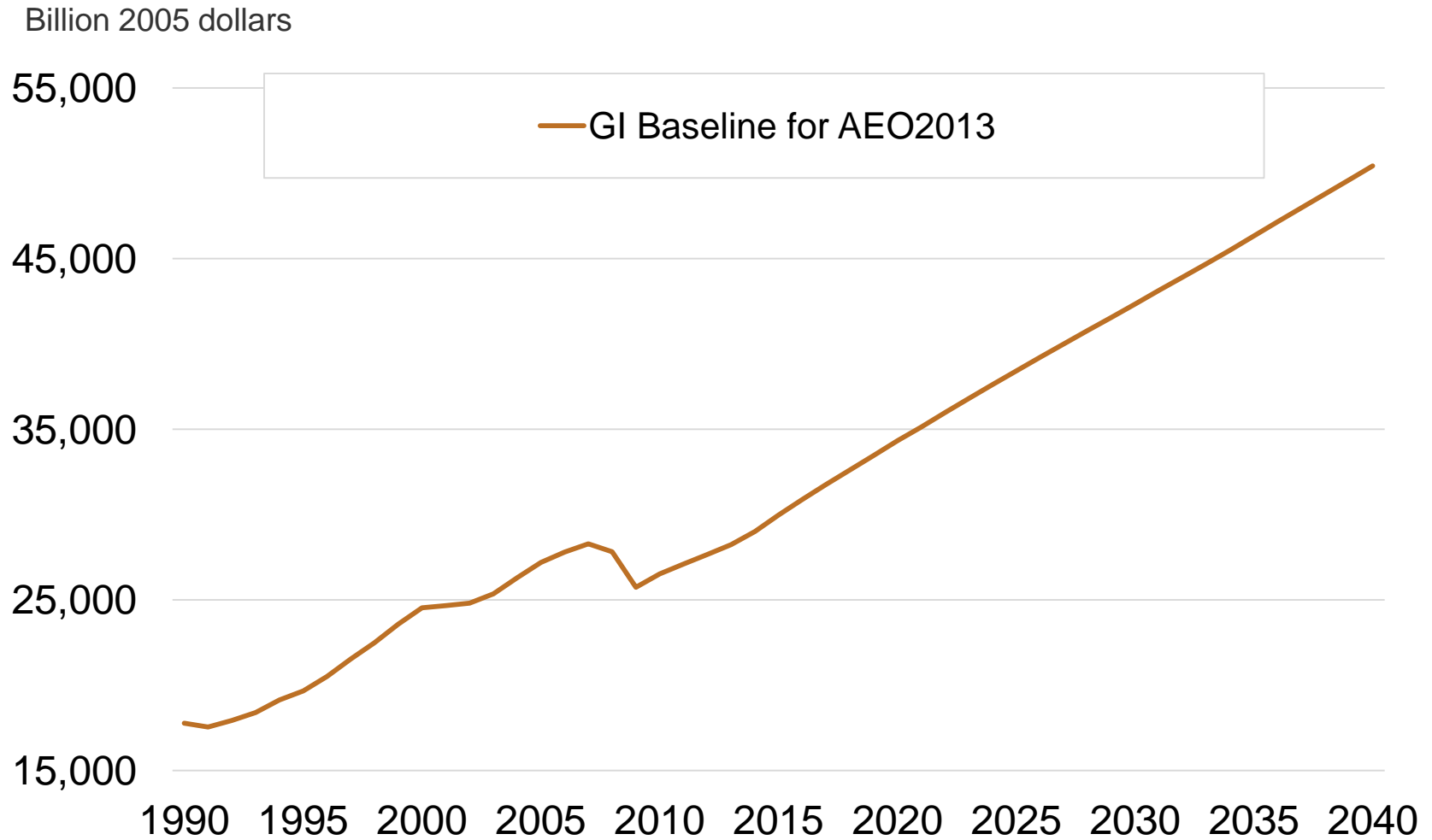


Source: ref2014.d092013a

# Initial industrial results consistent with new macro simulation

- Overall gross output growth is about 0.1 percent lower in AEO2014 runs compared to the AEO2013 projection, similar to the differential in GDP growth.
- **Composition** of industrial growth shifts, with manufacturing gaining share of gross output. By 2040, manufacturing is nearly 18 percent of gross output; in AEO2013 manufacturing share reached 16 percent.
- Consistent with slower growth in consumption, services growth is lower, especially retail trade and financial services.

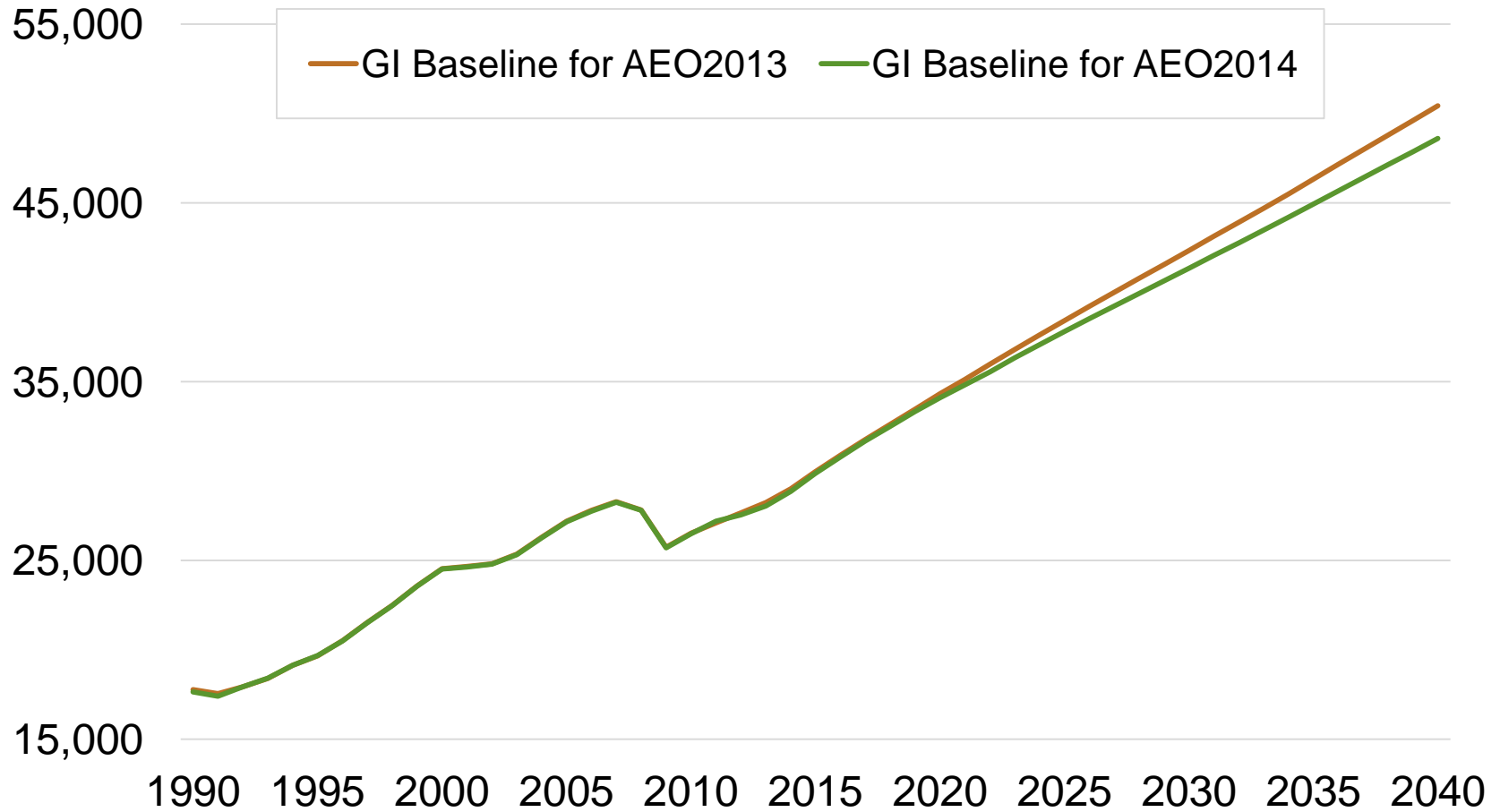
# Total output of goods and services



Source: ref2014.d092013a

# Total output of goods and services

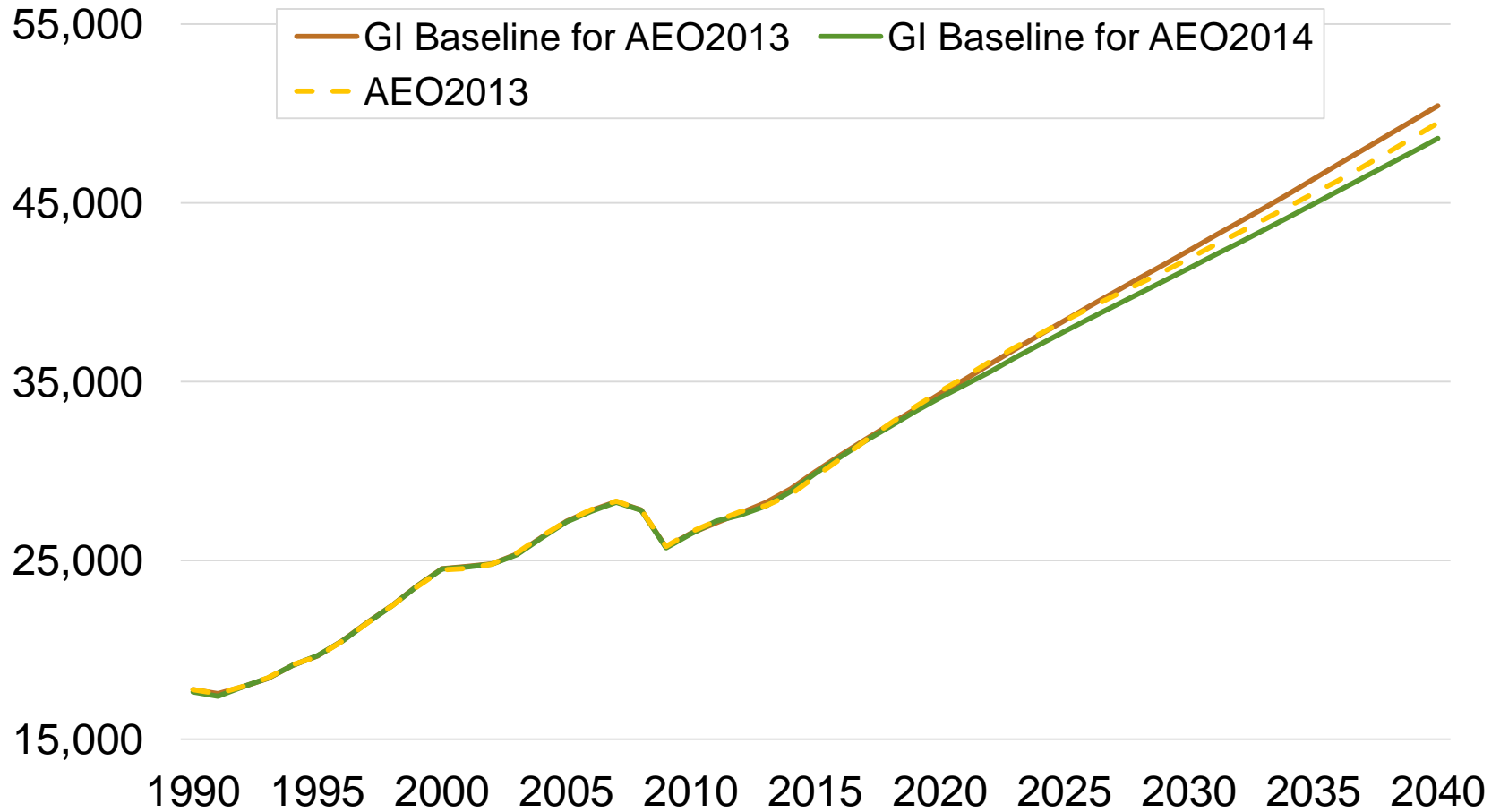
Billion 2005 dollars



Source: ref2014.d092013a

# Total output of goods and services

Billion 2005 dollars

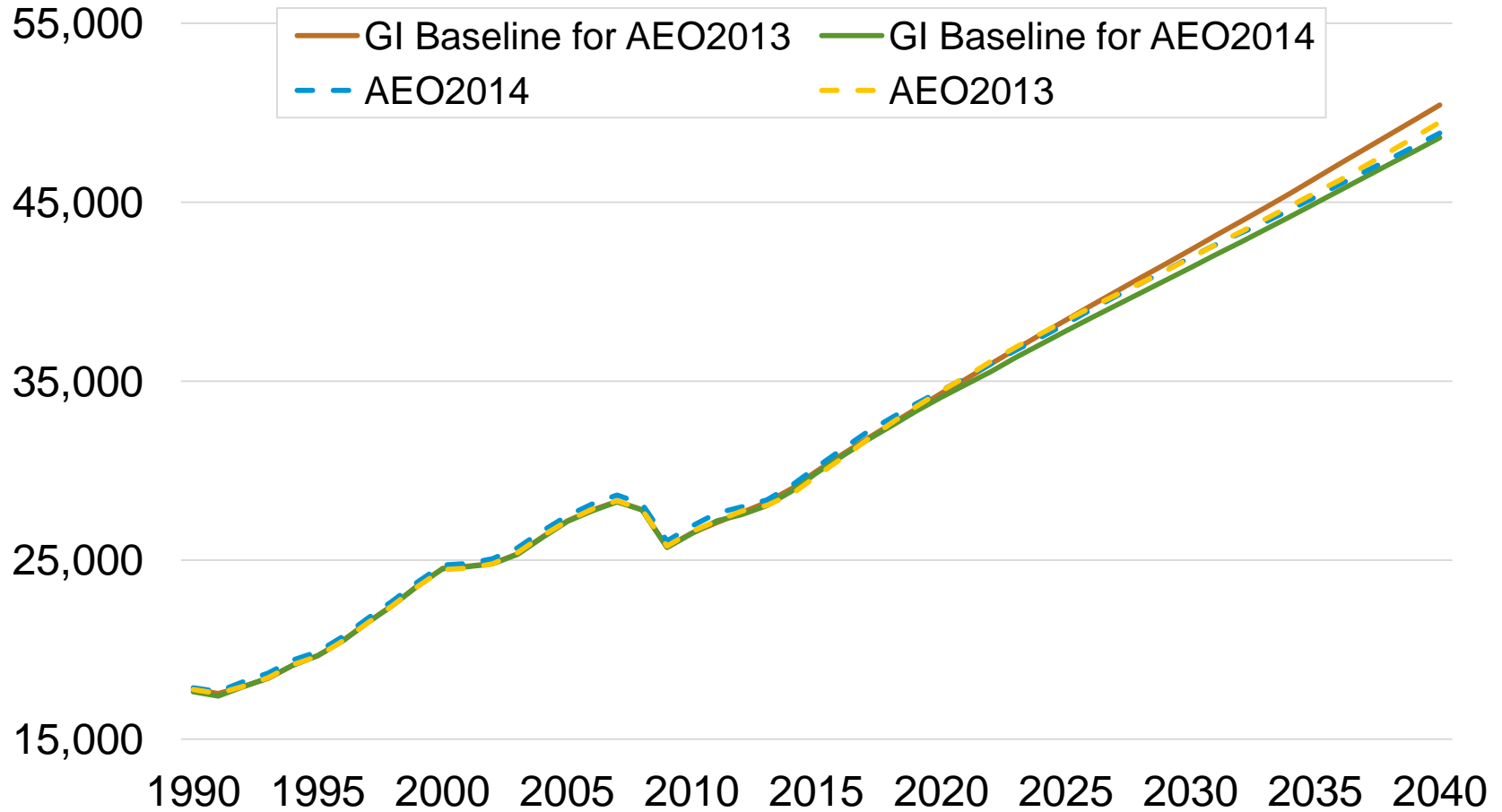


Source: ref2014.d092013a



# Total output of goods and services

Billion 2005 dollars



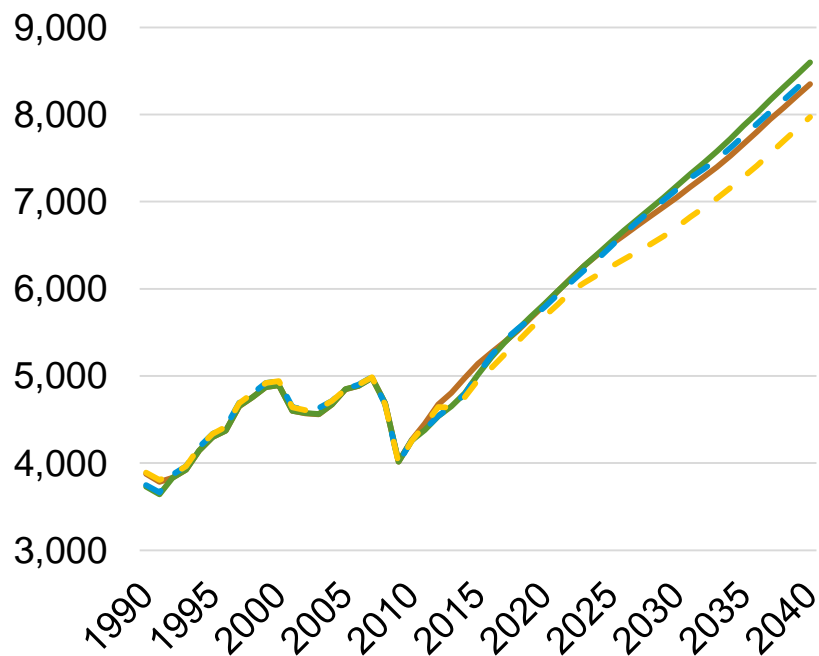
Source: ref2014.d092013a

# Sub-sector breakout

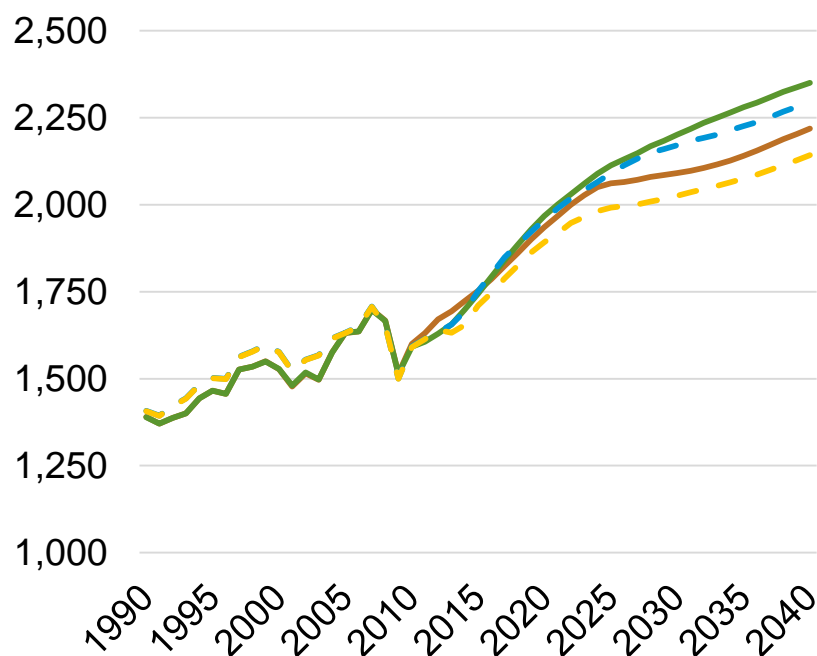
(billion 2005 dollar)

— GI Baseline for AEO2013    — GI Baseline for AEO2014  
- - AEO2014 Prelim    - - AEO2013

### Manufacturing



### Energy Intensive Industries

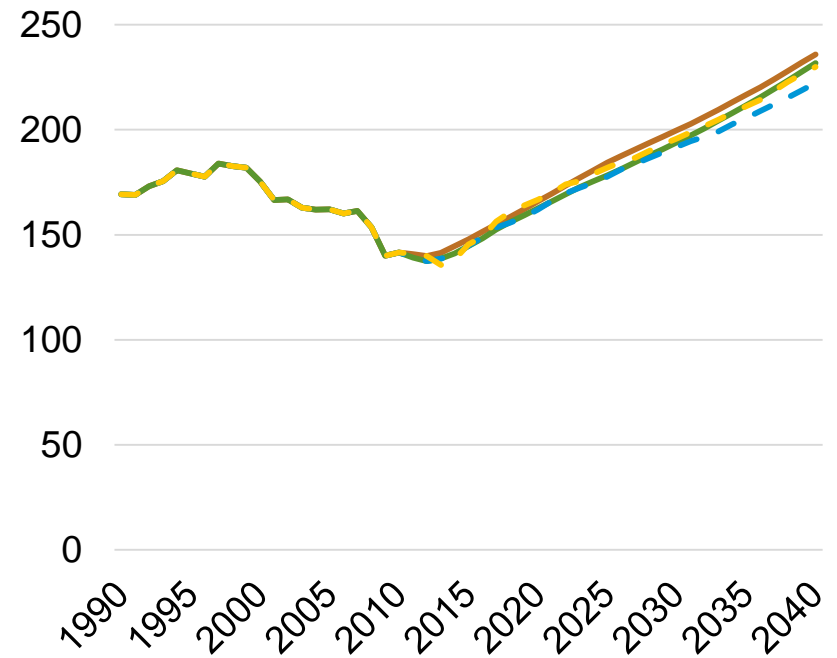
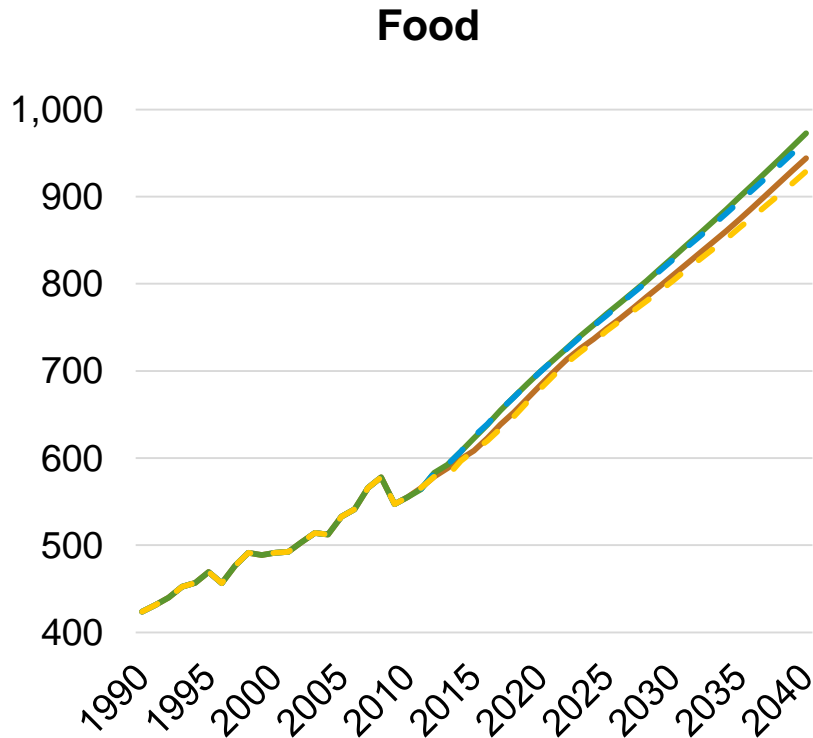


Source: ref2014.d092013a

# Plant-based, energy-intensive industries

(billion 2005 dollar)

— GI Baseline for AEO2013    — GI Baseline for AEO2014  
— AEO2014 Prelim            — AEO2013

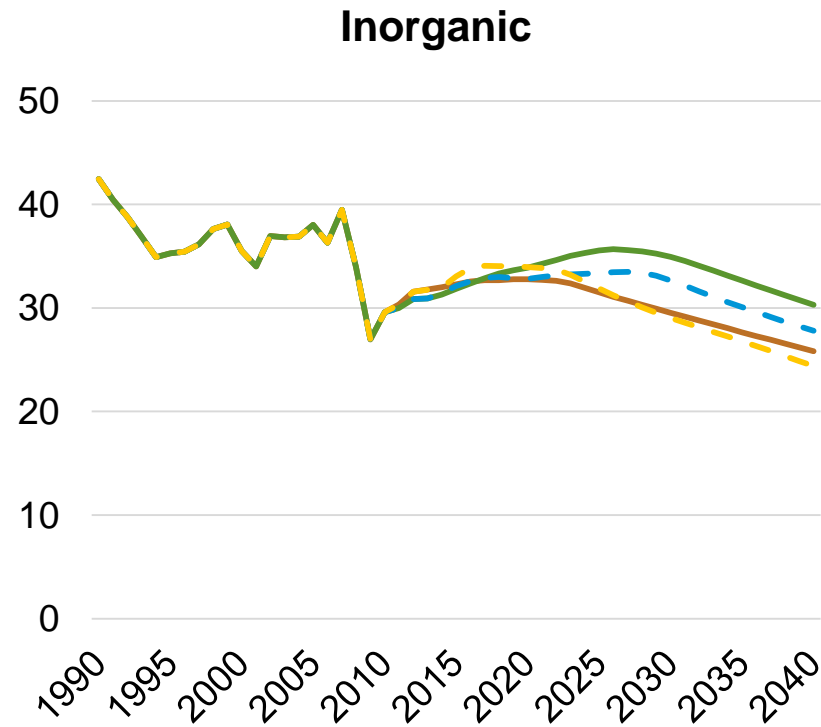
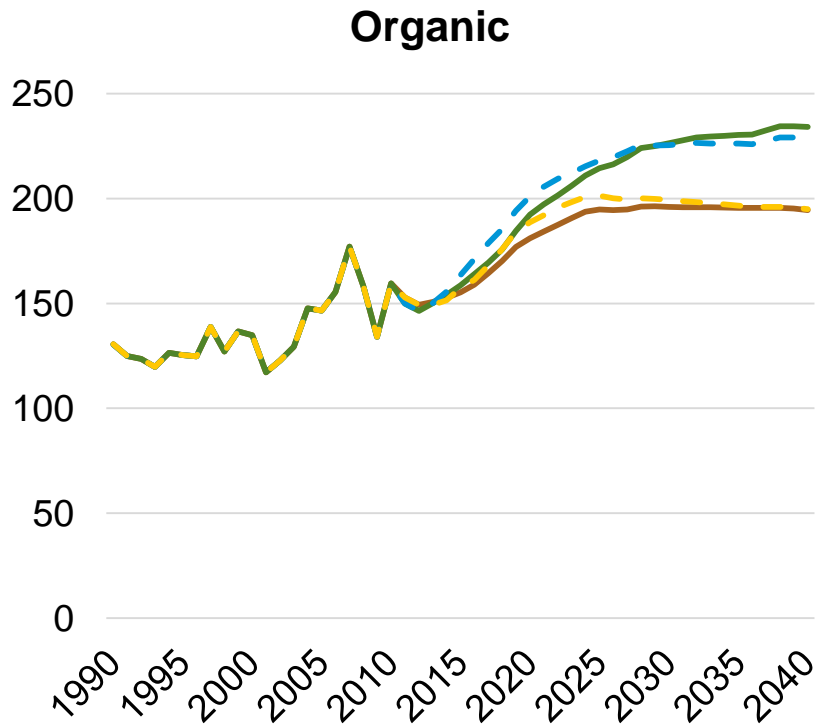


Source: ref2014.d092013a

# Basic bulk chemicals

(billion 2005 dollar)

— GI Baseline for AEO2013    — GI Baseline for AEO2014  
- - AEO2014 Prelim                      - - AEO2013

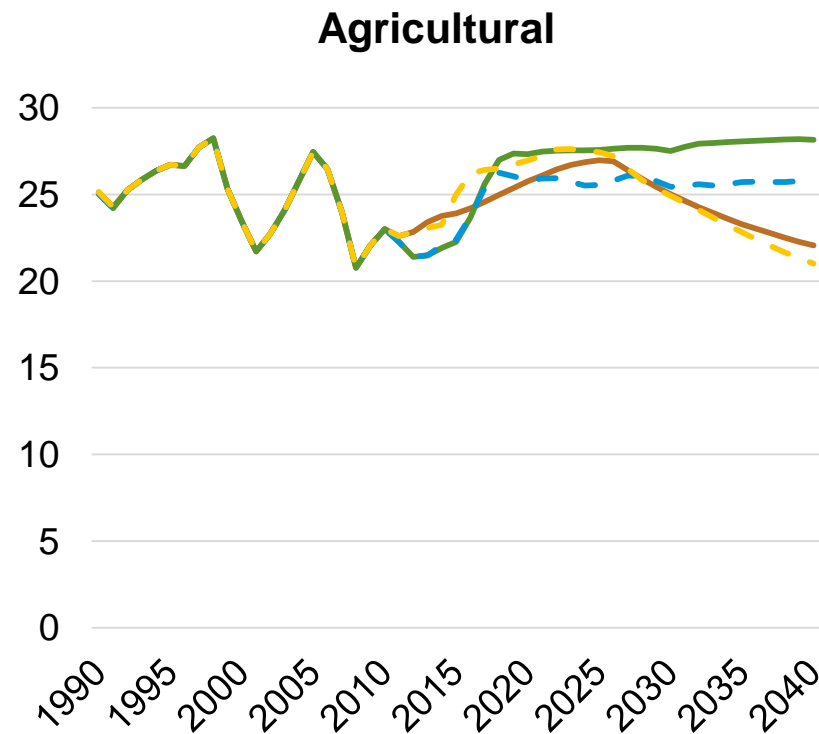
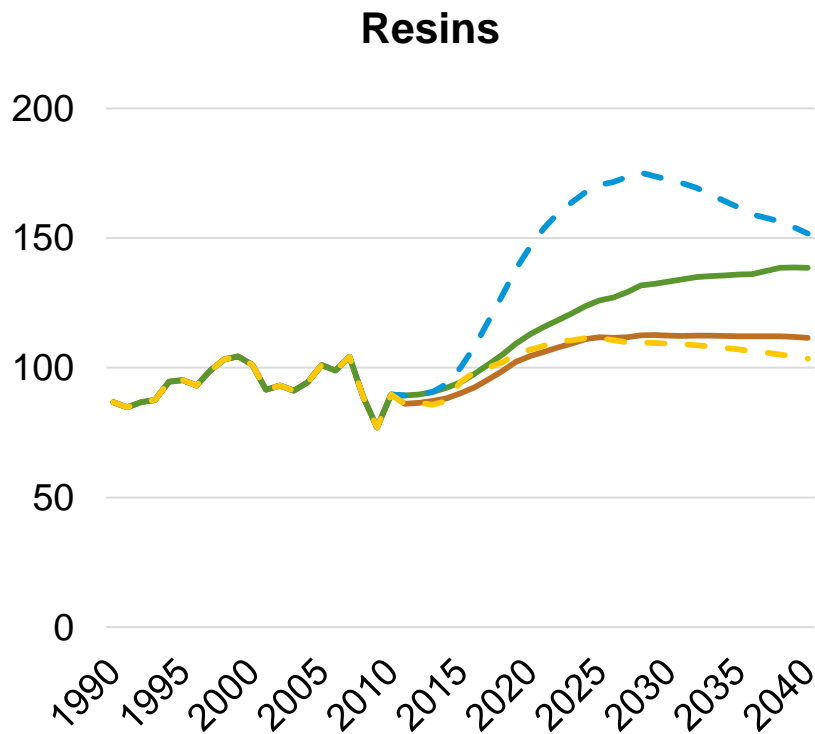


Source: ref2014.d092013a

# Other bulk chemicals

(billion 2005 dollar)

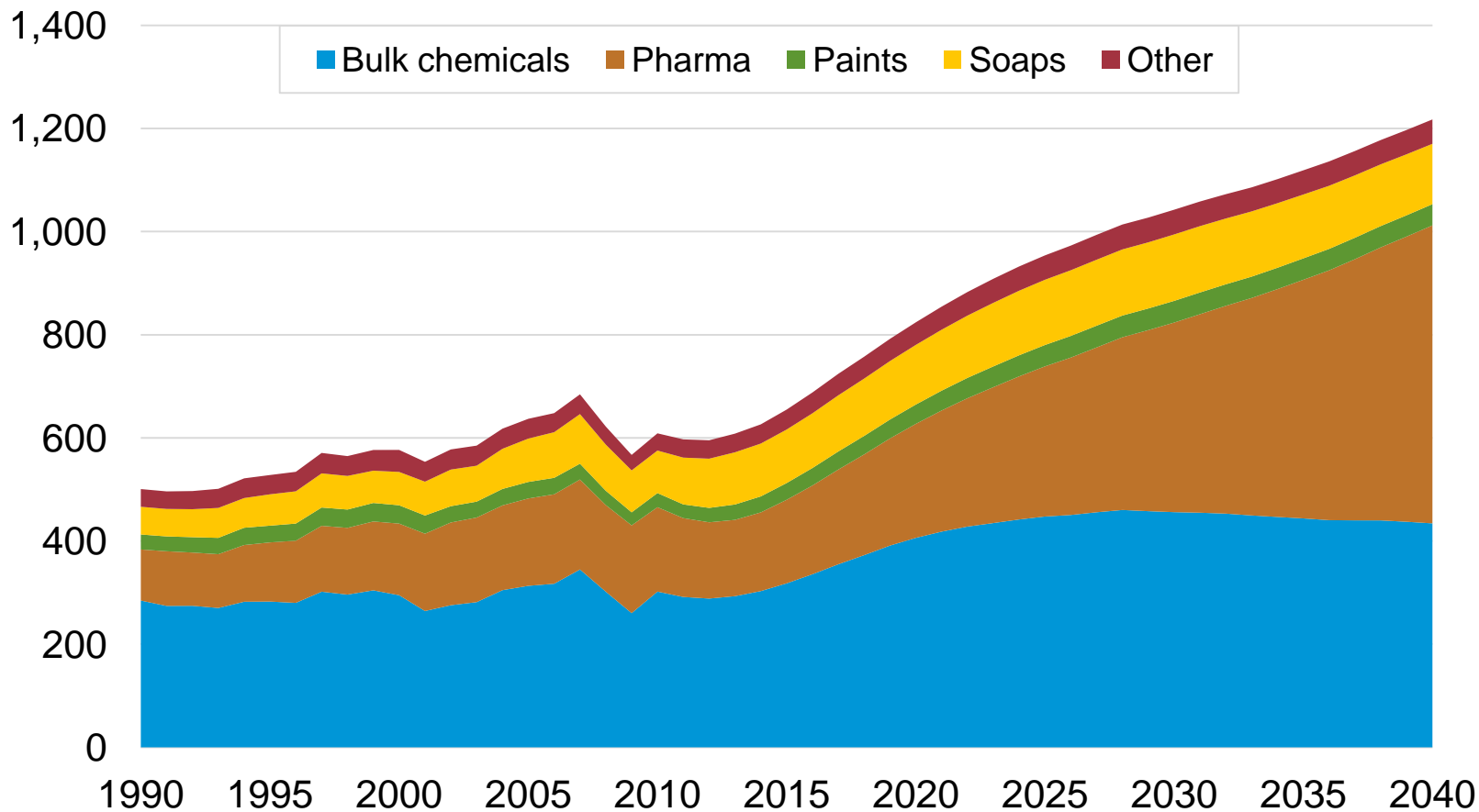
— GI Baseline for AEO2013    — GI Baseline for AEO2014  
 - - AEO2014 Prelim            - - AEO2013



Source: ref2014.d092013a

# Economic contribution of bulk chemicals becomes smaller relative to non-intensive chemicals

Billion 2005 dollar



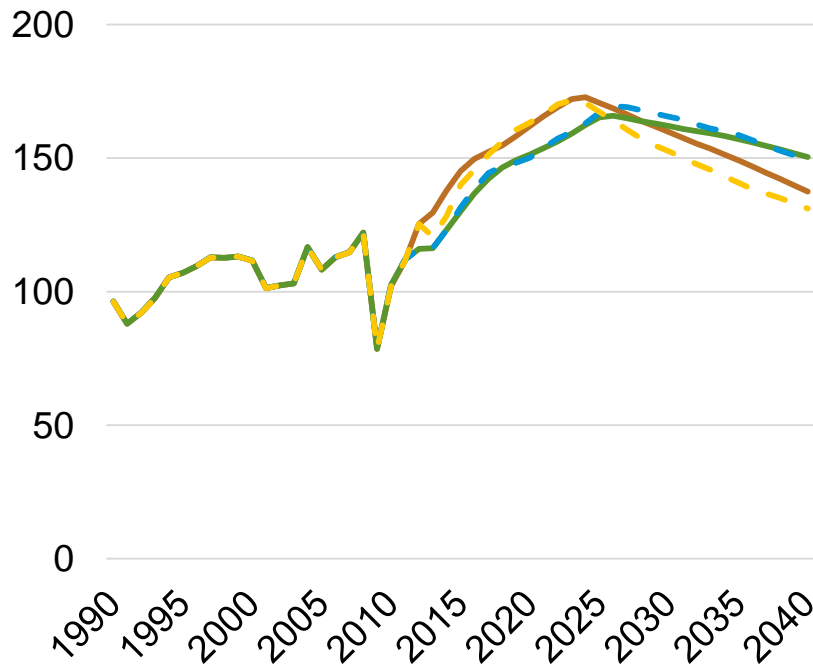
Source: ref2014.d092013a

# Energy-intensive primary metals

(billion 2005 dollar)

— GI Baseline for AEO2013    — GI Baseline for AEO2014  
- - AEO2014 Prelim            - - AEO2013

### Iron and Steel R3311a2



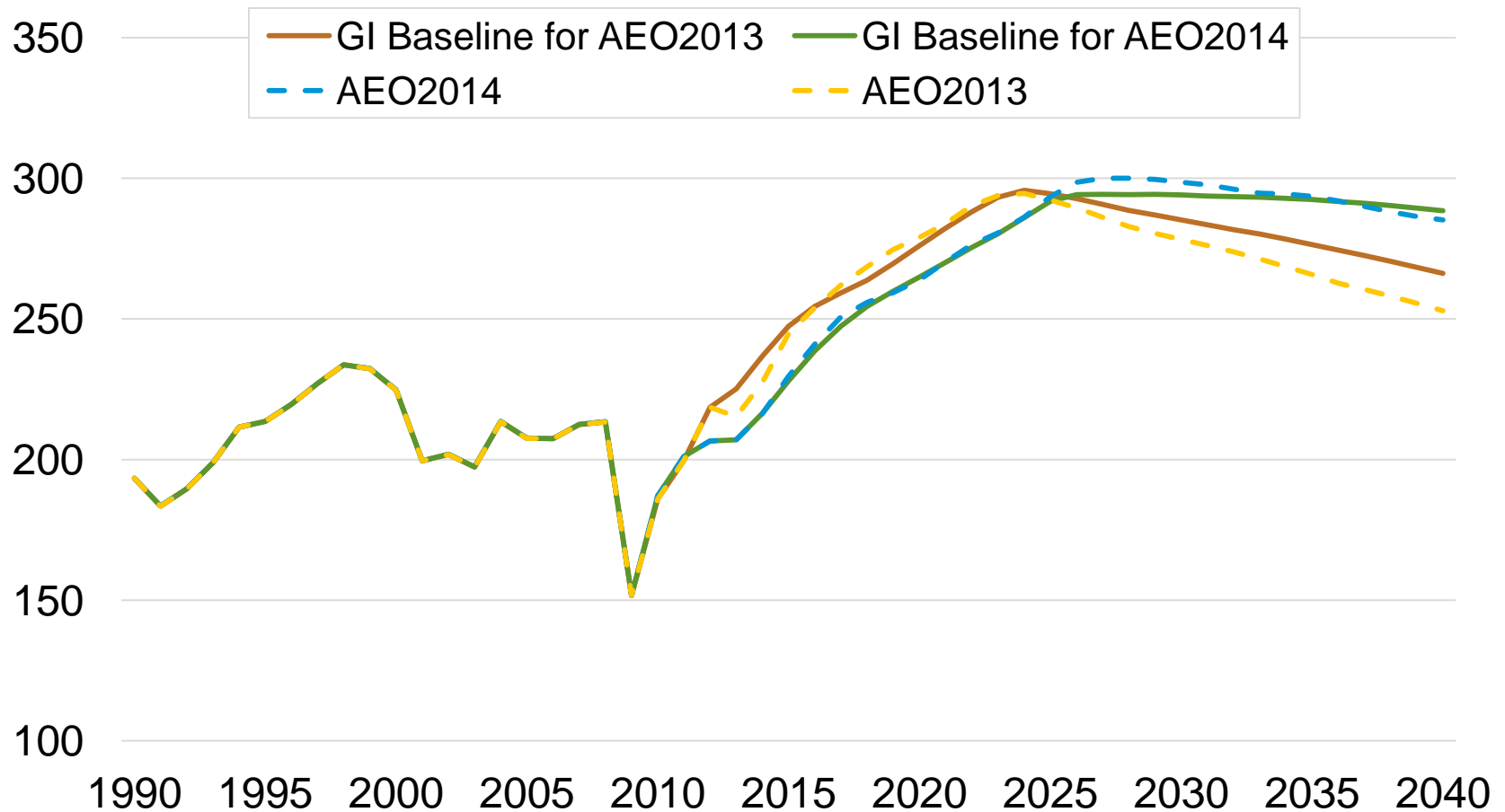
### Aluminum R3313



Source: ref2014.d092013a

# All primary metals

Billion 2005 dollar



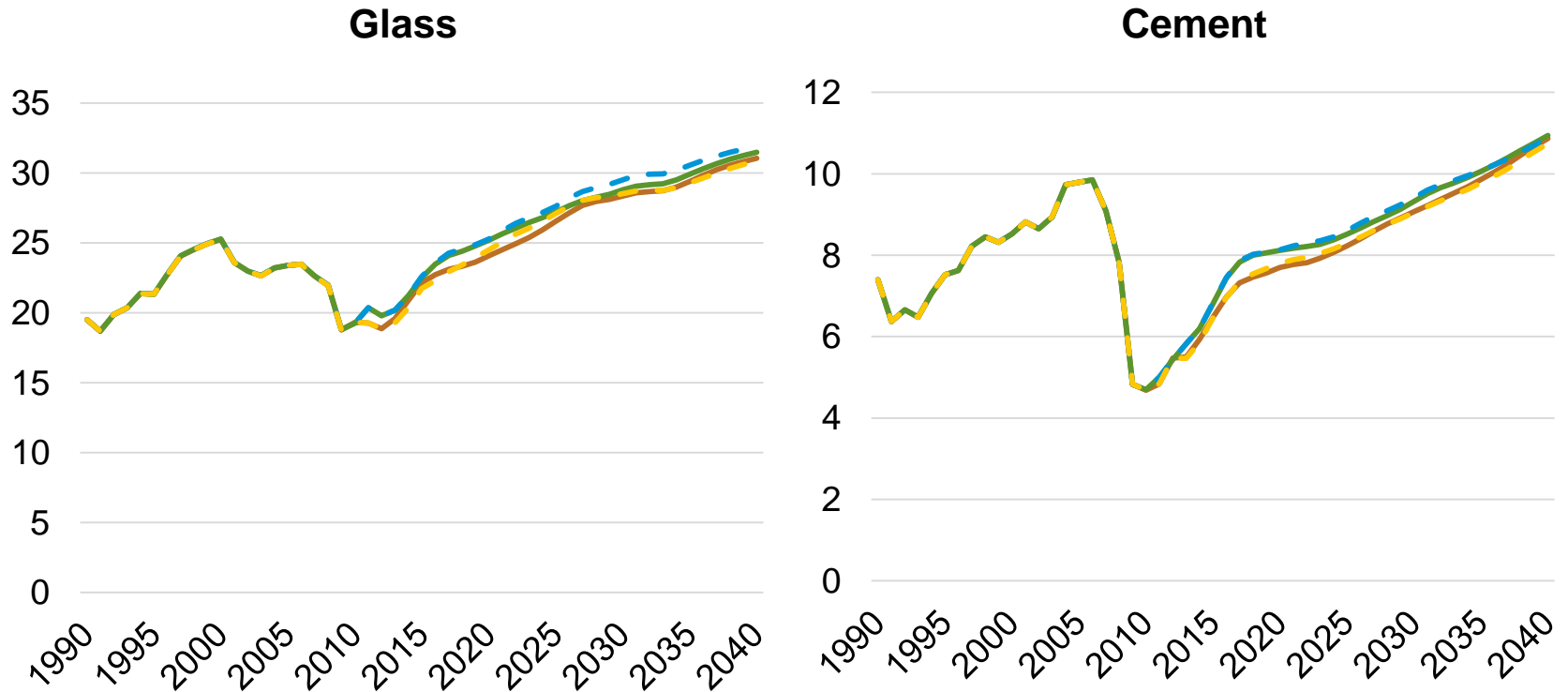
Source: ref2014.d092013a



# Energy-intensive non-metallic minerals\*

(billion 2005 dollar)

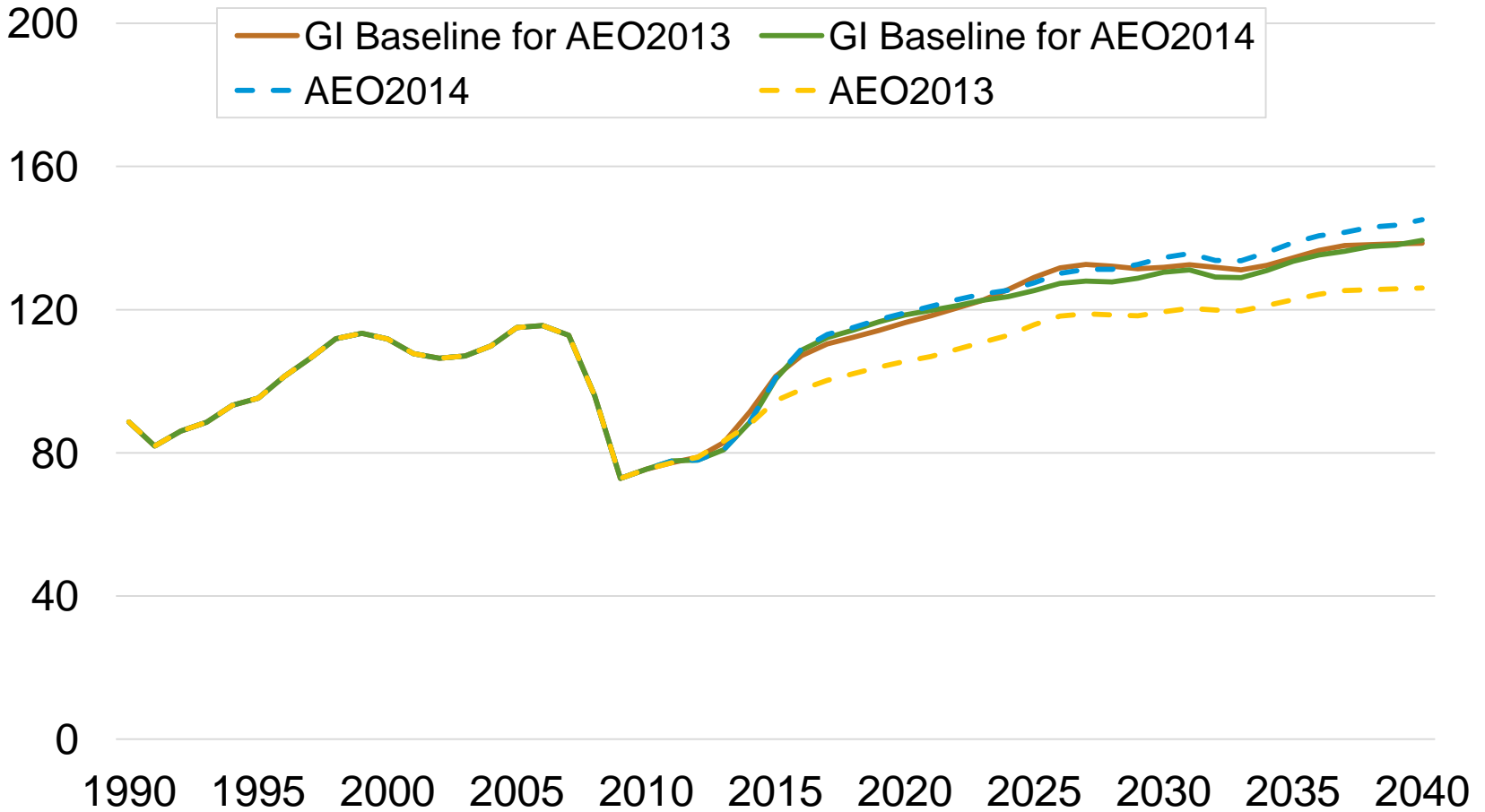
— GI Baseline for AEO2013    — GI Baseline for AEO2014  
— AEO2014 Prelim            — AEO2013



Source: ref2014.d092013a; \*also know as stone, clay, and glass (SCG)

# All non-metallic minerals\*

Billion 2005 dollar



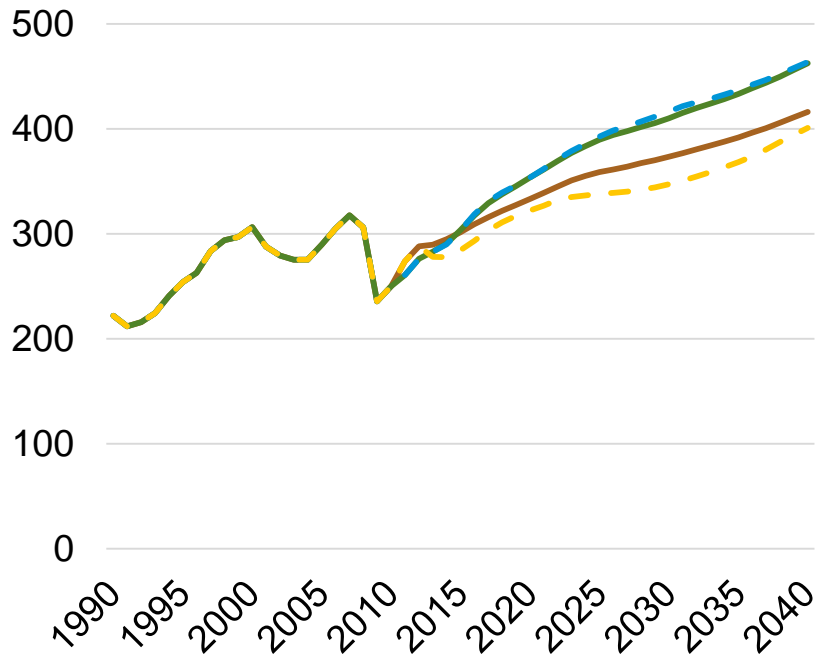
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# Metal-based durables

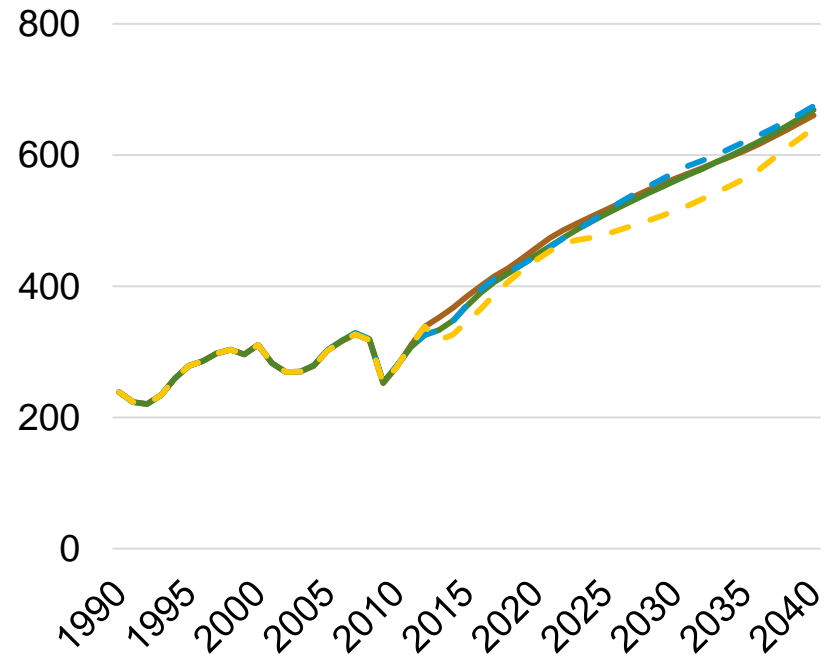
(billion 2005 dollar)

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### Fabricated metals



### Machinery



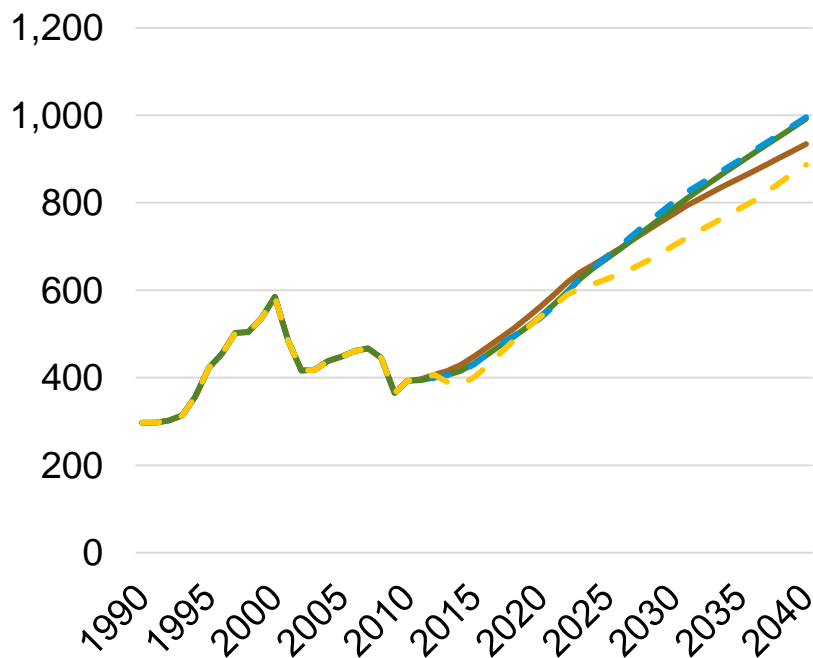
Source: ref2014.d092013a

# Metal-based durables

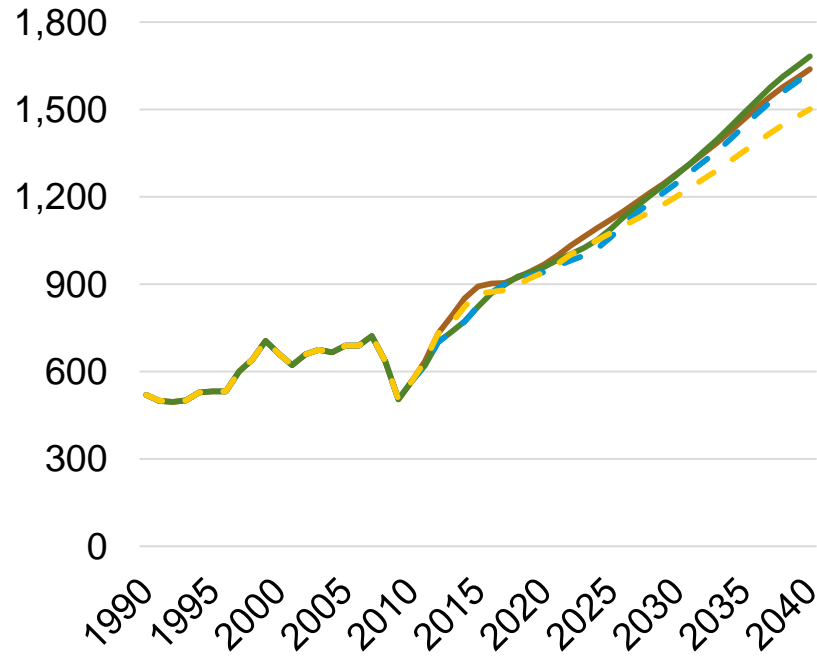
(billion 2005 dollar)

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### Computers & electronics



### Transportation equipment

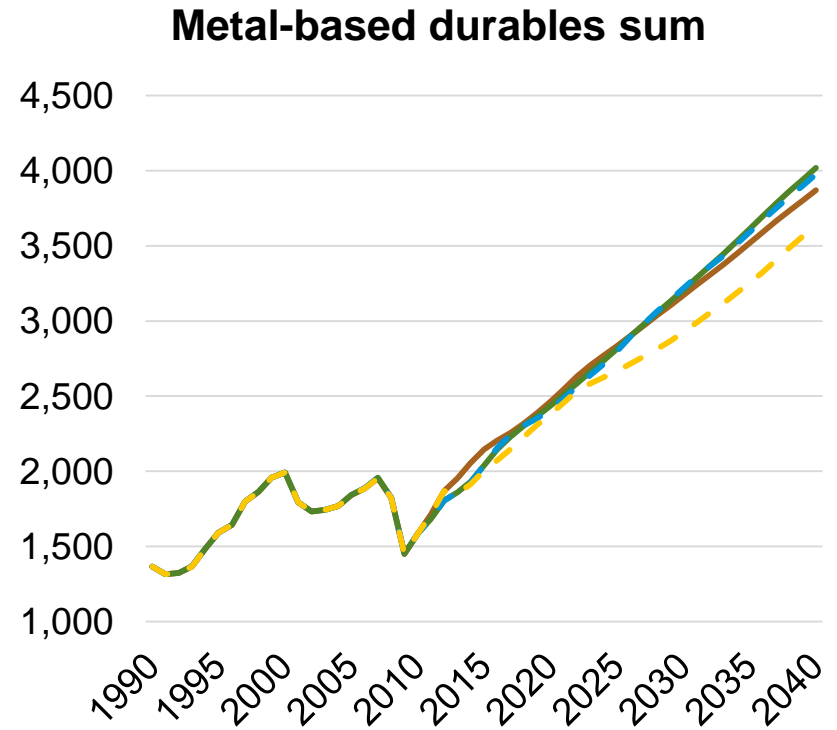
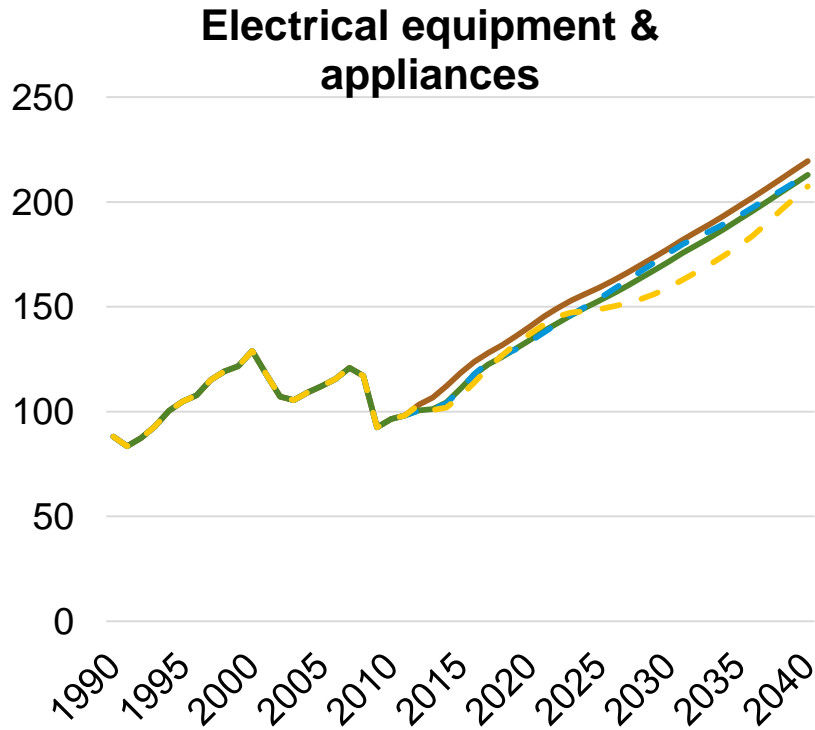


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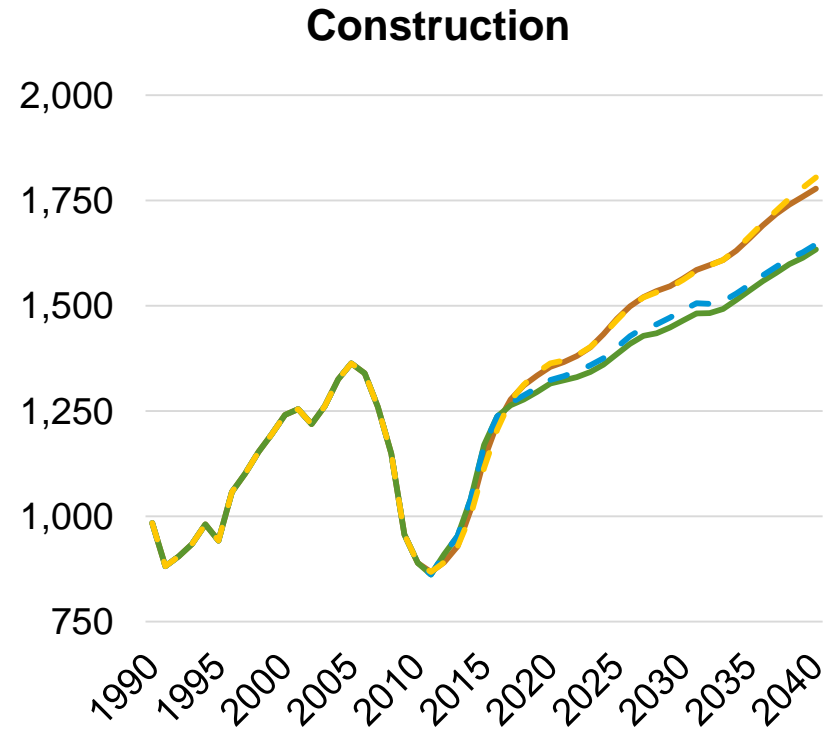
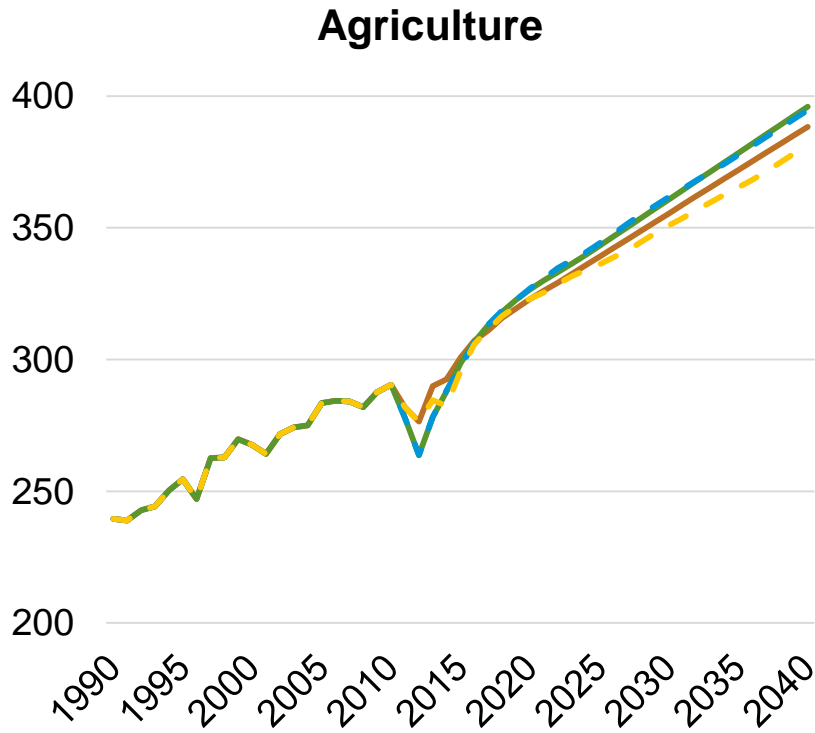


Source: ref2014.d092013a

# Non-manufacturing\*

(billion 2005 dollar)

— GI Baseline for AEO2013    — GI Baseline for AEO2014  
 - - AEO2014 Prelim        - - AEO2013



Source: ref2014.d092013a; \*most of mining is done in other modules so it is not included