

# *Annual Energy Outlook 2014:* Electricity Working Group Meeting September 25, 2013



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*Electricity Analysis Team*

*Office of Electricity, Coal, Nuclear, and Renewables Analysis*

*Office of Energy Analysis*

**WORKING GROUP PRESENTATION FOR DISCUSSION PURPOSES  
DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE**

# Key Modeling updates from AEO2013

- Revised Reserve Margin and Capacity Market Methodology
  - Explicit Reserve Margin, Explicit Capacity Payment
  - Results in 3-5 mill higher electric prices
- Operating/Spinning reserve structure
  - New constraints introduced in the capacity planning and dispatch submodules to enforce required levels of spinning and operating reserves.
  - Costs related to maintaining reserves will be passed through to prices.
  - Impact: results in slightly more CC builds and fewer CT, however the remaining CT as well as existing steam units generate a little more to meet the new operating reserve requirements.
- Fully linked CO<sub>2</sub> transport algorithm to EOR opportunities

# Environmental Rules

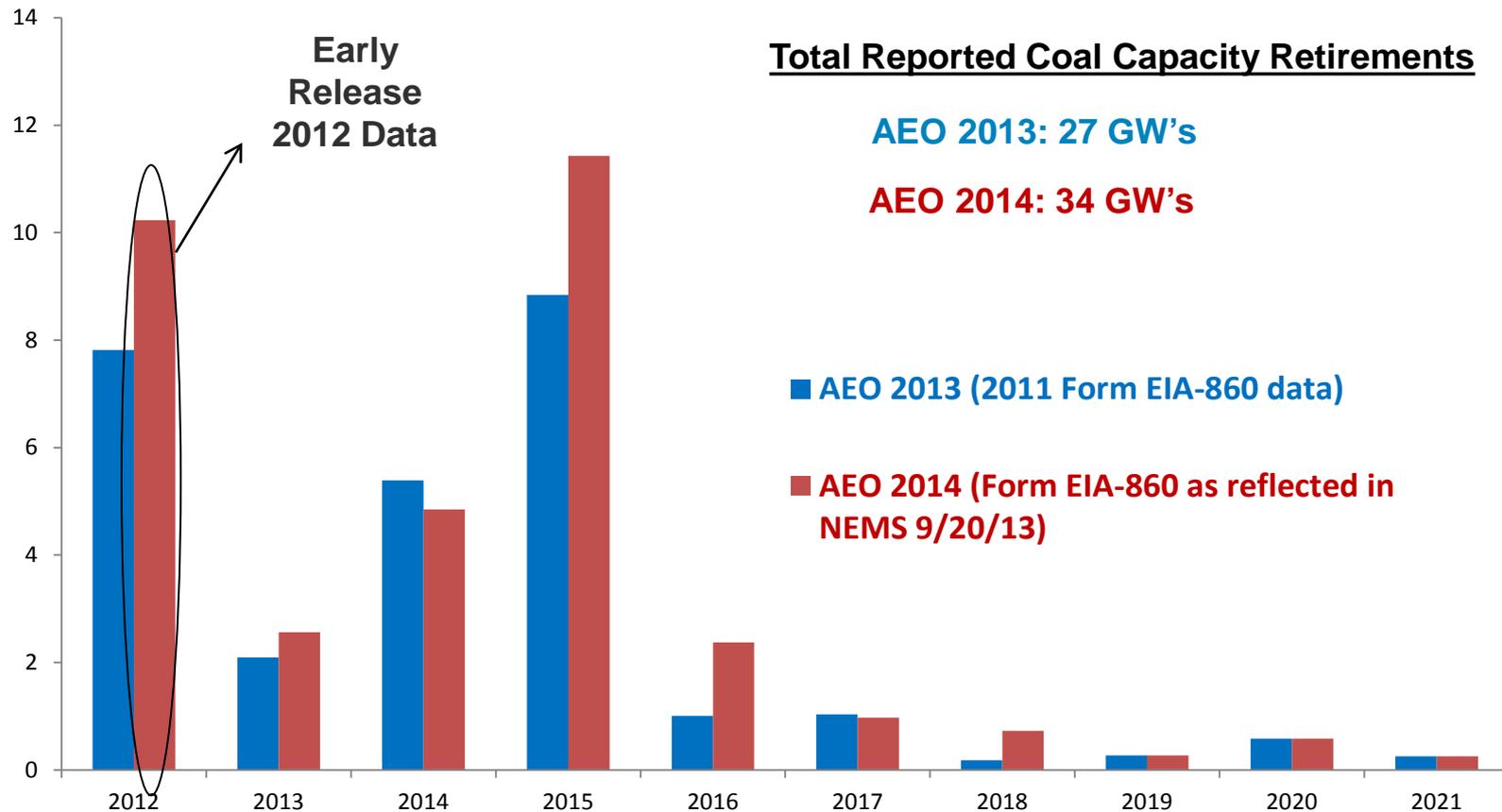
- Only current laws and regulations are included in EIA's reference case.
- Clean Air Interstate Rule is assumed in place through 2040.
- Mercury and Air Toxics Standards take effect in 2016.
  - AEO2014 allows ESP upgrades for certain eligible plants.
  - DSI and fabric filter costs were updated.
- Regional Greenhouse Gas Initiative is in place for 9 Northeastern states, the limit was updated in Feb. 2013.
- California cap-and-trade program as specified in AB32 is modeled in all affected sectors.

# Existing and Proposed Generating Capacity

- Analyzed company press releases and submissions to EIA for consistency with respect to plant retirements and new capacity additions
- Compared submissions to EIA against EPA Settlement Agreements with regard to plans for:
  - Unit retirements
  - Environmental equipment retrofits
  - Coal to gas conversions

# Reported Coal Retirements By Year

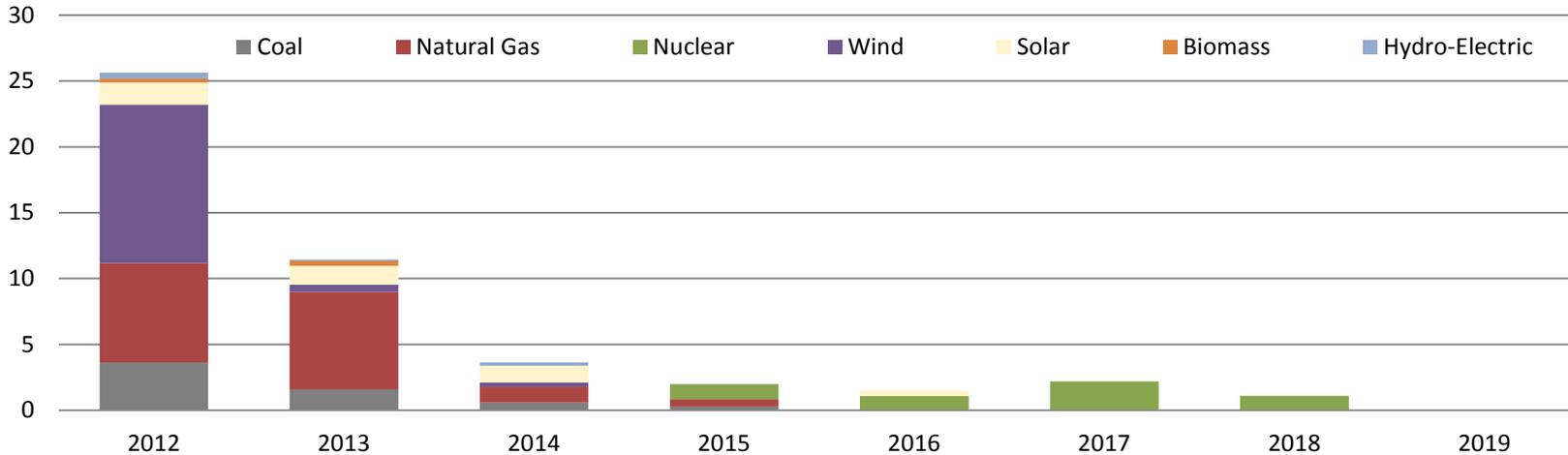
*gigawatts*



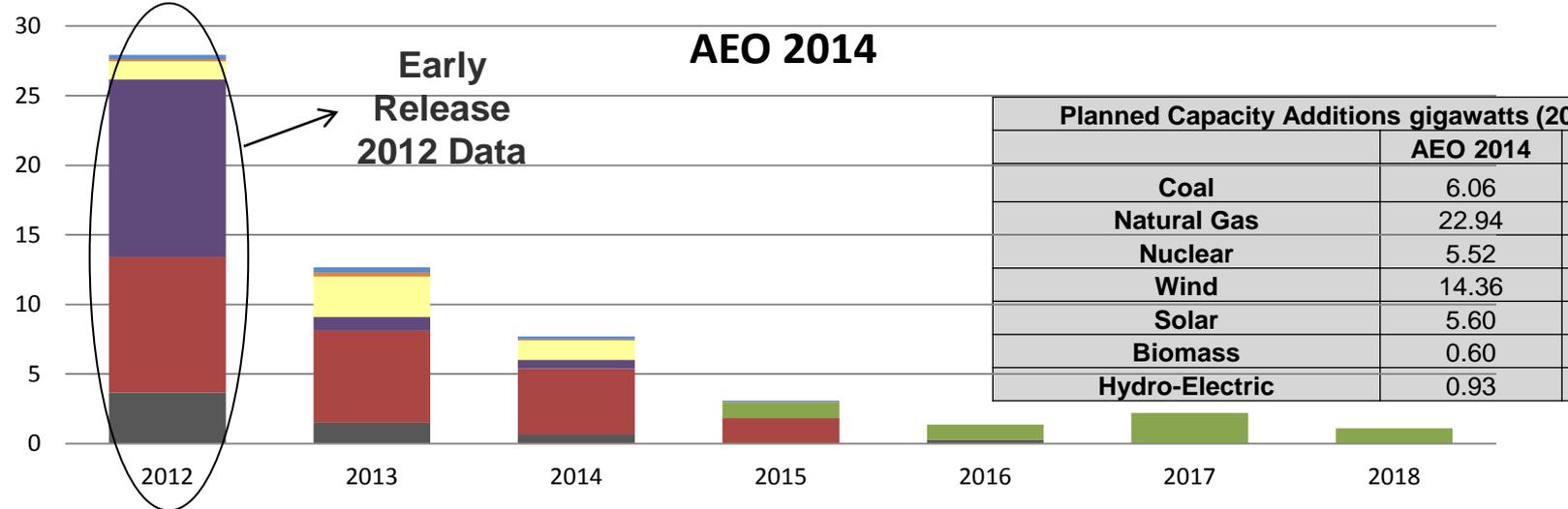
# Planned New Plant Capacity Additions

*gigawatts*

## AEO 2013



## AEO 2014



Early Release 2012 Data

Planned Capacity Additions gigawatts (2012-2019)		
	AEO 2014	AEO 2013
Coal	6.06	6.06
Natural Gas	22.94	16.73
Nuclear	5.52	5.52
Wind	14.36	12.91
Solar	5.60	4.73
Biomass	0.60	0.74
Hydro-Electric	0.93	0.83

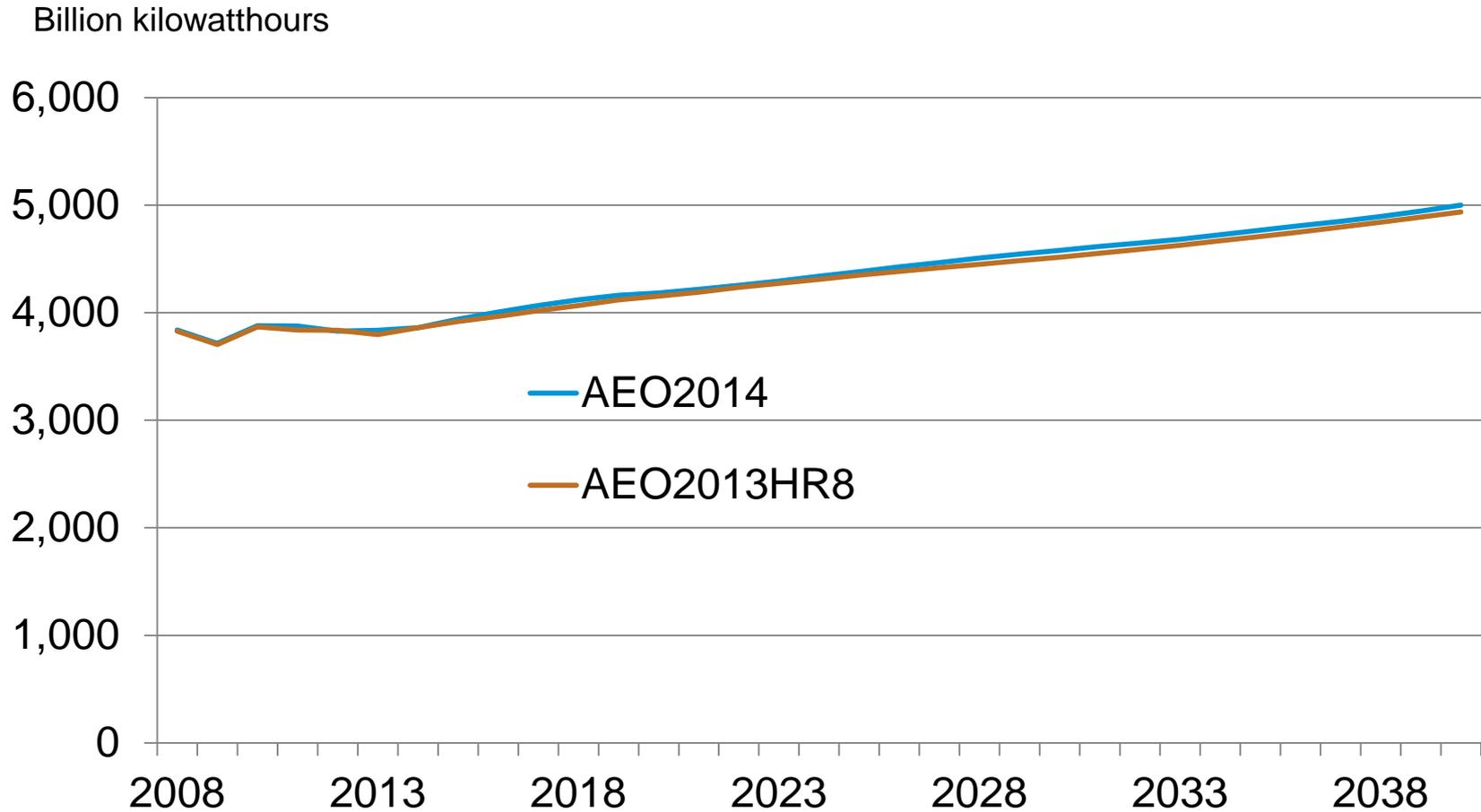
# Nuclear Power Assumptions

- **Planned Retirements – 4,795 MW**
  - 2013 – Kewaunee, San Onofre 2 & 3, Crystal River
  - 2014 -- Vermont Yankee
  - 2019 -- Oyster Creek
  - No further retirements assumed, but model can make economic retirement decisions; typically not seen in a reference case
- **Planned Additions – 5,522 MW**
  - Watts Bar (2015)
  - Summer 2 & 3 (2017 & 2018)
  - Vogtle 3 & 4 (2016 & 2017)
- **Planned Upgrades – 540 MW**
  - Assumed implemented only if reported on Form EIA-860

# Changes in results from AEO 2013

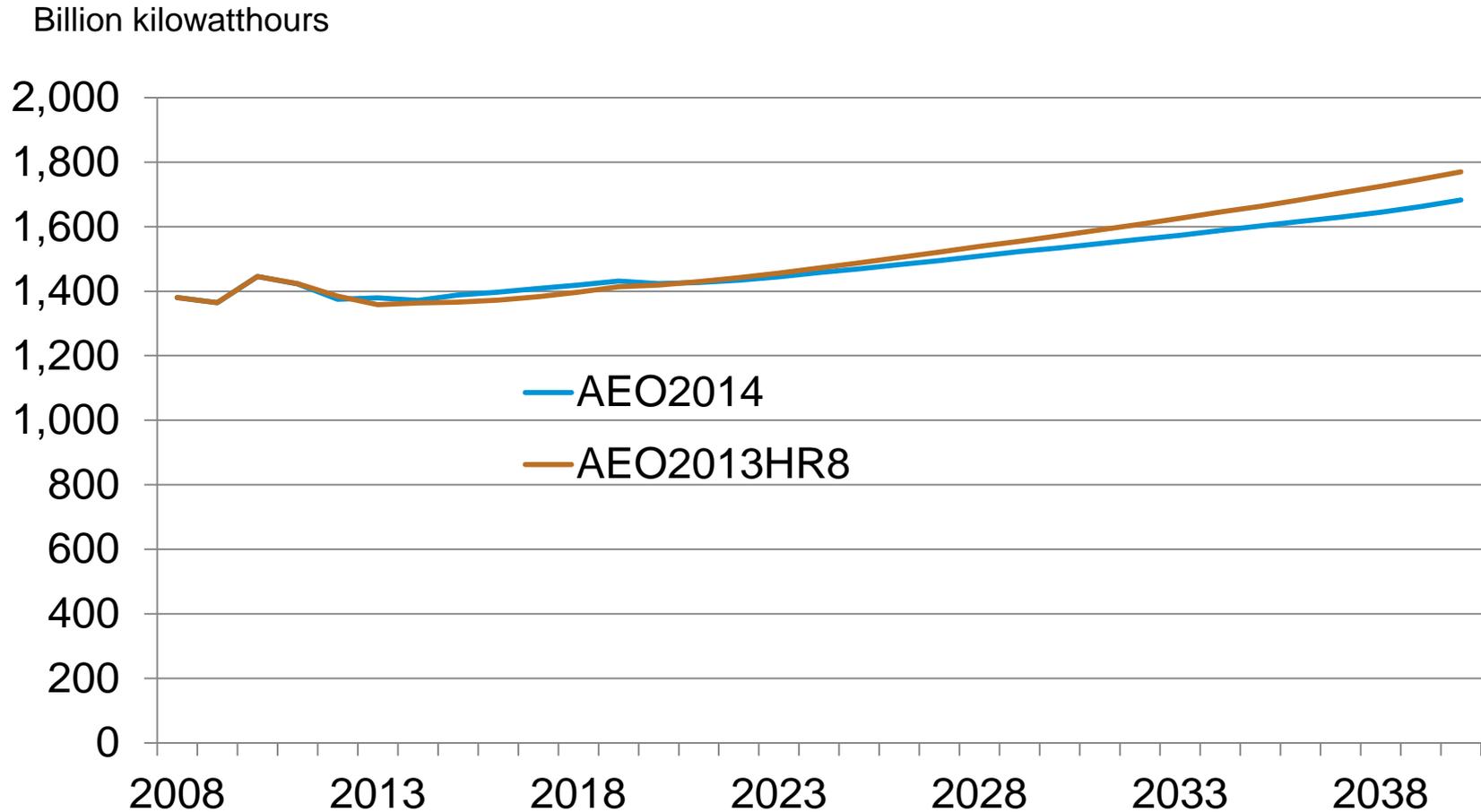
- Comparisons relative to AEO2013HR8 which included the impacts of the American Taxpayer Relief Act of 2012 passed on 1/1/2013.
- Similar overall load growth but sectoral mix changes
  - 1.0 % 2012-2040 compound annual growth rate (similar to AEO2013HR8)
    - Residential (0.7% CAGR vs. 0.9% for AEO2013HR8)
    - Industrial (0.8% CAGR vs. 0.5% for AEO2013HR8)
- By 2040 electricity use is 1.3% higher overall while total generating capacity is 2.4% higher.
- Natural gas fuel prices higher for most of the forecast, but flatten out post 2035, ending lower than last year's forecast.

# Total Electricity Sales



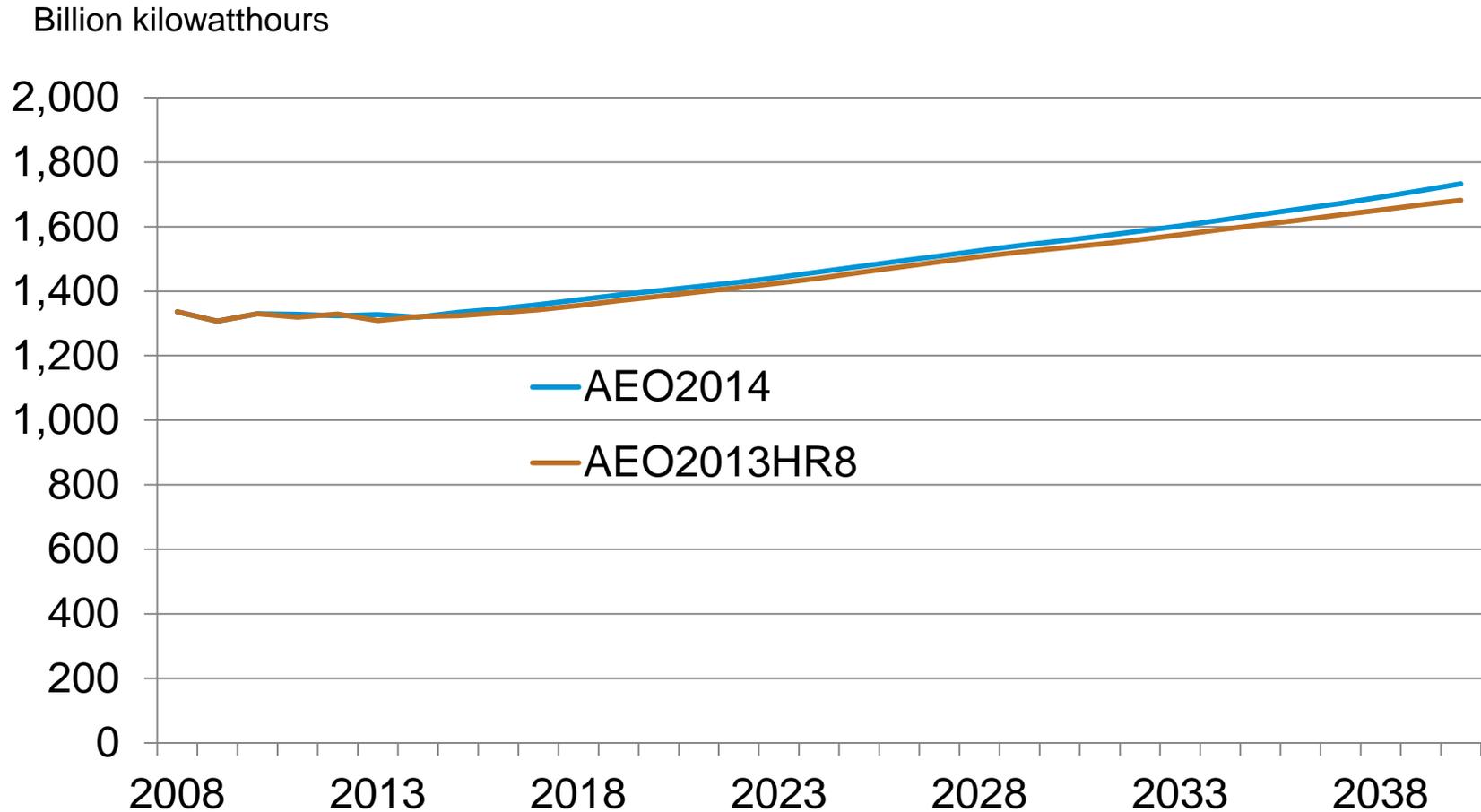
Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Residential Electricity Sales



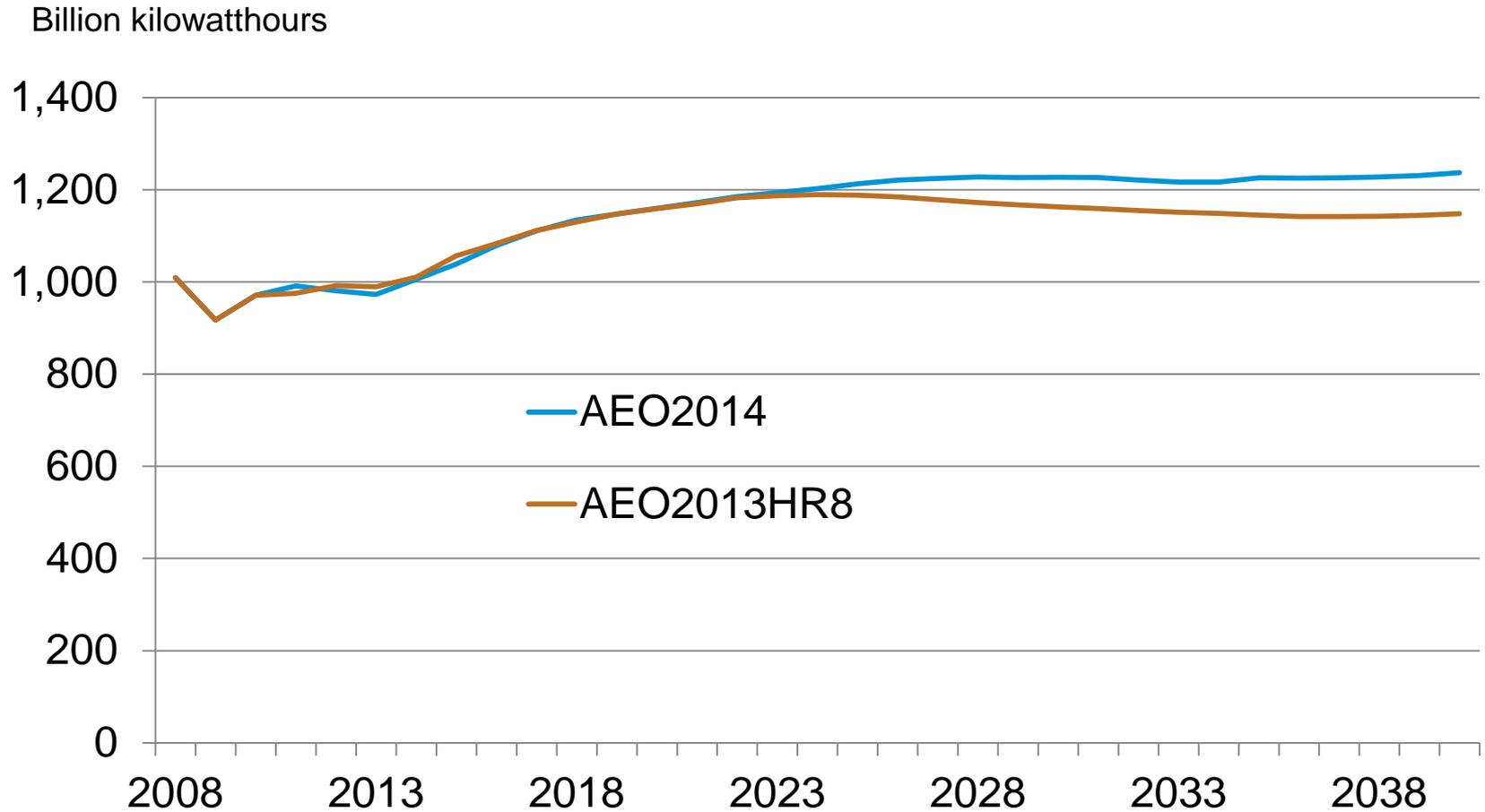
Source: AEO 2014: NEMS run ref2014/d083113a, AEO2013 HR8

# Commercial Electricity Sales



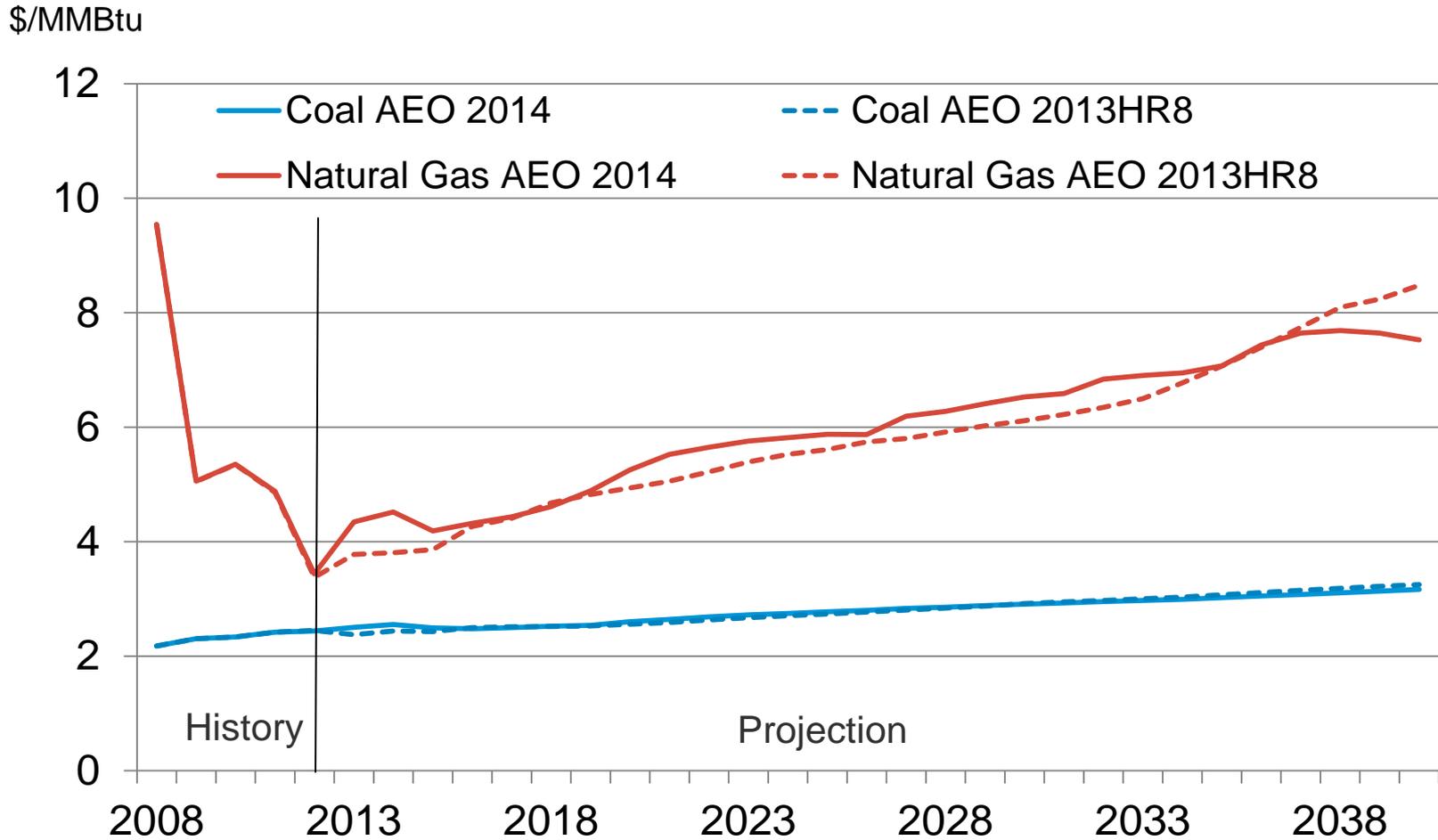
Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Industrial Electricity Sales



Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

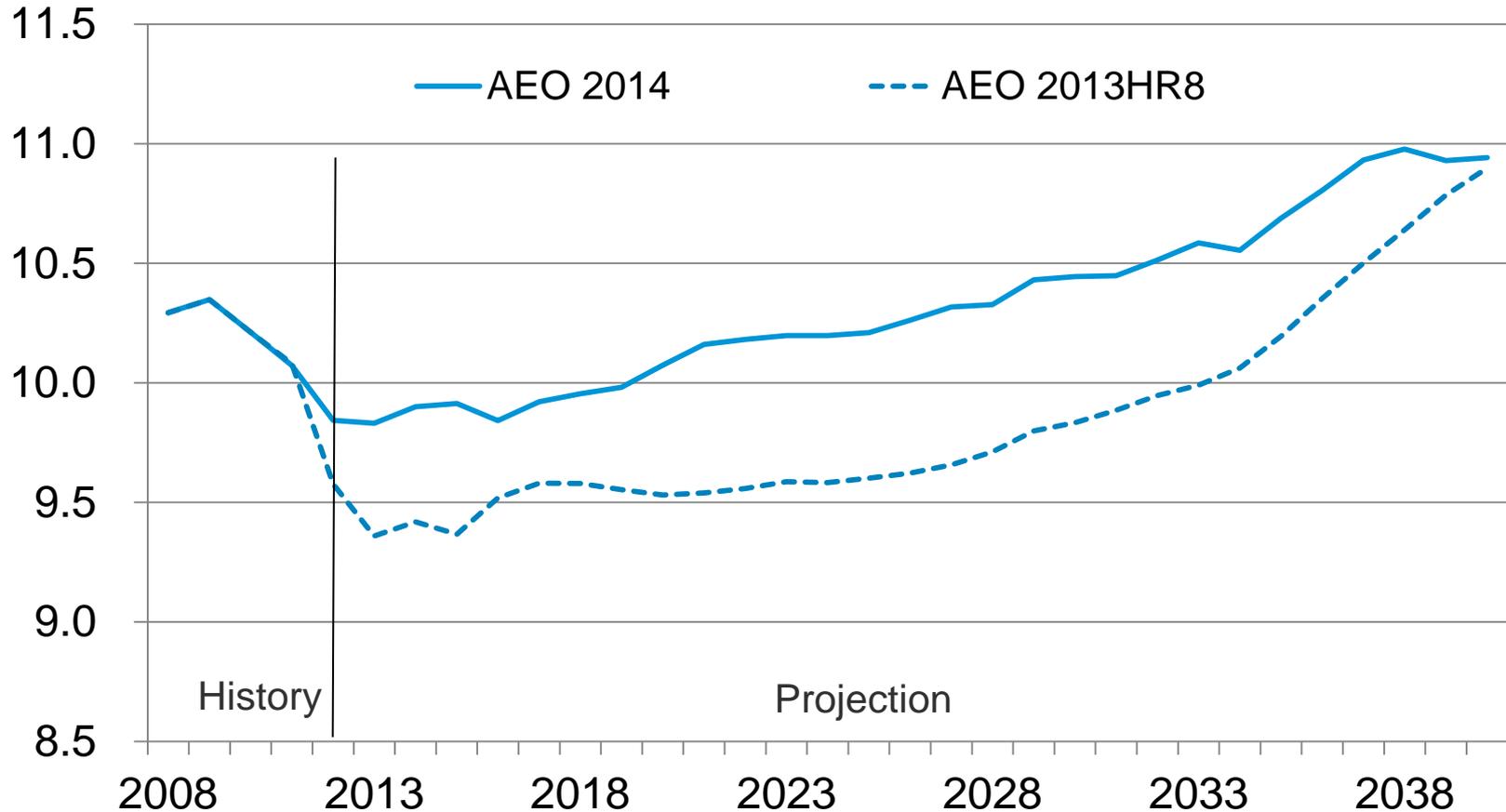
# Power Sector Fuel Prices



Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

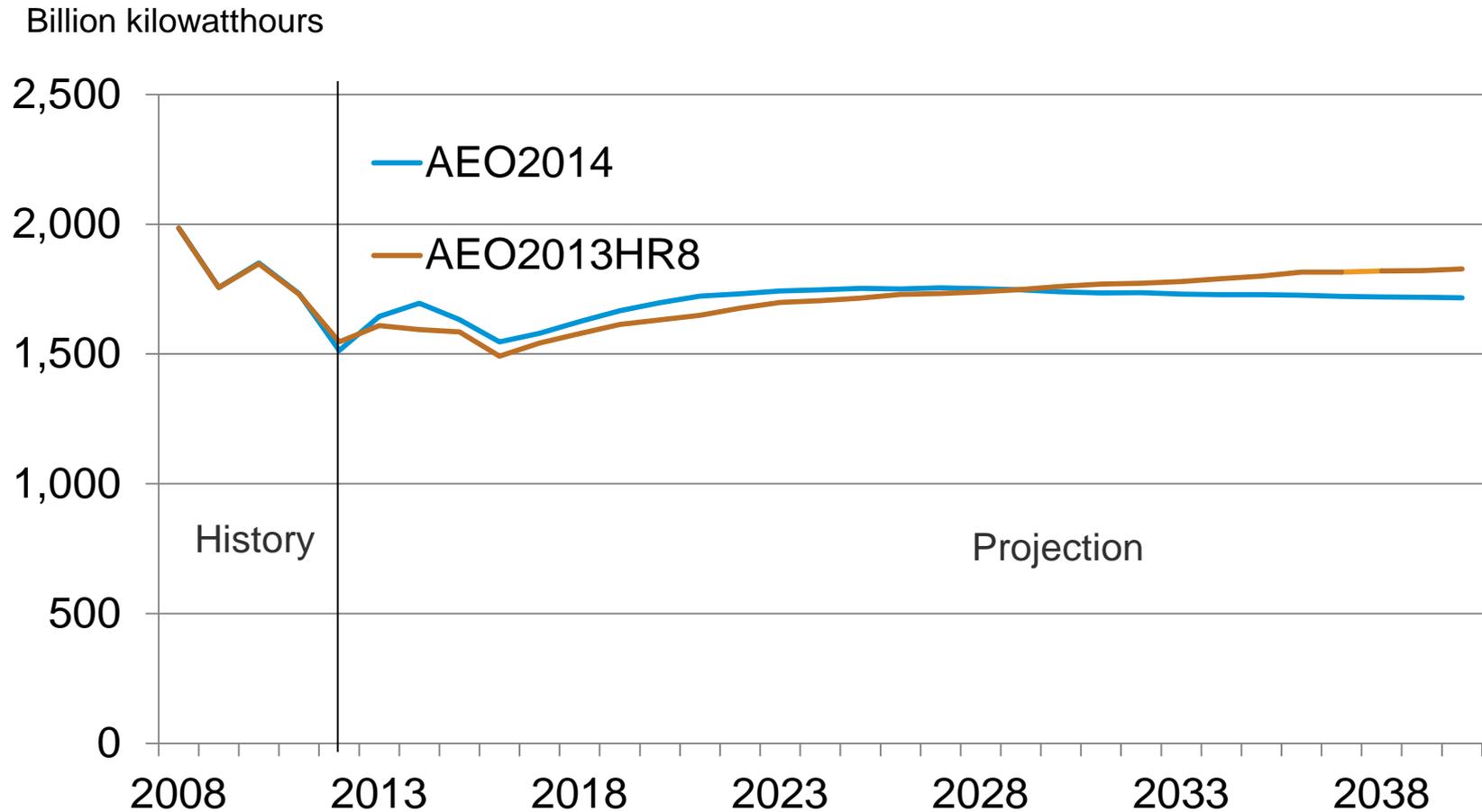
# Electricity Prices

Cents /kWh (2012\$)



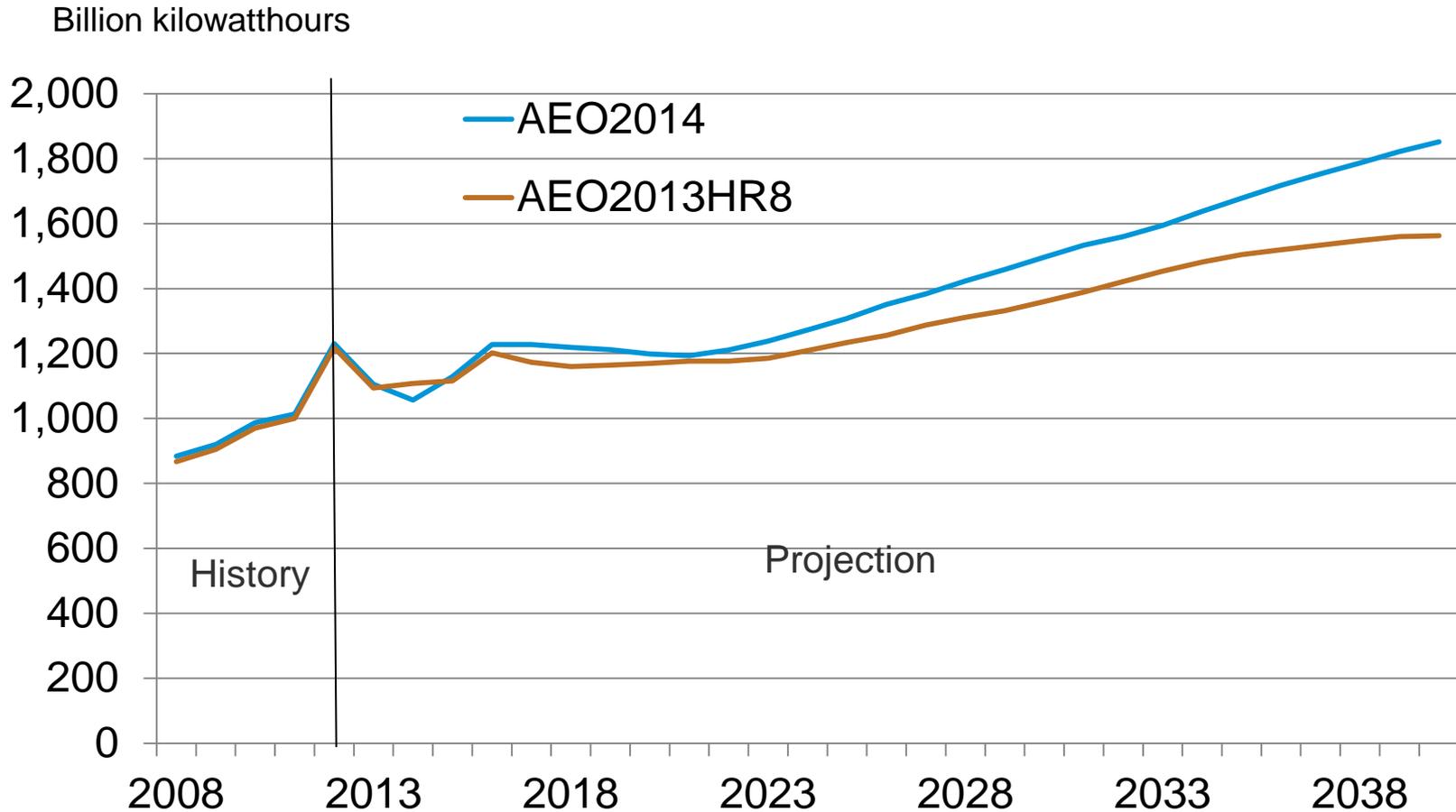
Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Coal Generation



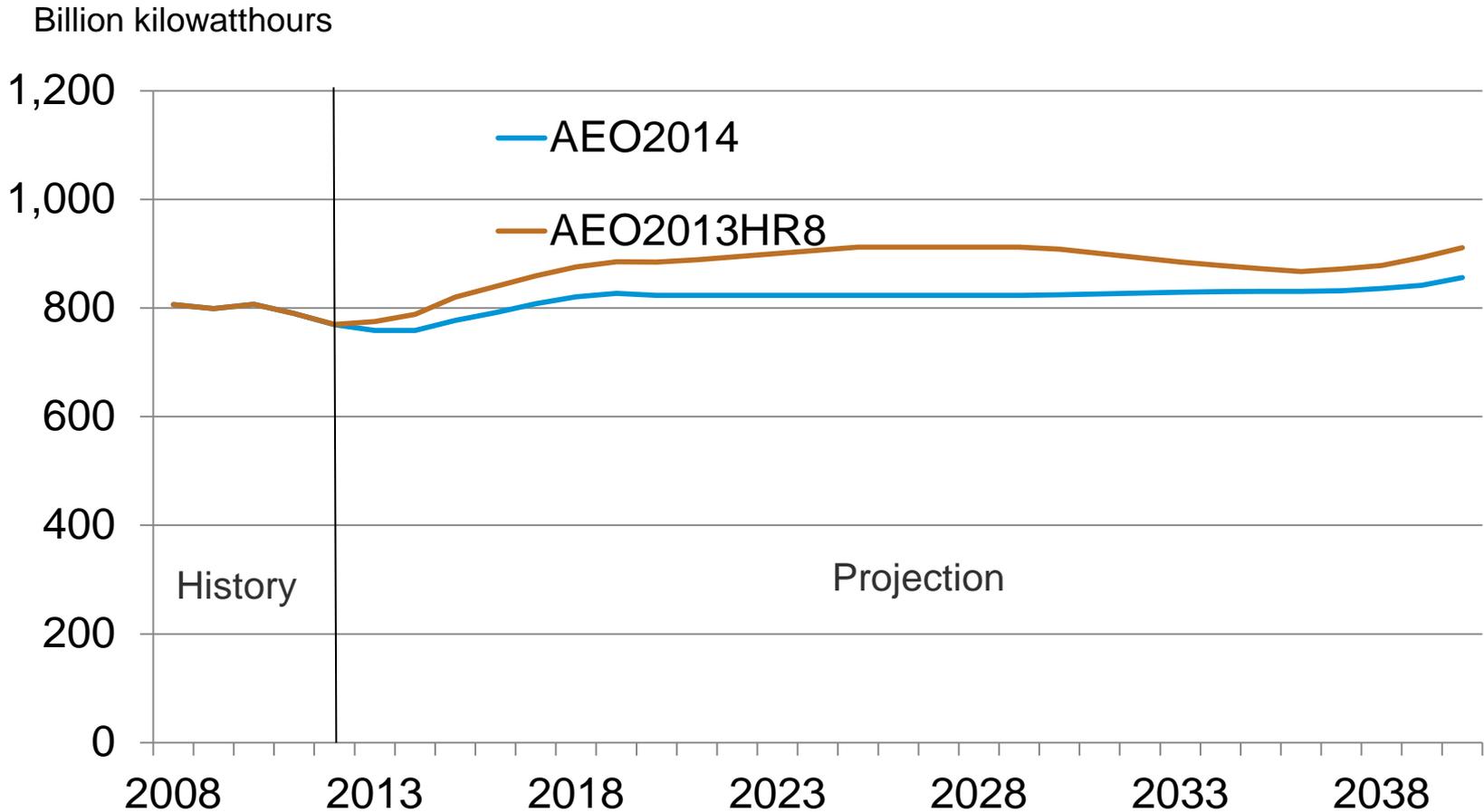
Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Natural Gas Generation



Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

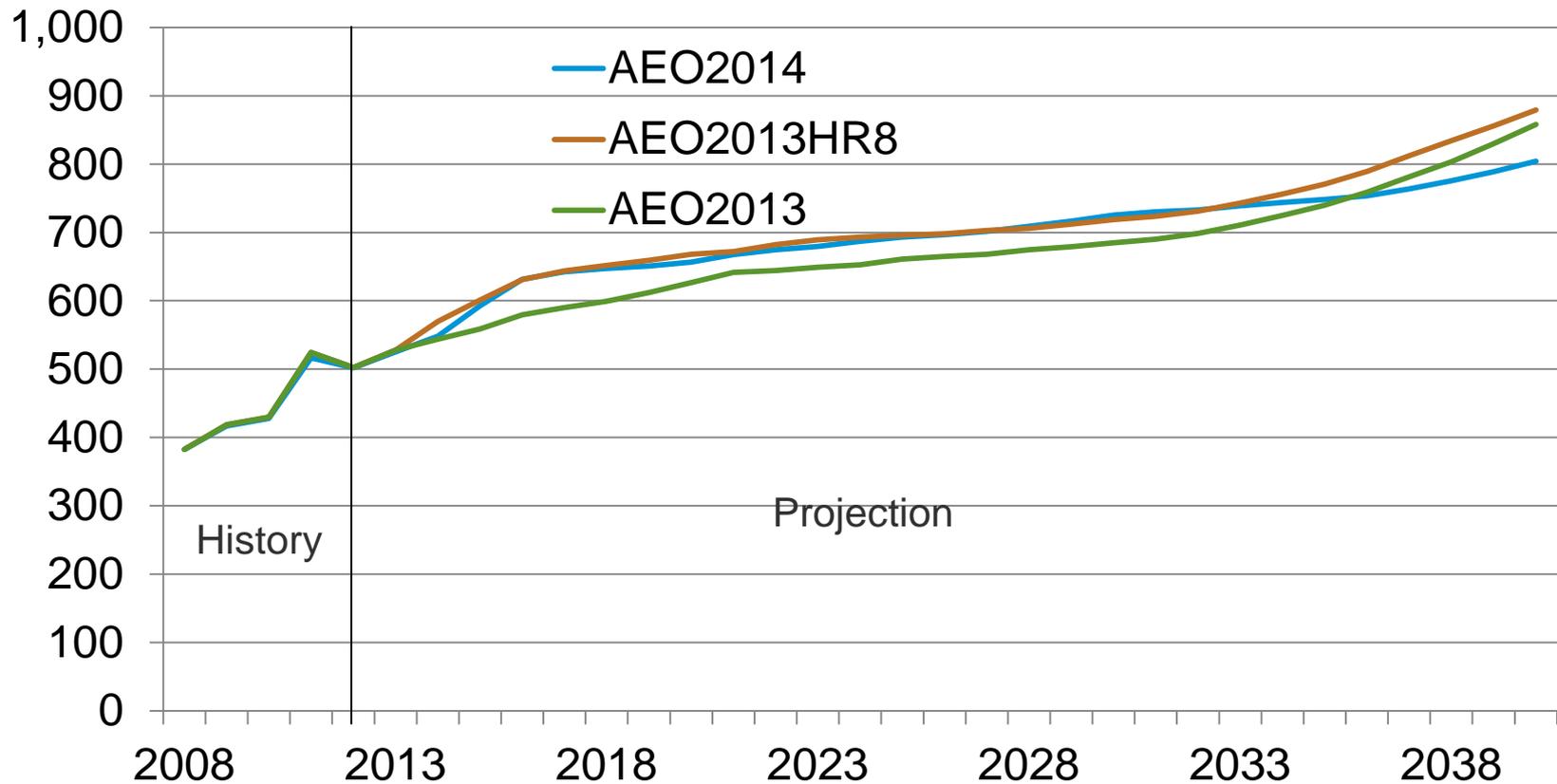
# Nuclear Generation



Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Renewable Generation

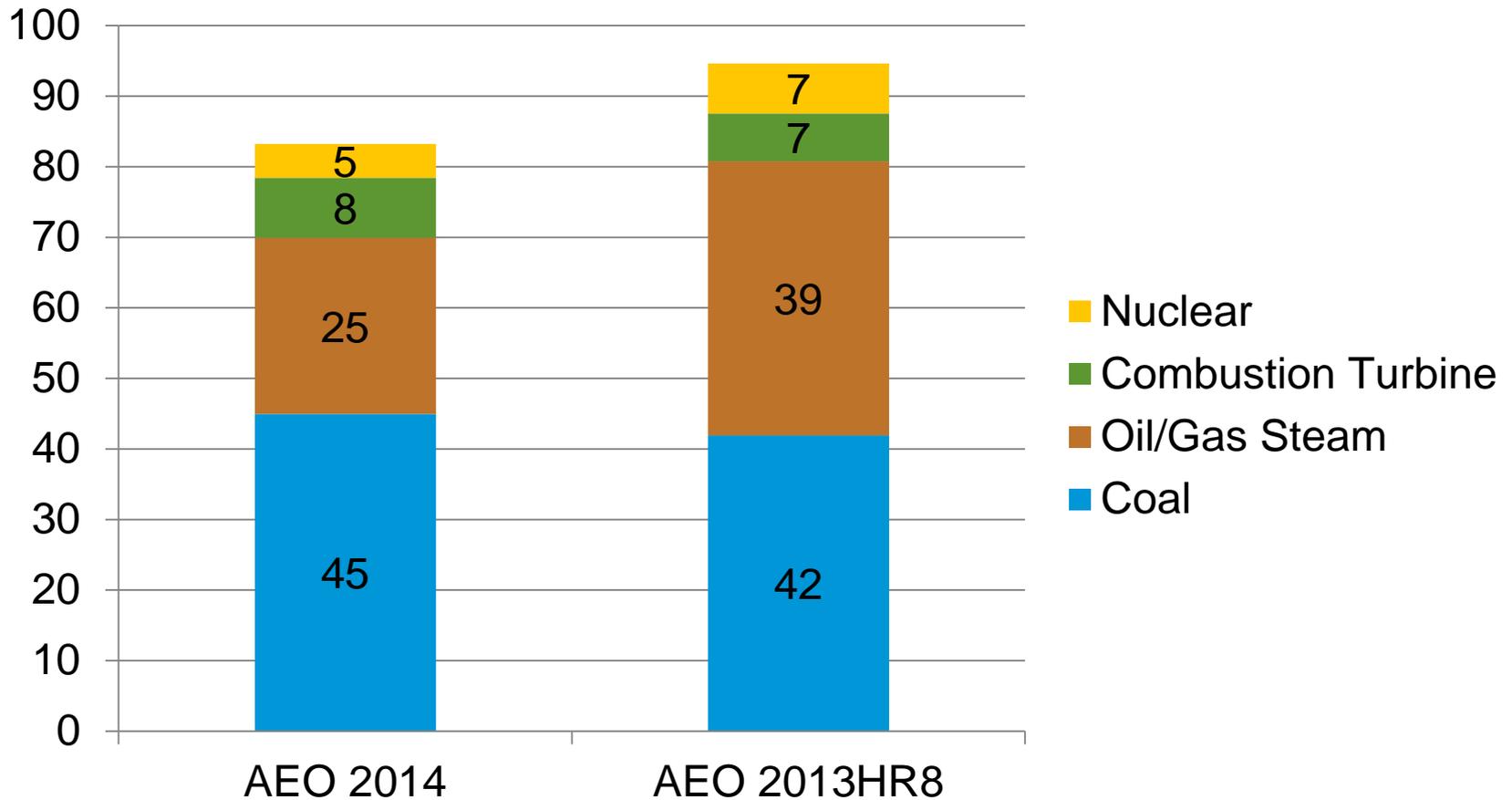
Billion kilowatthours



Source: AEO 2014: NEMS run ref2014/d092013a, AEO 2013: Full Release Reference Case, AEO2013 HR8

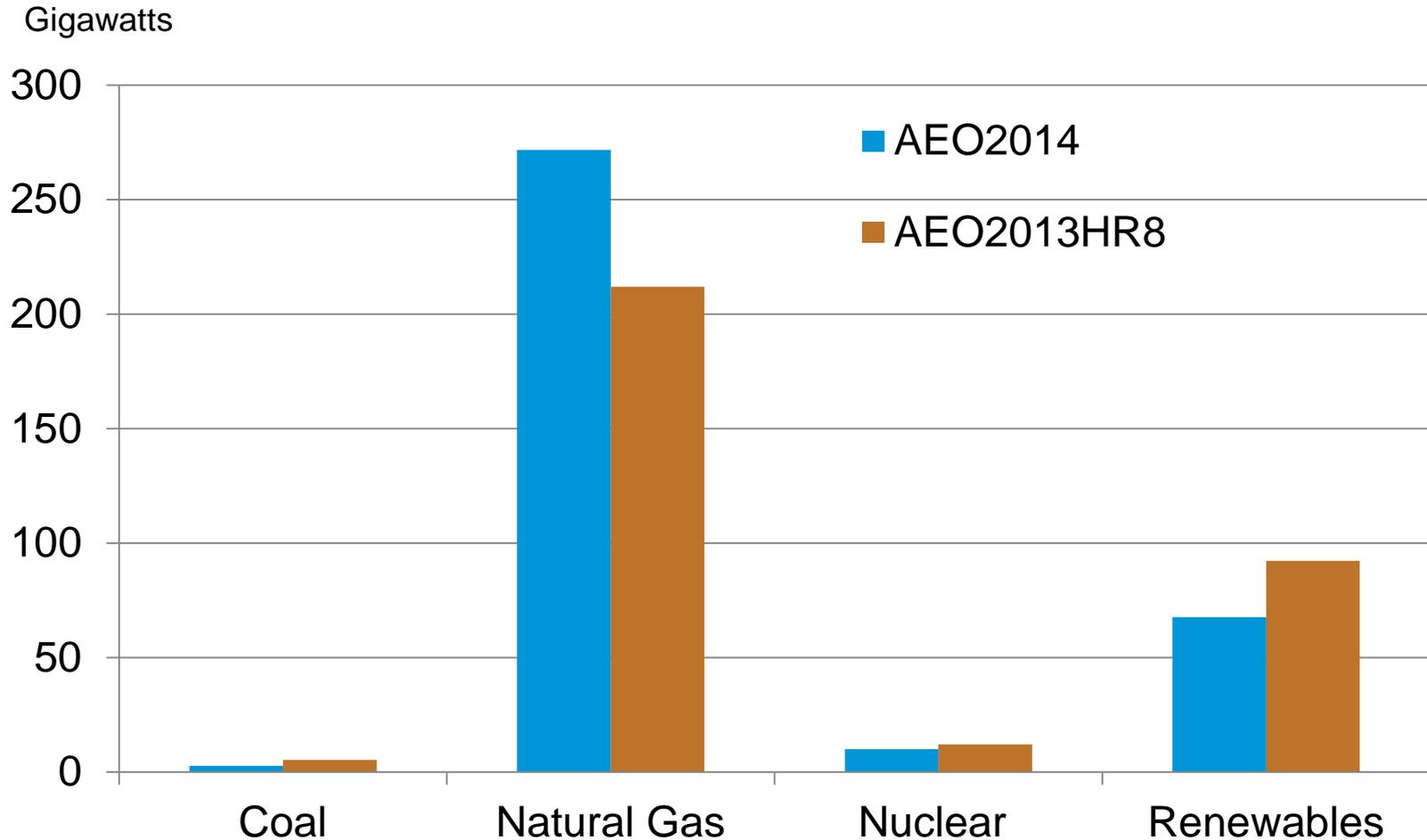
# Plant Retirements through 2040

Gigawatts



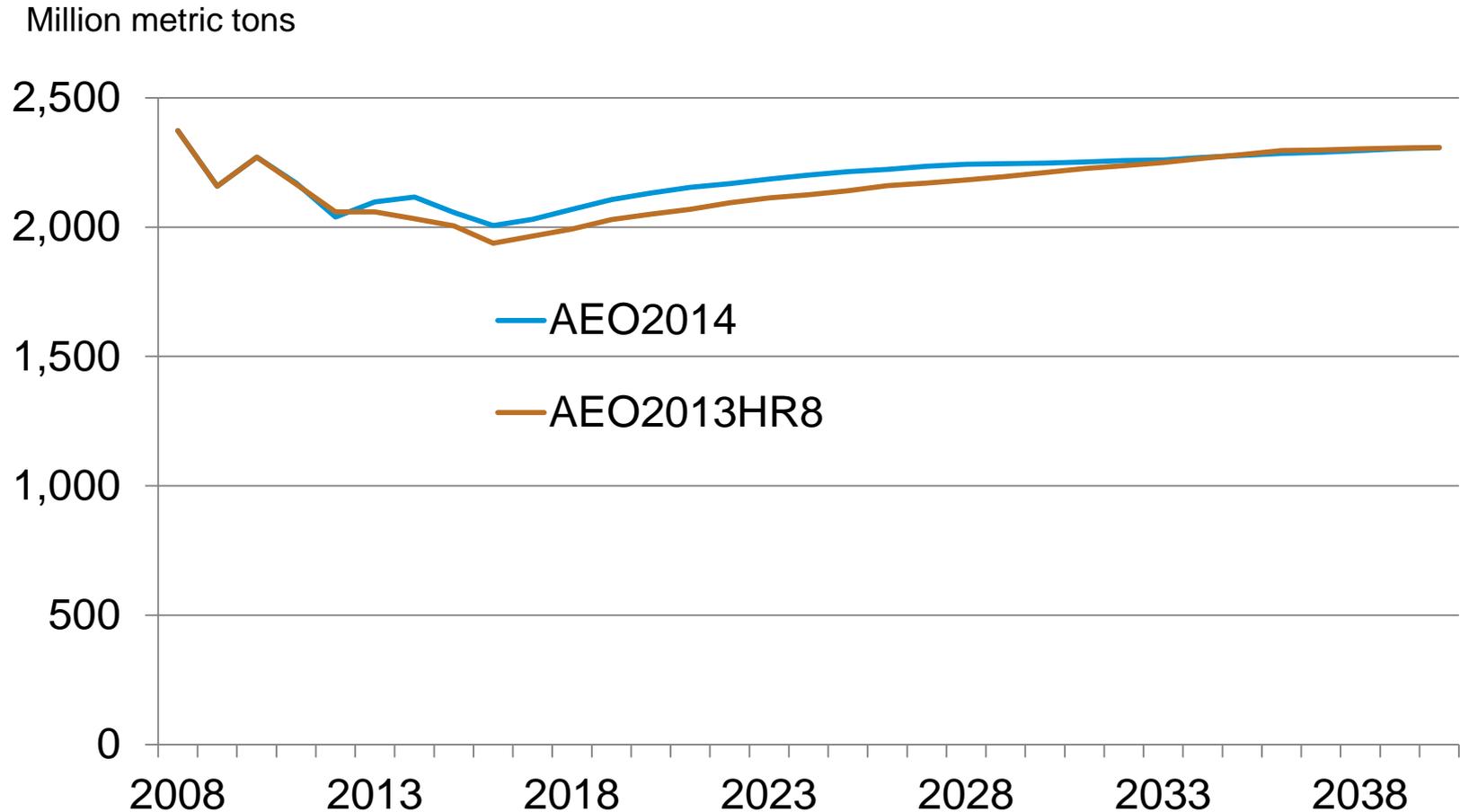
Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Capacity Additions through 2040



Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# CO<sub>2</sub> Emissions



Source: AEO 2014: NEMS run ref2014/d092013a, AEO2013 HR8

# Changes in release cycles for EIA's AEO and IEO

- To focus more resources on rapidly changing energy markets and how they might evolve over the next few years, the U.S. Energy Information Administration is revising the schedule and approach for production of the *International Energy Outlook (IEO)* and the *Annual Energy Outlook (AEO)*.
- Starting with *IEO2013*, which was released in July, 2013, EIA adopted a two-year production cycle for both the *IEO* and *AEO*.
- Under this approach, a full edition of the *IEO* and *AEO* will be produced in alternating years and an interim, shorter edition of each will be completed in the “off” years.

	<u>2014</u>	<u>2015</u>
<b>International Energy Outlook</b>	<b>Interim Edition will be released in mid 2014</b> , focusing on the liquids projection, which is used as part of the <i>AEO2014</i> . Summary tables and a short analysis will be included.	<b>Full Edition will be released in the spring 2015</b>
<b>Annual Energy Outlook</b>	<b>Full Edition will be released in spring 2014</b> , including analysis of energy issues and many alternative scenarios.	<b>Interim Edition will be released in late 2014 or early 2015</b> and will only include the Reference, Low and High Economic Growth, and Low and High Oil Price cases. The shorter version will include tables for these cases and short discussions.

# Contacts

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