

# Buildings Sector Working Group

## *AEO2014 Preliminary Results*



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# Overview

- Residential projects
  - RECS update
  - Housing stock formation and decay
  - Lighting model
  - ENERGY STAR homes benchmarking
  - Weather elasticities
- Commercial projects
  - Major end-use capacity factors
  - Data center servers
  - ENERGY STAR buildings
  - Hurdle rate floor
- Both sectors
  - Usual annual updates
  - Miscellaneous end-use technology assumptions updates
  - Distributed generation
- Contract reports
- Changes in release cycles
  - AEO and IEO

# Residential results

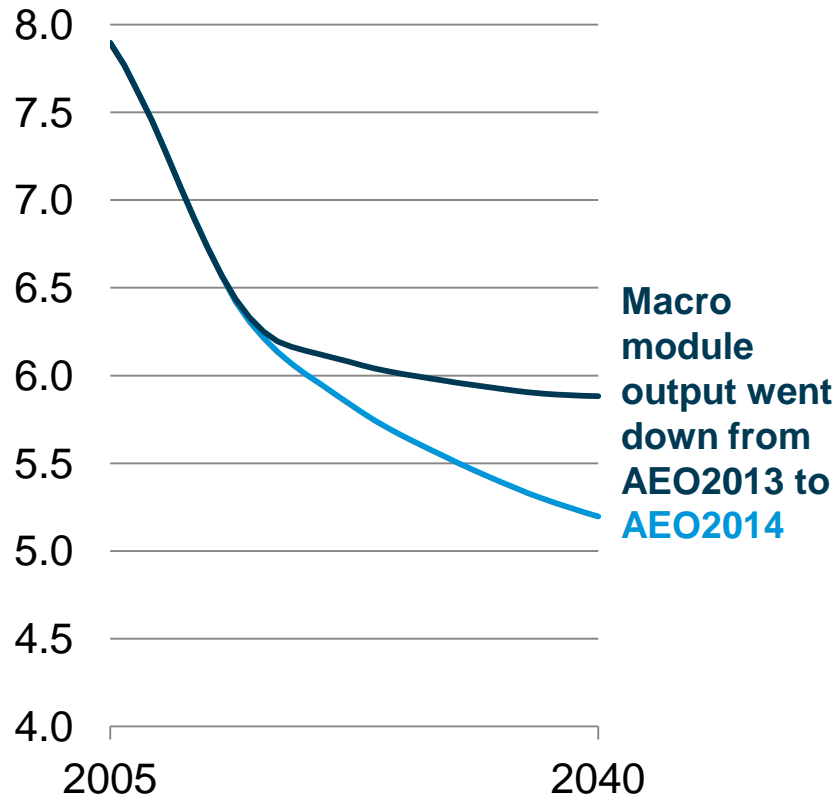
# Macro: slower household growth expected

- Slower population growth (now 0.7% CAGR; was 0.9%)
- Slower household growth
- Housing starts now based on macro module output for entire projection
- Decay rates: what percent of this year's stock survives into next year?

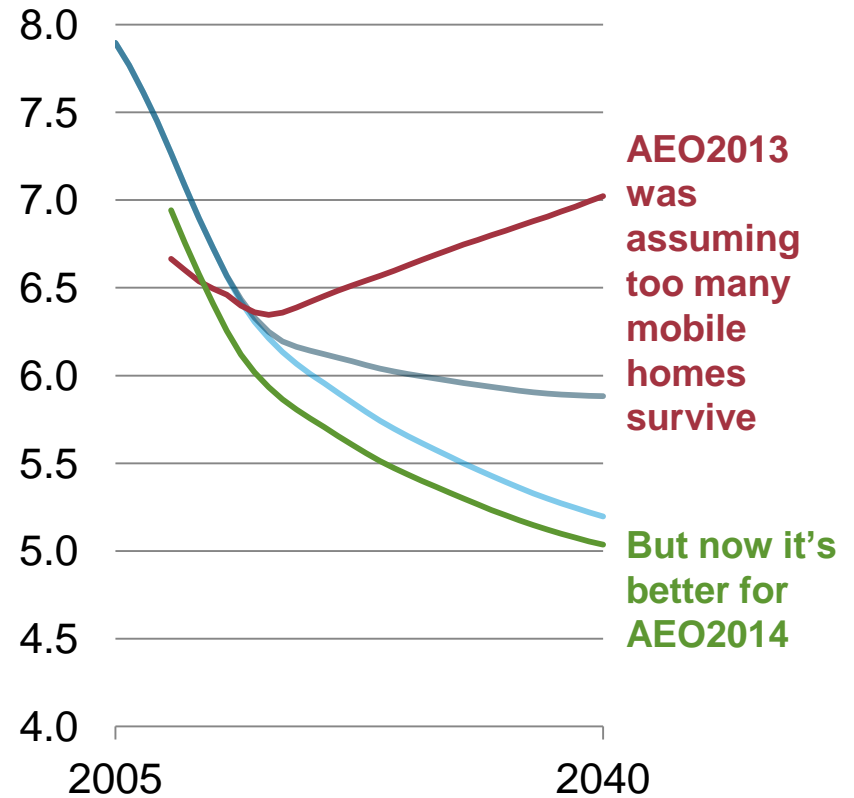
	NEW	OLD
Single family	.997	.996
Multi-family	.995	.999
Mobile homes	.966	.976

# What this means for, say, mobile homes

stock of mobile homes (MAM)  
millions

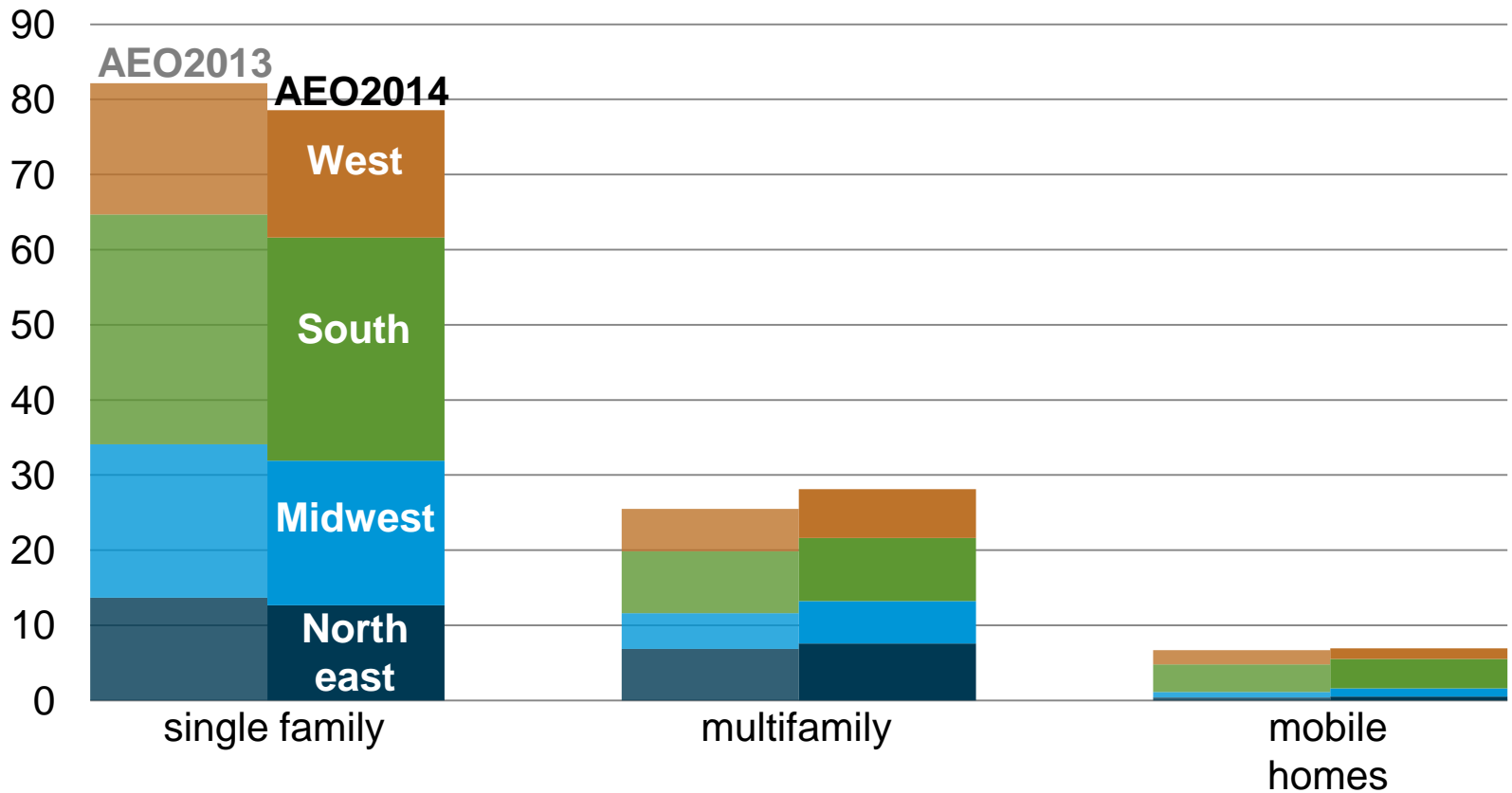


stock of mobile homes (MAM and RDM)  
millions



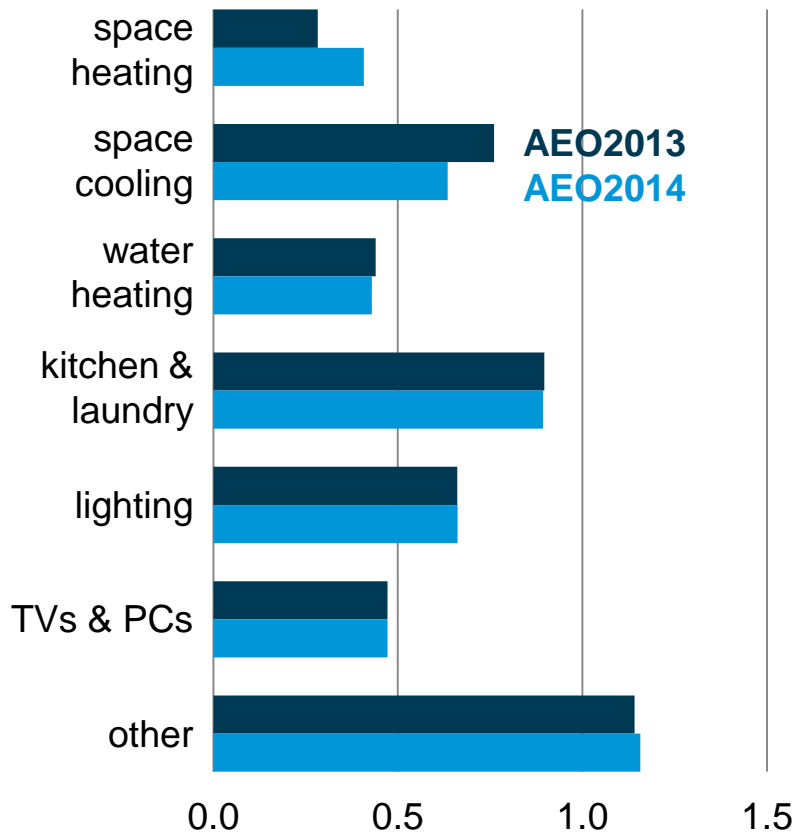
# 2009 RECS: Smaller share of single family households

**2009 housing stock by region and building type**  
millions of homes

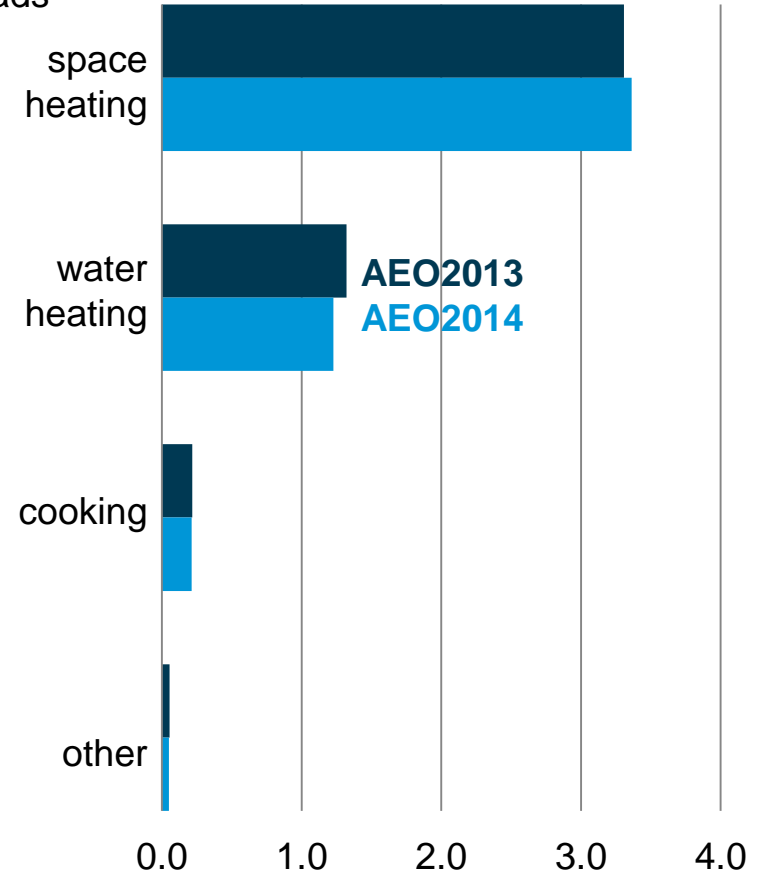


# Base year end use composition affects projections (major fuels)

**2009 electricity (delivered)**  
quads



**2009 natural gas**  
quads



Source: EIA, ref2014.d092413a

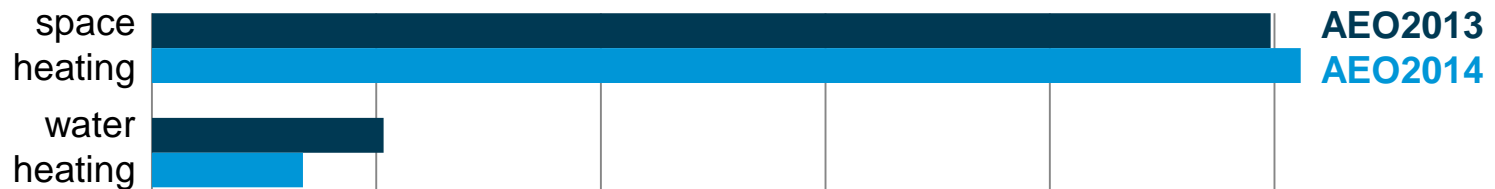
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# Base year end use composition affects projections (minor fuels)

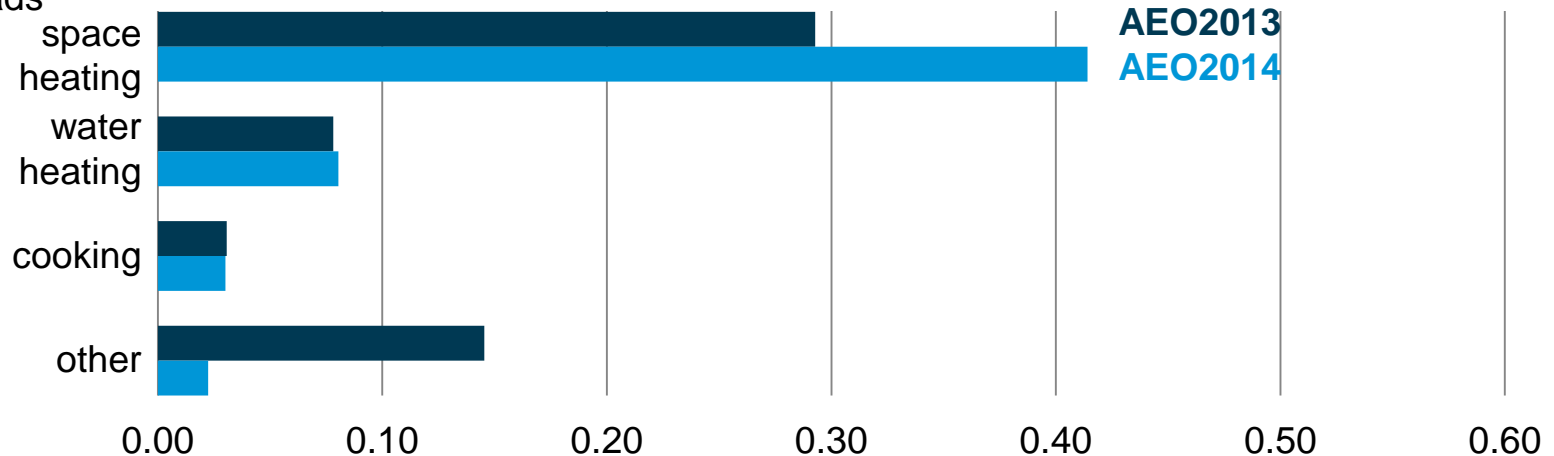
## 2009 distillate fuel

quads



## 2009 liquefied petroleum gas

quads



Source: EIA, ref2014.d092413a

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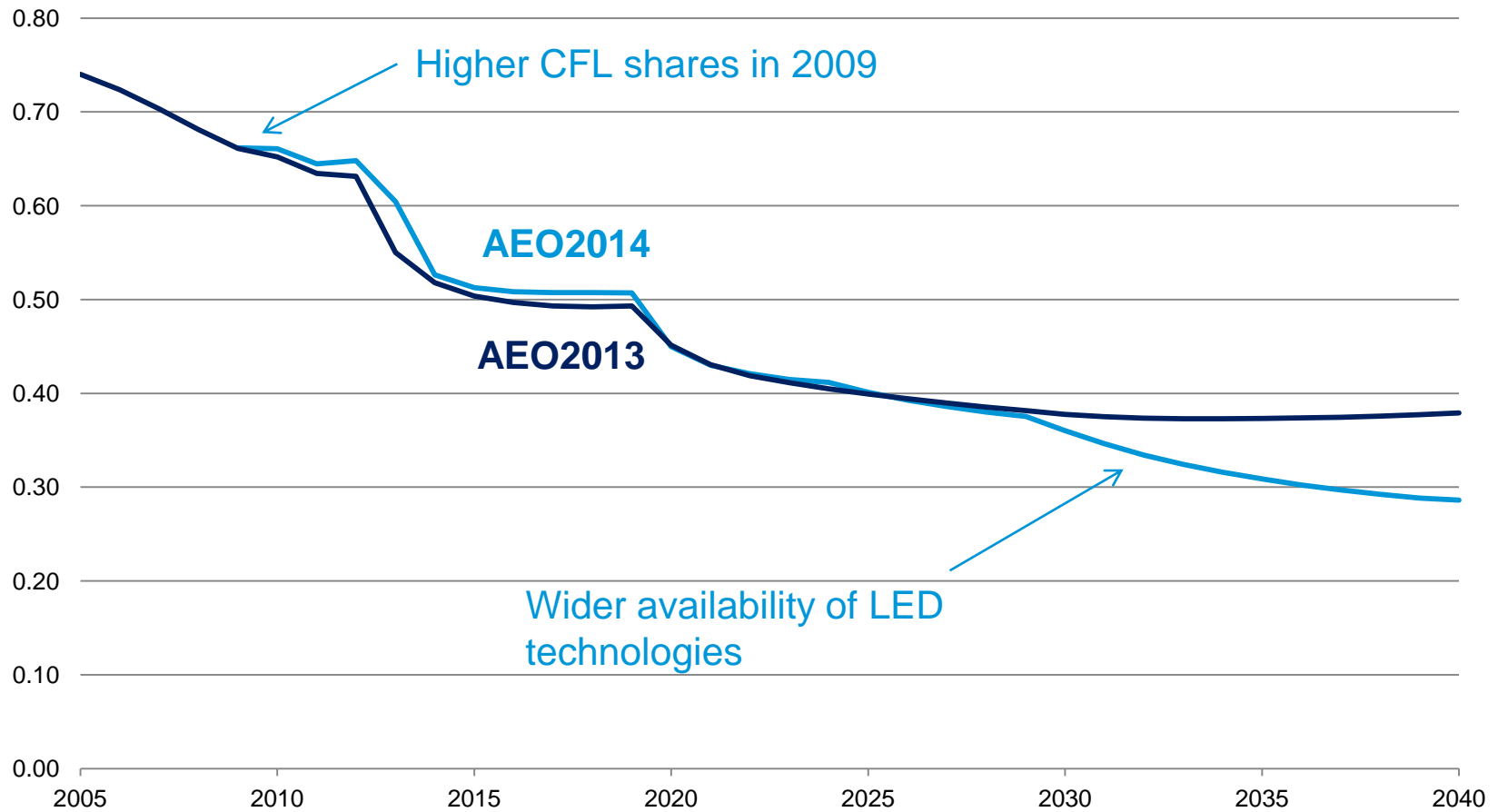


# Lighting module updates

- Lighting projections now driven completely by input file specifications
  - Flexible number of lighting end uses
  - Hours of use bins available for all end uses
- Redefined lighting end use categories
  - AEO 2013: general service, reflector, linear fluorescent, **torchieres**
  - AEO 2014: general service, reflector, linear fluorescent, **exterior**
- Data updates
  - Reduced cost of halogen bulbs meeting EISA efficacy requirements
  - Added LED alternative to linear fluorescents

# Lighting projections reflect expanded LED availability in later years

delivered lighting consumption  
quads



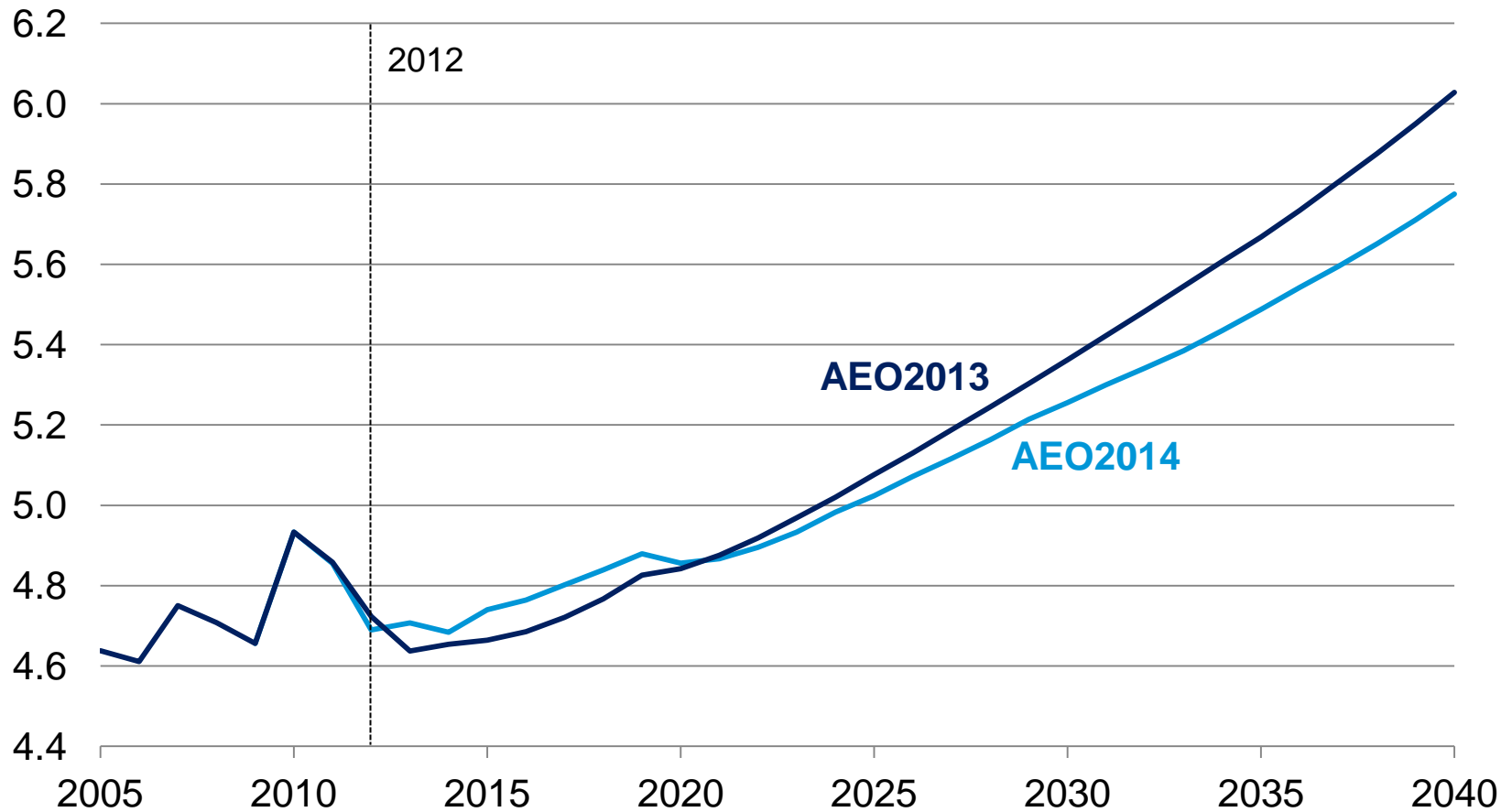
Source: EIA, ref2014.d092413a

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# Residential electricity consumption higher in near term

delivered electricity consumption

quads



Source: EIA, ref2014.d092413a

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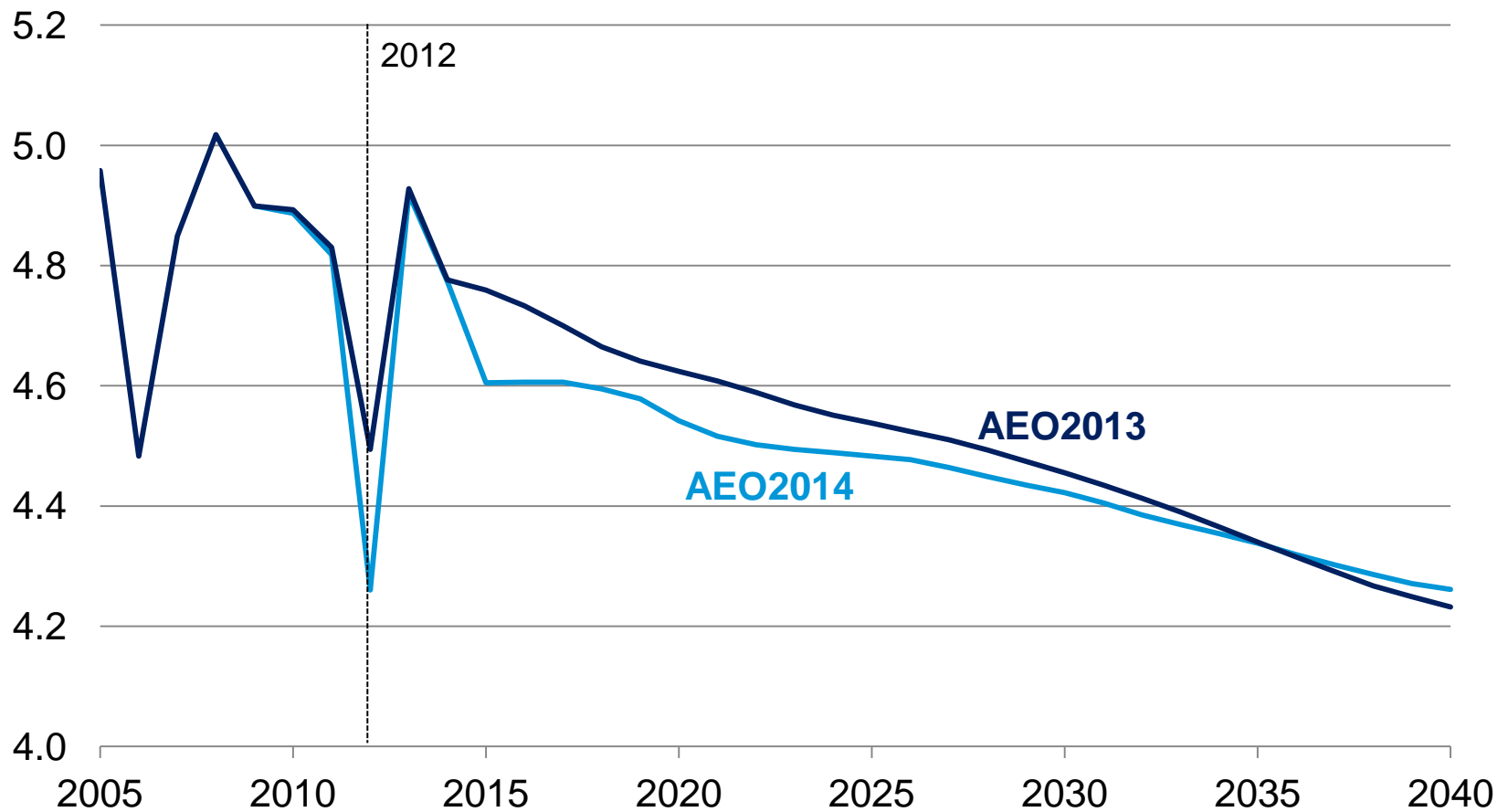
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# Residential natural gas consumption lower in near term

## natural gas consumption

quads



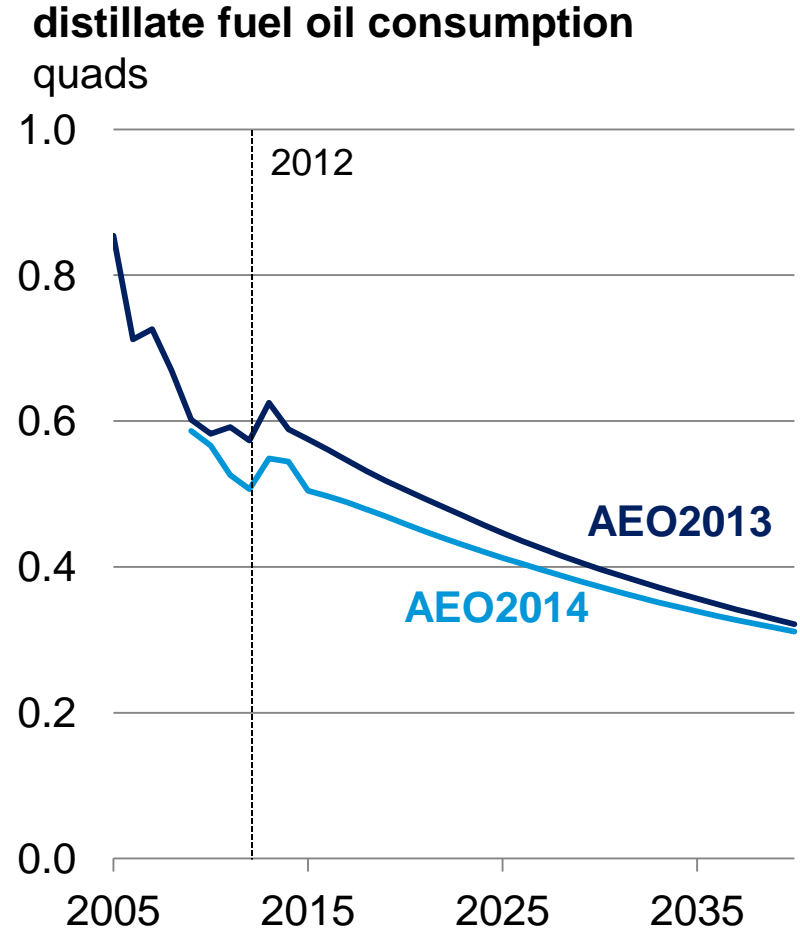
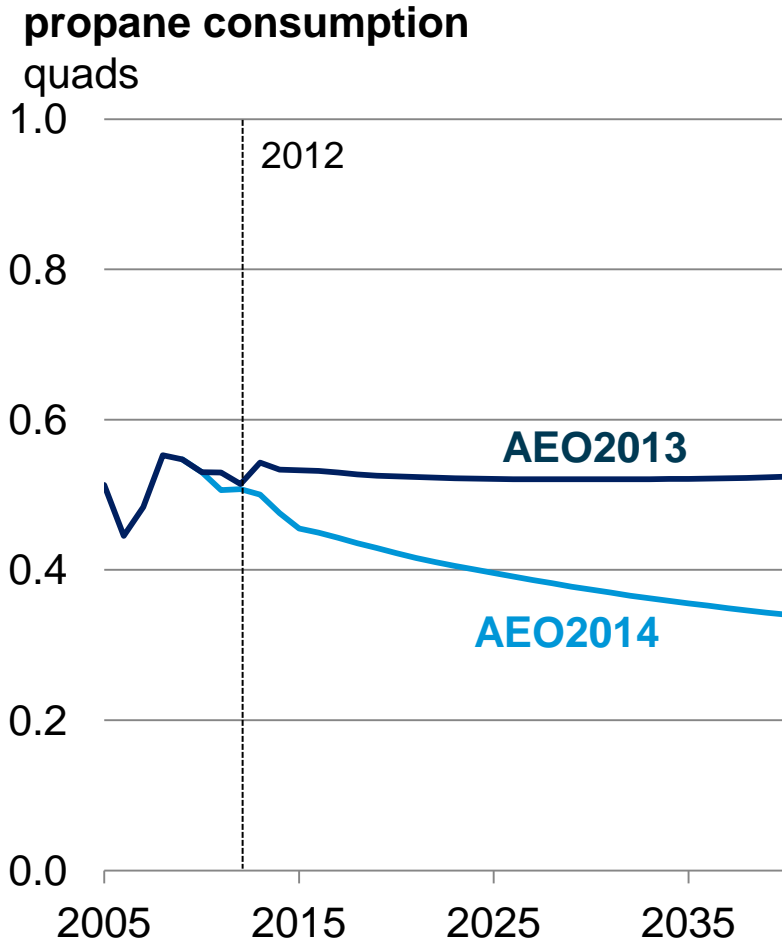
Source: EIA, ref2014.d092413a

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# Petroleum fuels also lower than AEO2013

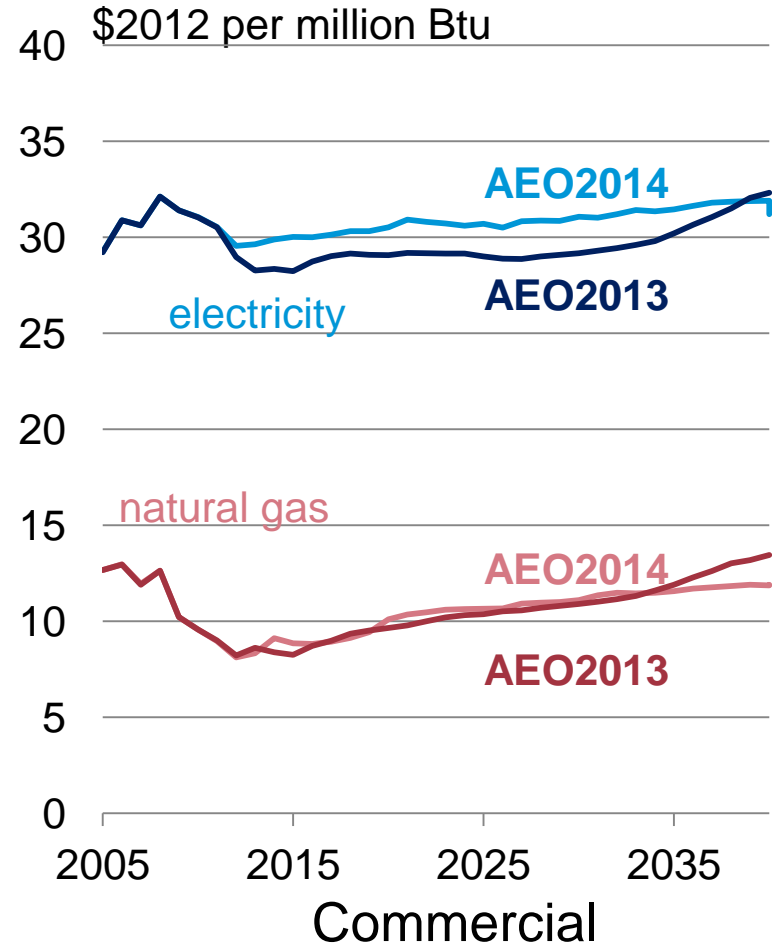
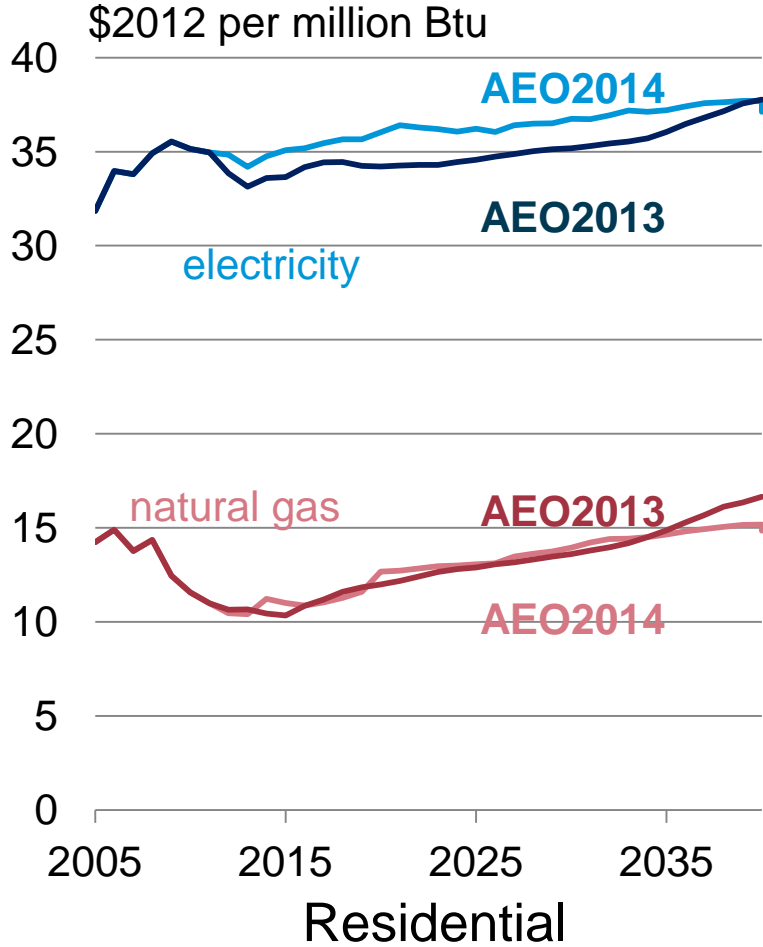


Source: EIA, ref2014.d092413a

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# Electricity prices higher; natural gas similar



Source: EIA, ref2014.d092413a

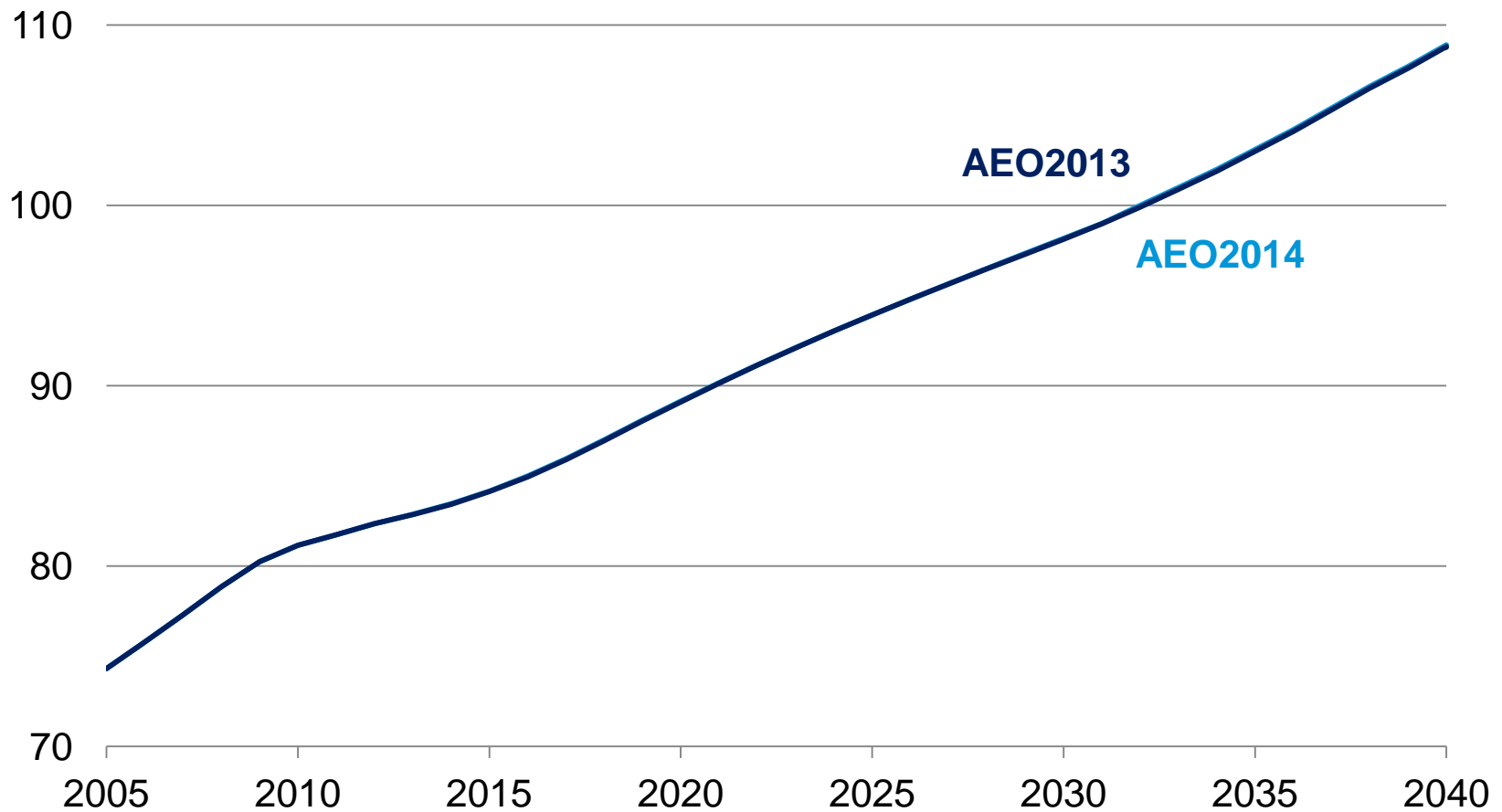
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# Turning to the commercial sector ...

# Commercial floorspace virtually unchanged from AEO2013

**total floorspace**  
billion square feet



Source: EIA, ref2014.d092413a

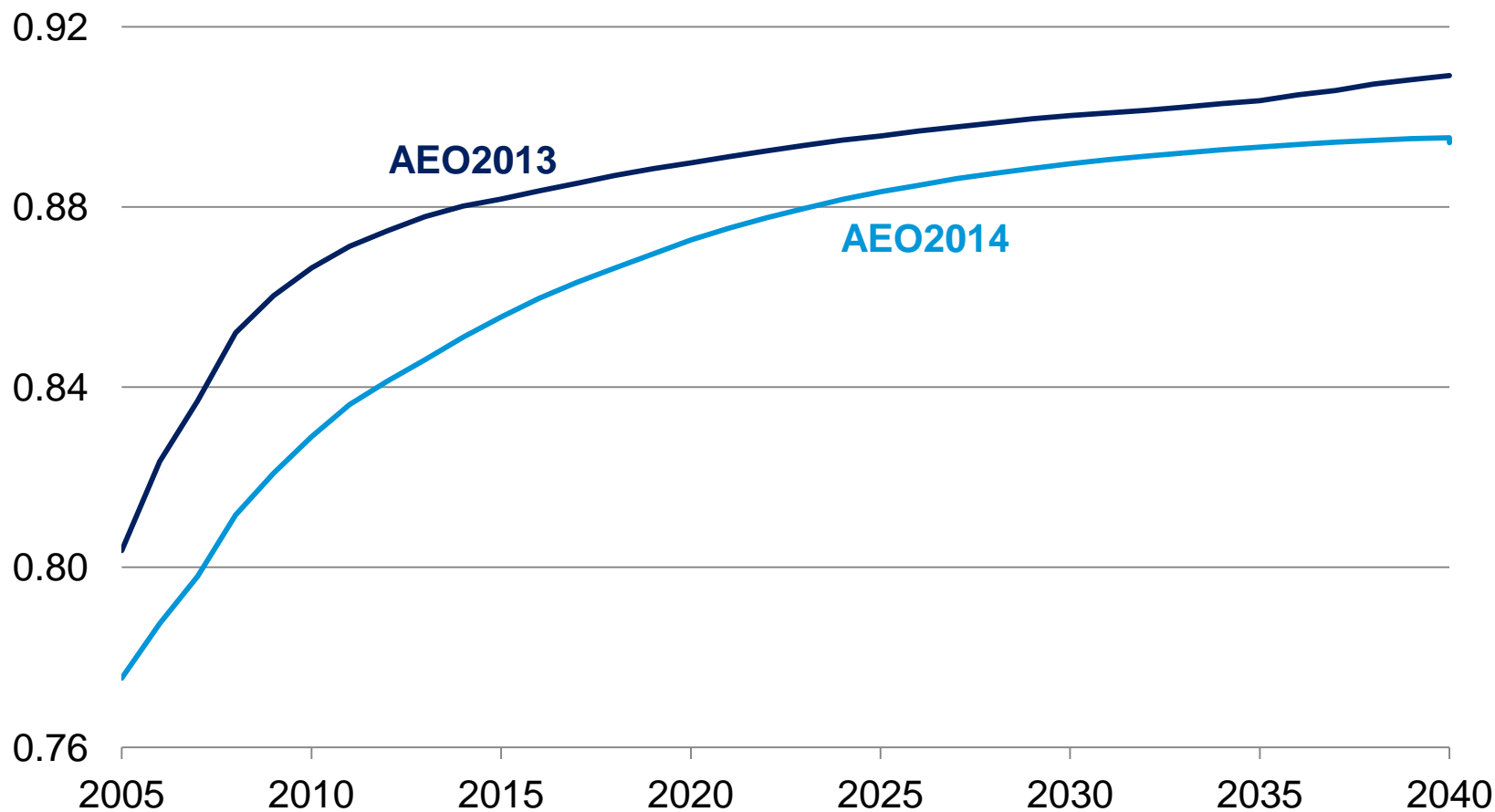
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# Lower commercial capacity factors reduce potential savings from efficient purchases

## stock efficiency of natural gas water heaters

Btu out/ Btu in



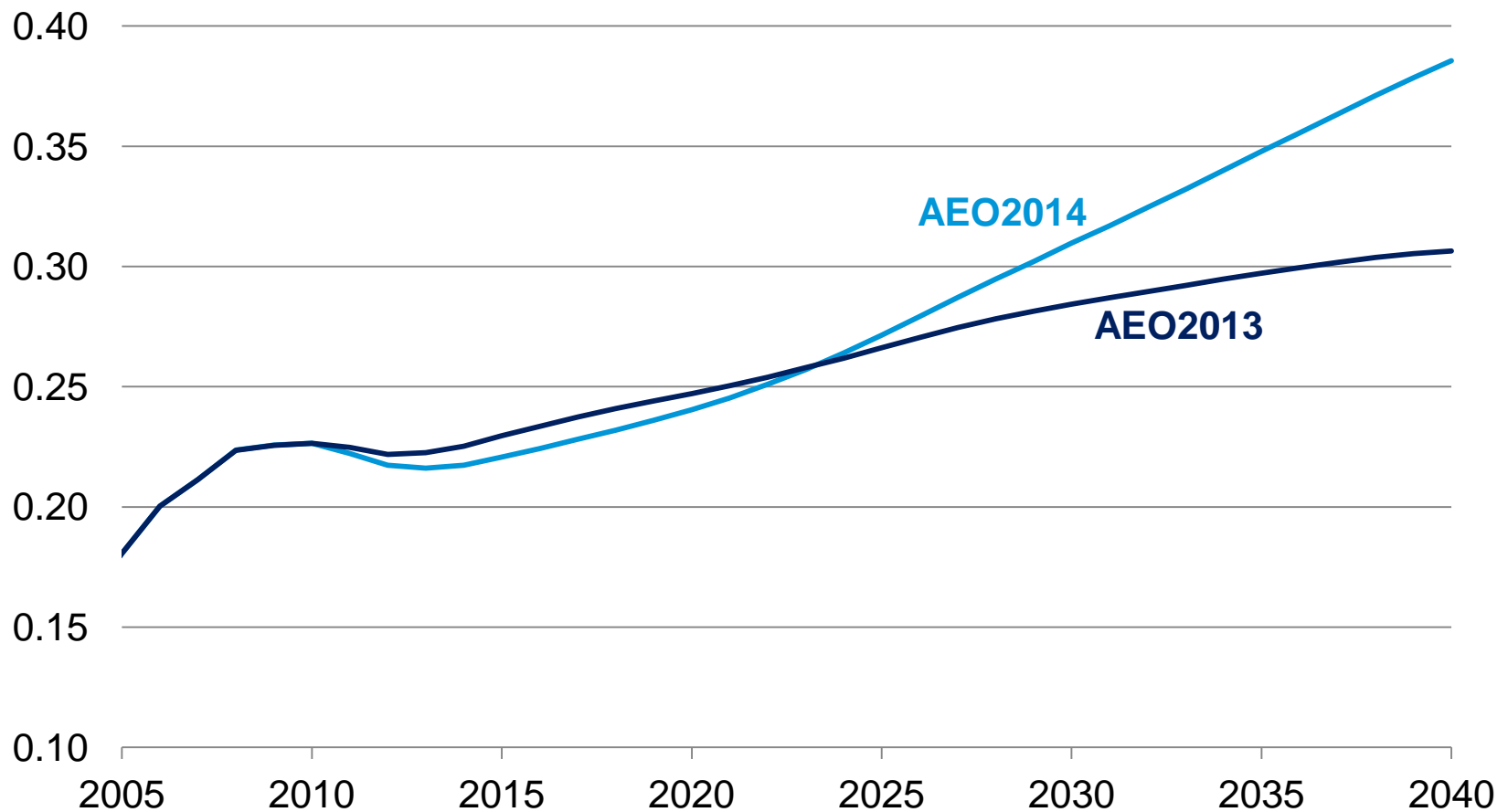
Source: EIA, ref2014.d092413a

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# Data centers server installed base grows at the rate of service output

non-PC office equipment consumption  
quads



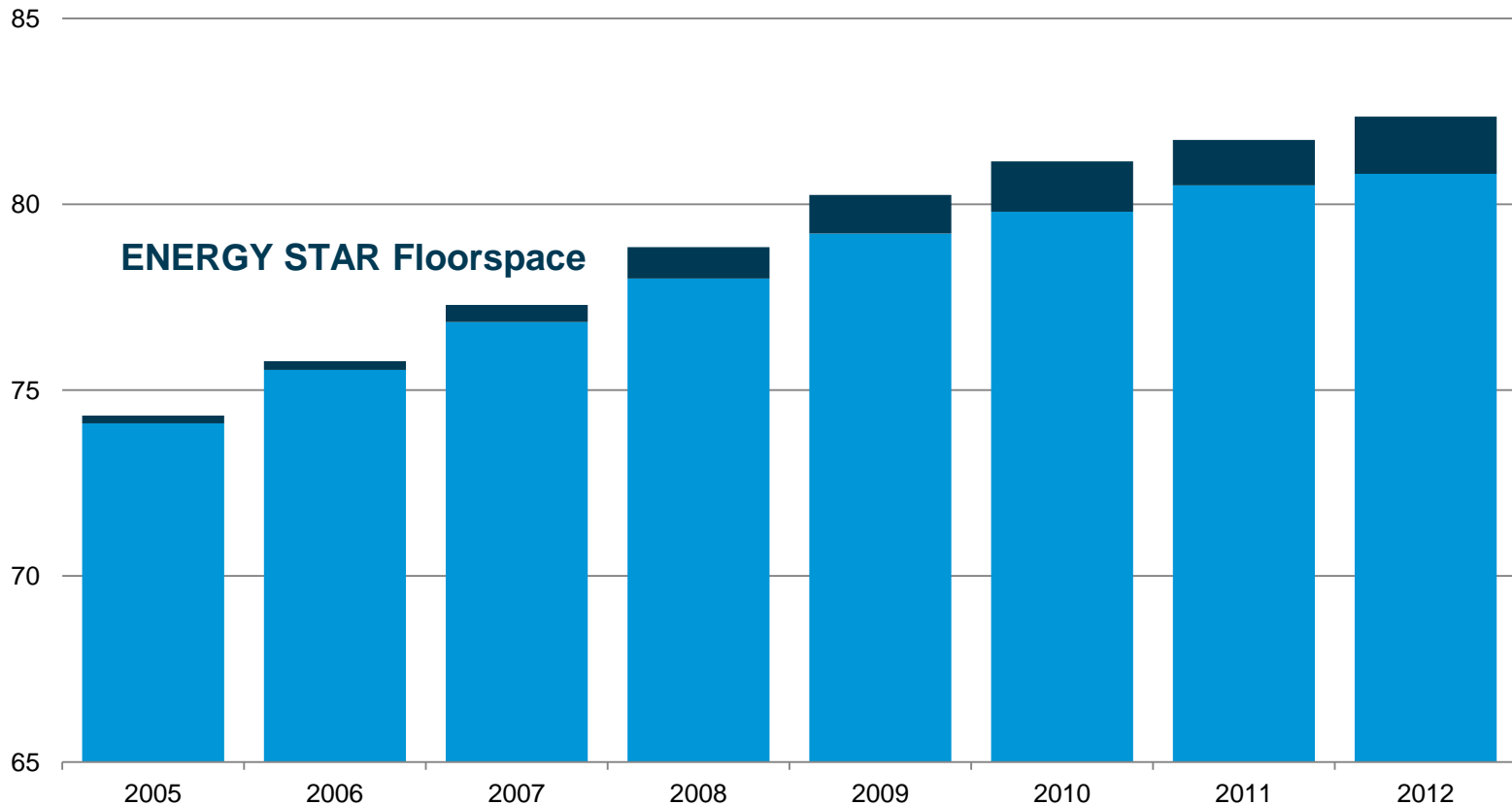
Source: EIA, ref2014.d092413a

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# ENERGY STAR floorspace accounts for 1.9% of total commercial floorspace in 2012

**total floorspace**  
billion square feet



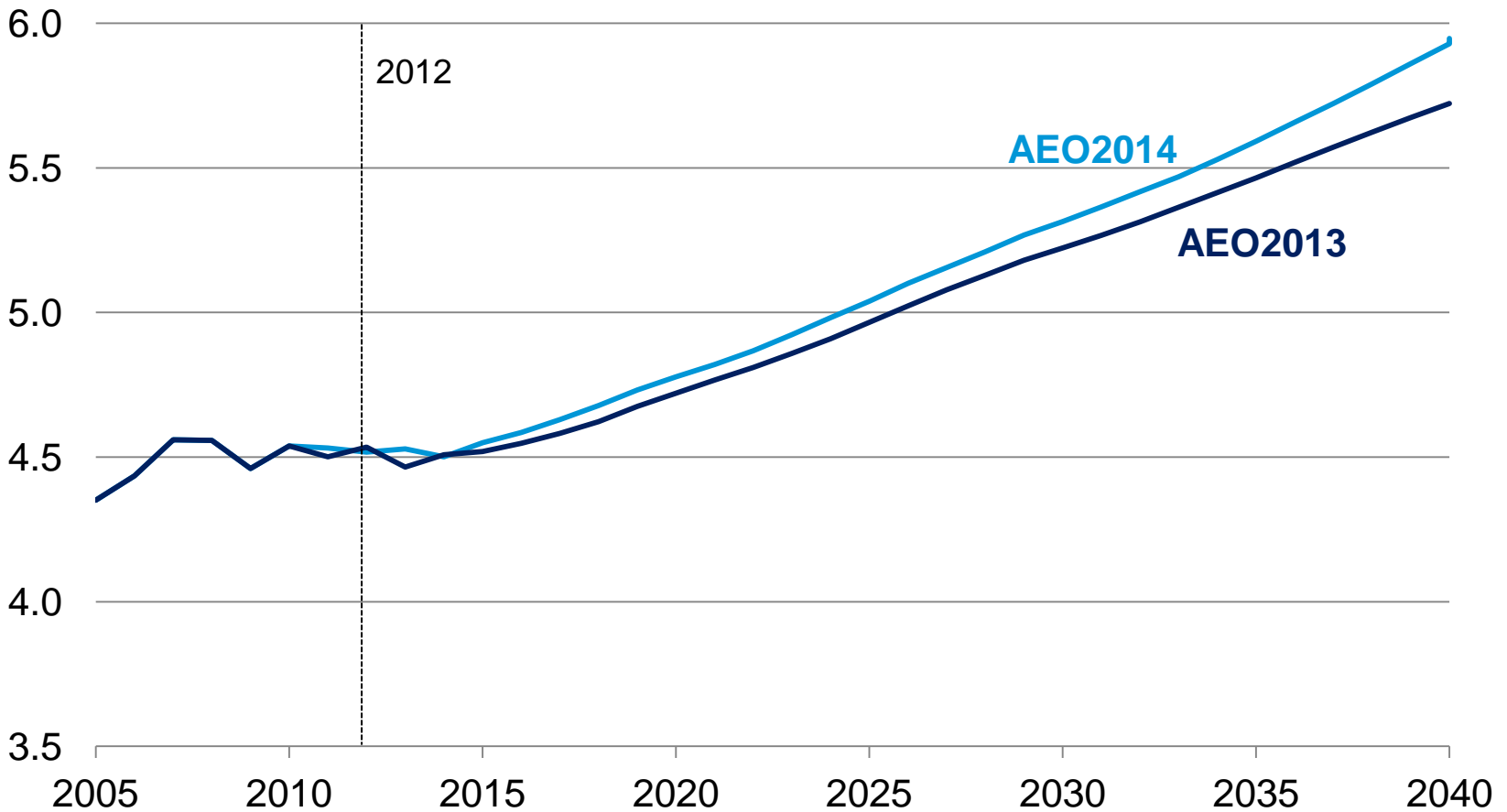
Source: EIA, ref2014.d092413a

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# Commercial electricity consumption higher than in AEO2013 delivered electricity consumption

quads



Source: EIA, ref2014.d092413a

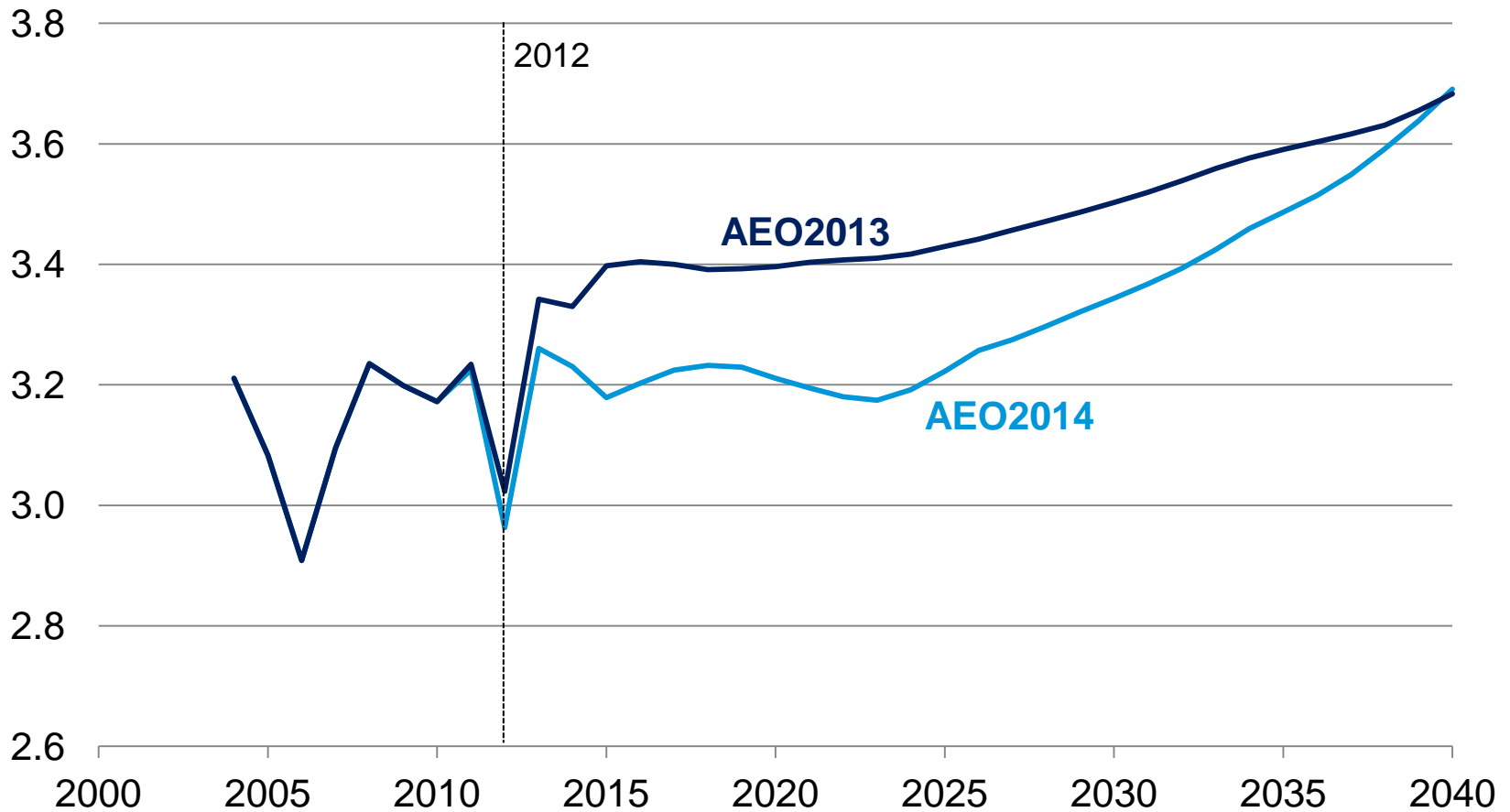
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# Commercial natural gas consumption lower than in AEO2013

natural gas consumption

quads



Source: EIA, ref2014.d092413a

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# Other projects

# Miscellaneous Electric Loads (MELs) Update

Commercial MELs	Residential MELs
Distribution Transformers	Dehumidifiers
Data Center Servers	Set-top Boxes, All
IT Equipment (non-data center)	Modems & Routers
Water Treatment/Distribution	External Power Supplies
PC – Desktops	Non-Computer Rechargeable Electronics
PC – Laptops	Ceiling Fans
PC – Monitors	Televisions
Kitchen Ventilation	DVD
Lab Refrigerators/Freezers	PCs, Laptop
Medical Imaging Equipment	PCs, Desktop
Video Displays	Monitors (i.e. desktop PC monitors)
Video Boards	Audio Equipment
Security Systems	Portable Electric Spas
	Pools/Pool Pumps
	Security Systems, Home

Televisions consumed 70 TWh in 2011, but efficiency is improving with the changeover to LCDs; however increases in typical size counter some efficiency gains.

		2011	2015	2020	2030	2040
Installed Base	(000s)	355,000	364,000	388,000	444,000	501,000
Power Draw (W)	Active	127	95	83	69	62
	Off/Standby	1.62	1.13	0.49	0.40	0.4
Annual Usage (hrs)	Active	1,460	1460	1460	1460	1460
	Off/Standby	7300	7300	7300	7300	7300
UEC	kWh/yr	197	150	130	100	94
AEC	TWh/yr	70.0	54.6	50.4	44.4	47.1

***This category includes:***

- *Cathode Ray Tubes (CRT) – 47% of installed base*
- *Liquid Crystal Displays (LCD) – 42% of installed base*
- *Plasma – 11% of installed base*

*“Analysis and Representation of Miscellaneous Electric Loads in NEMS”, Navigant Consulting, September 2013.*

Major equipment contract reports now available online:

<http://www.eia.gov/analysis/studies/buildings/equipcosts/>



# Distributed generation

- Update to latest installed capacity for PV
- Potential refinement of current and near-term PV costs (Tracking the Sun VI and joint LBNL/NREL presentation)

# 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)*.
- Under this approach, a full edition of the *IEO* and *AEO* will be produced in alternating years and a shorter edition of each will be completed in the “interim” years.

# AEO and IEO cycles for 2014 and 2015

	2014	2015
International Energy Outlook	<p><b>Interim Edition</b> in mid 2014:</p> <ul style="list-style-type: none"> <li>• focus on the liquids projection as used in AEO2014</li> <li>• summary tables</li> <li>• short analysis</li> </ul>	<p><b>Full Edition</b> in the spring</p>
Annual Energy Outlook	<p><b>Full Edition</b> in the spring:</p> <ul style="list-style-type: none"> <li>• analysis of energy issues</li> <li>• many alternative scenarios</li> </ul>	<p><b>Interim Edition</b> in late 2014 or early 2015:</p> <ul style="list-style-type: none"> <li>• Reference</li> <li>• Low / High Economic Growth</li> <li>• Low / High Oil Price cases</li> <li>• short discussions</li> </ul>

# For more information

U.S. Energy Information Administration home page | [www.eia.gov](http://www.eia.gov)

Short-Term Energy Outlook | [www.eia.gov/steo](http://www.eia.gov/steo)

Annual Energy Outlook | [www.eia.gov/aeo](http://www.eia.gov/aeo)

International Energy Outlook | [www.eia.gov/ieo](http://www.eia.gov/ieo)

Monthly Energy Review | [www.eia.gov/mer](http://www.eia.gov/mer)

Today in Energy | [www.eia.gov/todayinenergy](http://www.eia.gov/todayinenergy)