DRAFT: Working Document

Preliminary Data Update of the 2008 New Jersey Energy Master Plan

August 13, 2010

RUTGERS
Edward J. Bloustein School of Planning and Public Policy

Center for Energy, Economic & Environmental Policy (CEEEP)

Acknowledgement

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Margaret Gallos

John Garvey

Benjamin Hunter

Jerome May

Anne Marie McShea

Kristina Miller

Frank Perrotti

John "Greg" Reinert

Andrea Sarmentero-Garzon

Joseph Sullivan

Micheal Winka

All errors and omissions are the responsibility of CEEEP

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Overview of Presentation's Contents

This Power Point DRAFT presentation contains four main sections:

- First, it provides a summary of the New Jersey Energy Master Plan Statute and the major goals of the 2008 Energy Master Plan. The complete Energy Master Plan Statute along with more details regarding the 2008 Energy Master Plan is provided in Appendix A to the presentation.

- Second, the presentation provides a breakdown of generic residential electric and natural gas "rates" in 2009. Four graphics are presented. Two graphics are for electricity and two are for natural gas; two provide the value of each component and two provide the percentage of that component as a part of the total rate.

- Third, the presentation contains a comparison of projections made in 2008 with updated projections based primarily but not exclusively on the R/ECON™ State Economic model. The 2008 projections include the *Business as Usual Scenario* and the *EMP Scenario*. The 2010 projection is a *Baseline* projection based upon the recent runs of the R/ECON™ model and does not account for the 2008 Energy Master Plan, Solar Energy Advancement and Fair Competition Act and Offshore Wind Economic Development Act. Projections should not be treated as forecasts; instead, they are the result of a modeling exercise given a particular set of assumptions.

- Finally, the presentation contains information regarding costs of various generation technologies and associated assumptions. These data, culled from numerous publicly available reports, include capital costs, fixed and variable operations and maintenance costs, capacity factors, cost-of-capital, and other related costs.

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Energy Master Plan Statute (52:27F-14)

- Originally enacted in 1977.
- The State will create a new Energy Master Plan every 10 years and update every 3 years.
- A 1987 amendment to the statute mandated a standing committee representing all relevant state policymaking agencies (including Commerce, Energy and Economic Development; Community Affairs; Environmental Protection; Health; Human Services; Transportation; and Treasury).

The Statute details that the Energy Master Plan shall:

- Include long-term objectives but shall provide for the interim implementation of measures consistent with its objectives.
- Give due consideration to the energy needs and supplies in the several geographic areas of the State.
- Consult and cooperate with any federal or State agency having an interest in the production, distribution, consumption or conservation of energy.

The complete Energy Master Plan Statute can be found in Appendix A at the end of the presentation.

The latest Energy Master Plan was issued in October 2008 and its 3-year update is due in October 2011.

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Energy Master Plan (October 2008)

The 2008 Energy Master Plan proposes a road map toward an energy future with adequate, reliable energy that is environmentally responsible and competitively priced.

Goal 1 Maximize the State's energy conservation and energy efficiency to achieve reduction in energy consumption of at least 20% by 2020

Goal 2 Reduce peak electricity demand by 5,700 MW by 2020

Goal 3 Strive to exceed the current RPS and achieve 30% of the State's electricity needs from renewable sources by 2020

Goal 4 Develop a 21st Century energy infrastructure that supports the goals and action items of the EMP, ensures reliability of the system, and makes available additional tools to consumers to manage their energy consumption

Goal 5 Invest in innovative clean energy technologies and businesses to stimulate the industry's growth in New Jersey

The EMP goals and associated action items are discussed in the following slides. The key references are:

1. Energy Master Plan, October 2008
2. Modeling Report for the New Jersey Energy Master Plan, October 2008
3. 2008 EMP – 2008 Energy Master Plan R/ECON™ output, September 2008
4. 2008 Baseline – 2008 Baseline R/ECON™ output, September 2008
5. 2010 Baseline – 2010 Baseline R/ECON™ output, July 2010

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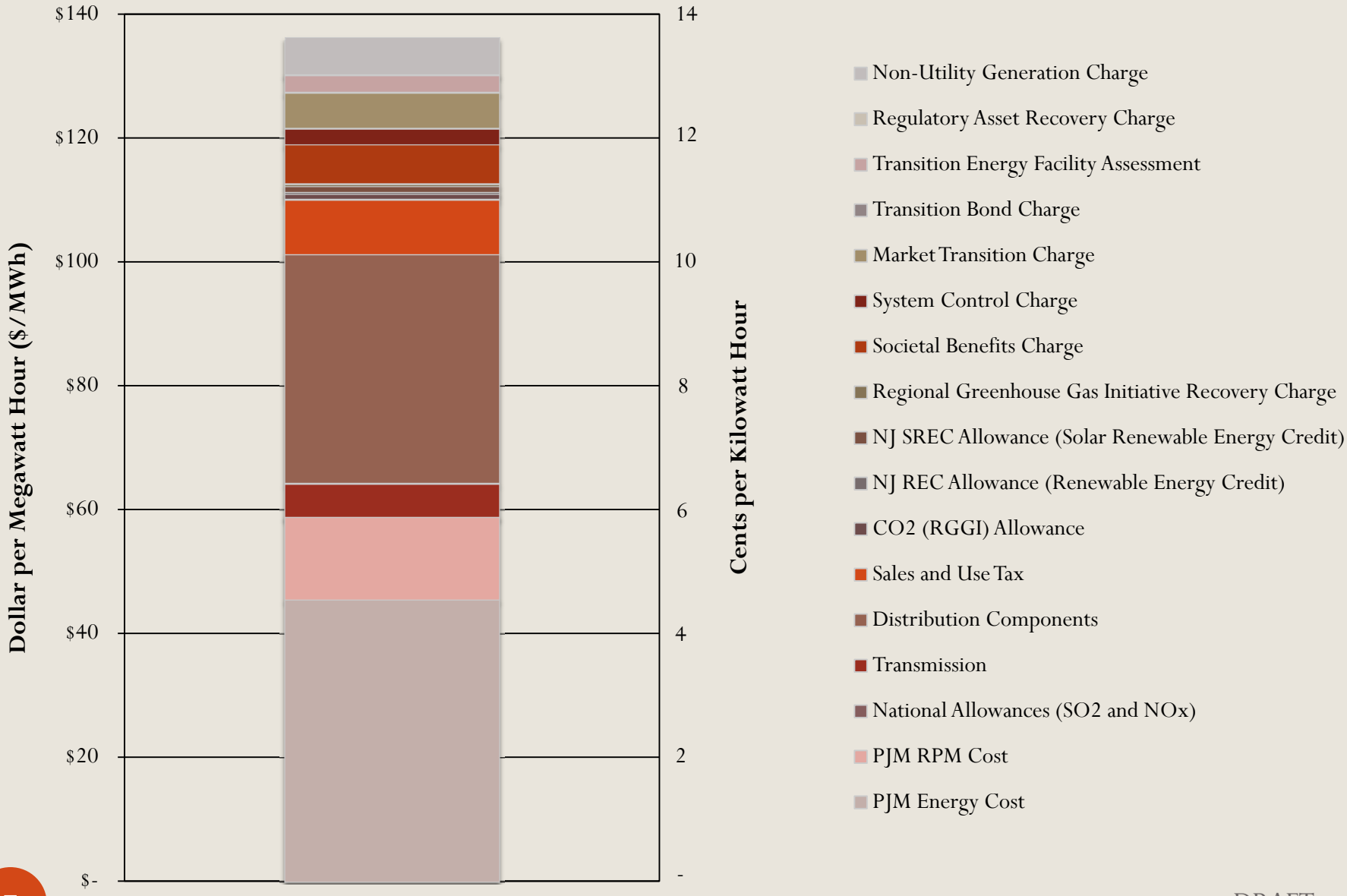
Reference: New Jersey Energy Master Plan (October 2008). Accessed at www.nj.gov/emp/

2009 New Jersey Residential Electricity "Rate"



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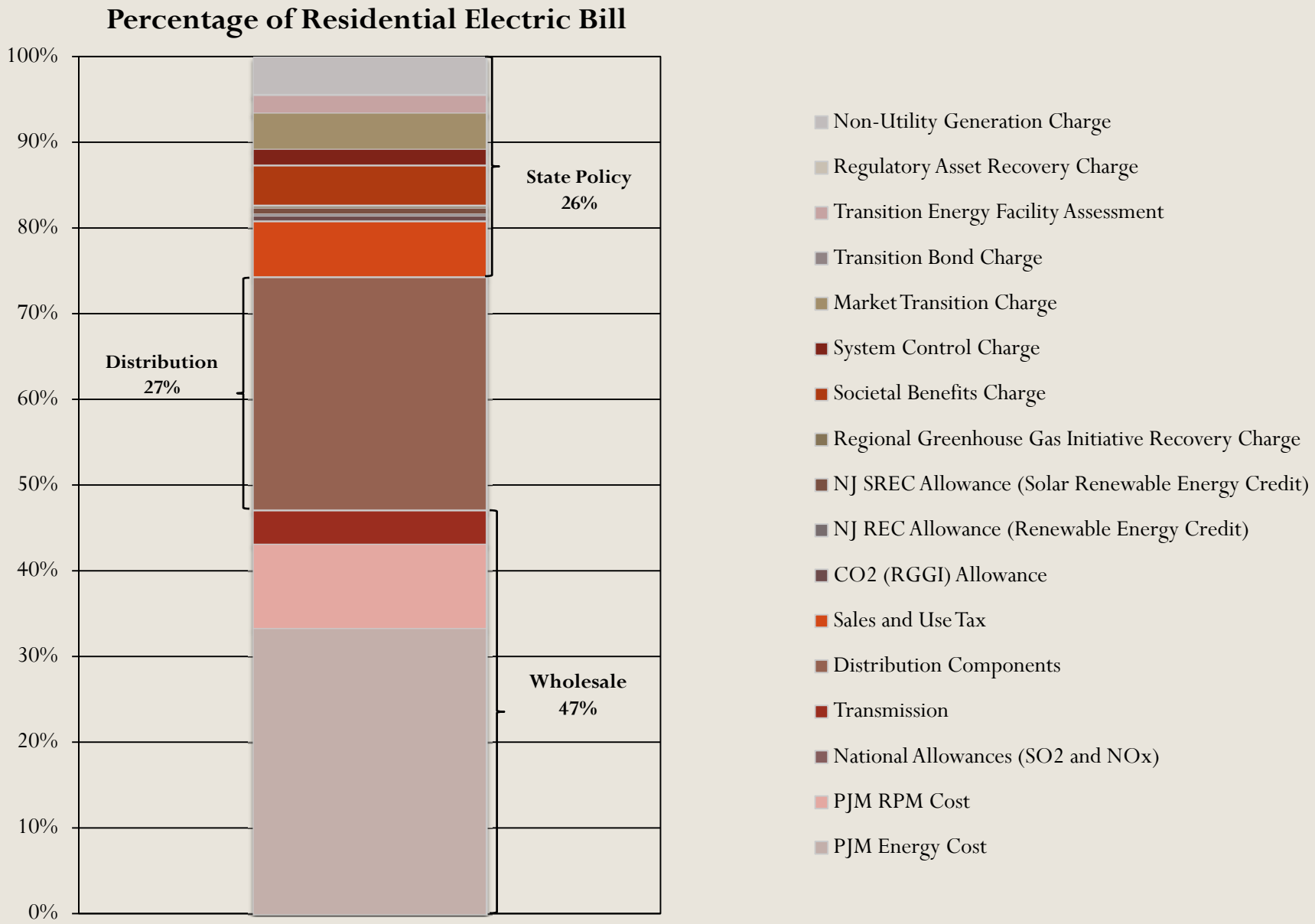
Based upon PJM 2009 prices, not NJ BGS auction prices; Energy cost includes ancillary services

2009 New Jersey Residential Electricity "Rate"



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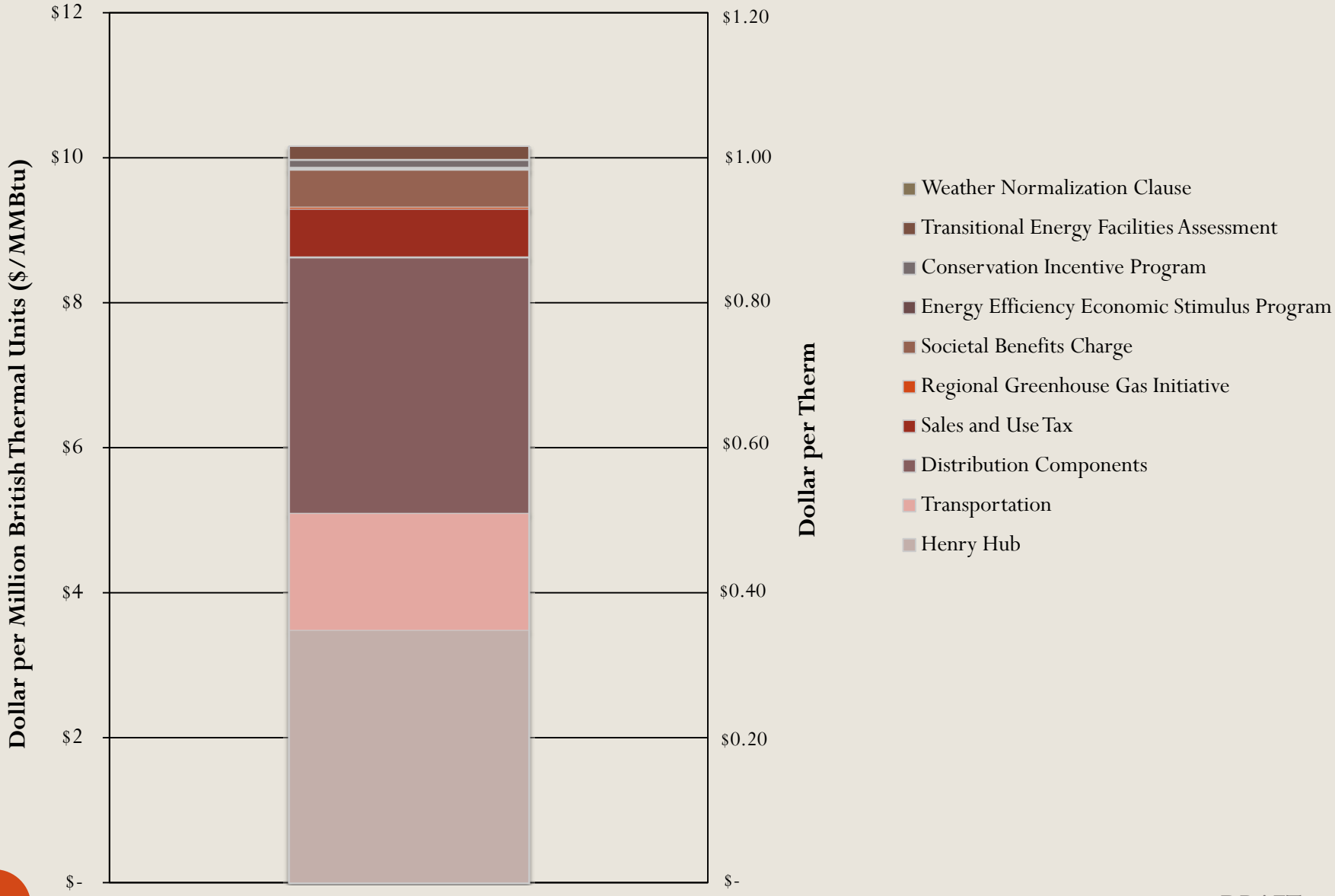
Based upon PJM 2009 prices, not NJ BGS auction prices; Energy cost includes ancillary services

2009 New Jersey Residential Natural Gas "Rate"



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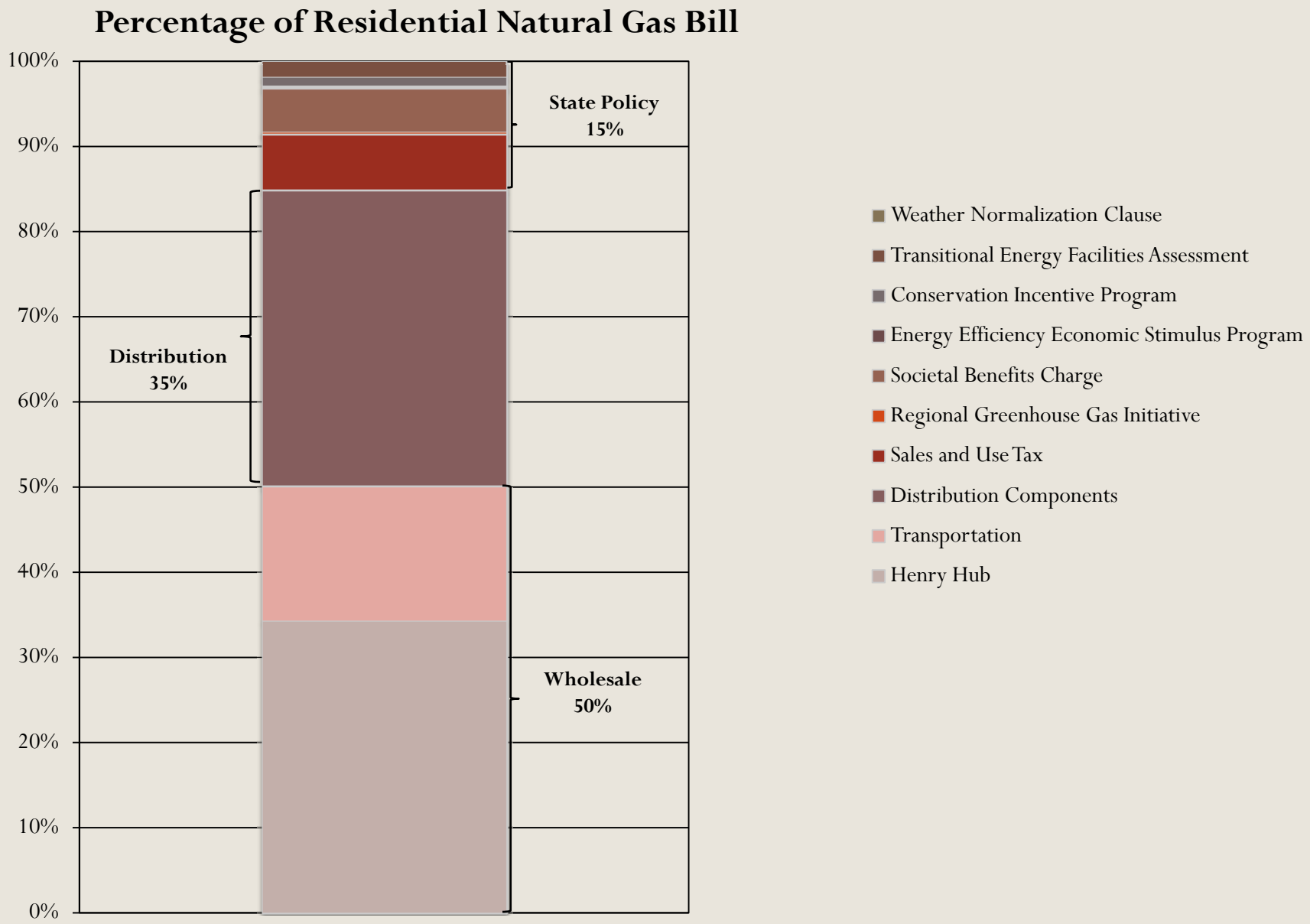
2009 New Jersey Residential Natural Gas "Rate"



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R/ECON Data & Model

R/ECON™ is an econometric model of New Jersey. It includes over 300 equations, based on historical data for New Jersey and the United States, which are solved simultaneously to produce forecasts for the state's economy. The heart of the model is a set of equations modeling employment, wages, and prices by industry. In general, employment in an industry depends on demand for that industry's output and the state's wages and prices relative to the nation's. Demand is represented by a variety of variables including (but not limited to) New Jersey personal income, population, and sectoral output or U.S. employment in the sector. Other sectors in the model include population, housing, vehicle registrations, state tax revenue, and energy. The historical and forecast data for the U.S. comes from IHS Global Insight, Inc., a national leader in economic forecasting. The R/ECON™ model does not try to predict the timing and degree of future business cycles.

- The 22.5% RPS in 2020 (but not the Solar Energy Advancement and Fair Competition Act and Offshore Wind Economic Development Act) is modeled in the 2010 Baseline

Historic Data

- 2008 BAU and EMP Case: historic data through 2006/2007
- 2010 Baseline: R/ECON™ Estimates

*The graphs in the following distinguish between historic and projected data, based on the 2010 Baseline R/ECON™ model. Therefore, the baseline is shown as 2008. All data is for New Jersey, unless stated otherwise.

Note: Most of the preliminary results are through 2020, although some go out to 2025.

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R/ECON Data & Model: Global Insight Assumptions

IHS Global Insight, Inc. provides historic and baseline, optimistic and pessimistic forecast data. The July 2010 R/ECON™ forecast model is based on the baseline May 2010 IHS Global Insight, Inc. historic and forecast data.

	2020 Value			Percent Change from the Baseline in 2020	
	Pessimistic	*Baseline*	*Optimistic*	*Pessimistic*	*Optimistic*
U.S. Non-Agricultural Employment (Millions)	145.7	149	150.4	-2.3%	0.9%
U.S. Real GDP ($ Billions)	$16,559	$17,573	$18,400	-5.8%	4.7%
U.S. Consumer Price Index (1984=100)	2.81	2.67	2.60	5.0%	-2.8%
Crude Oil Prices at West Texas Intermediary ($/Barrel)	$121	$105	$94	15.5%	-10.1%
Natural Gas Price at Henry Hub ($/MMBtu)	$6.61	$5.89	$4.89	12.1%	-17.0%
U.S. Motor Gasoline Price ($/Gallon)	$4.08	$3.64	$3.37	12.0%	-7.6%
U.S. Unemployment Rate	6.5%	5.20%	4.5 %	24.8%	-12.9%
Federal Funds Rate	6.0%	4.70%	4.5%	26.3%	-5.3%

References: R/ECON™ (7/22/10).

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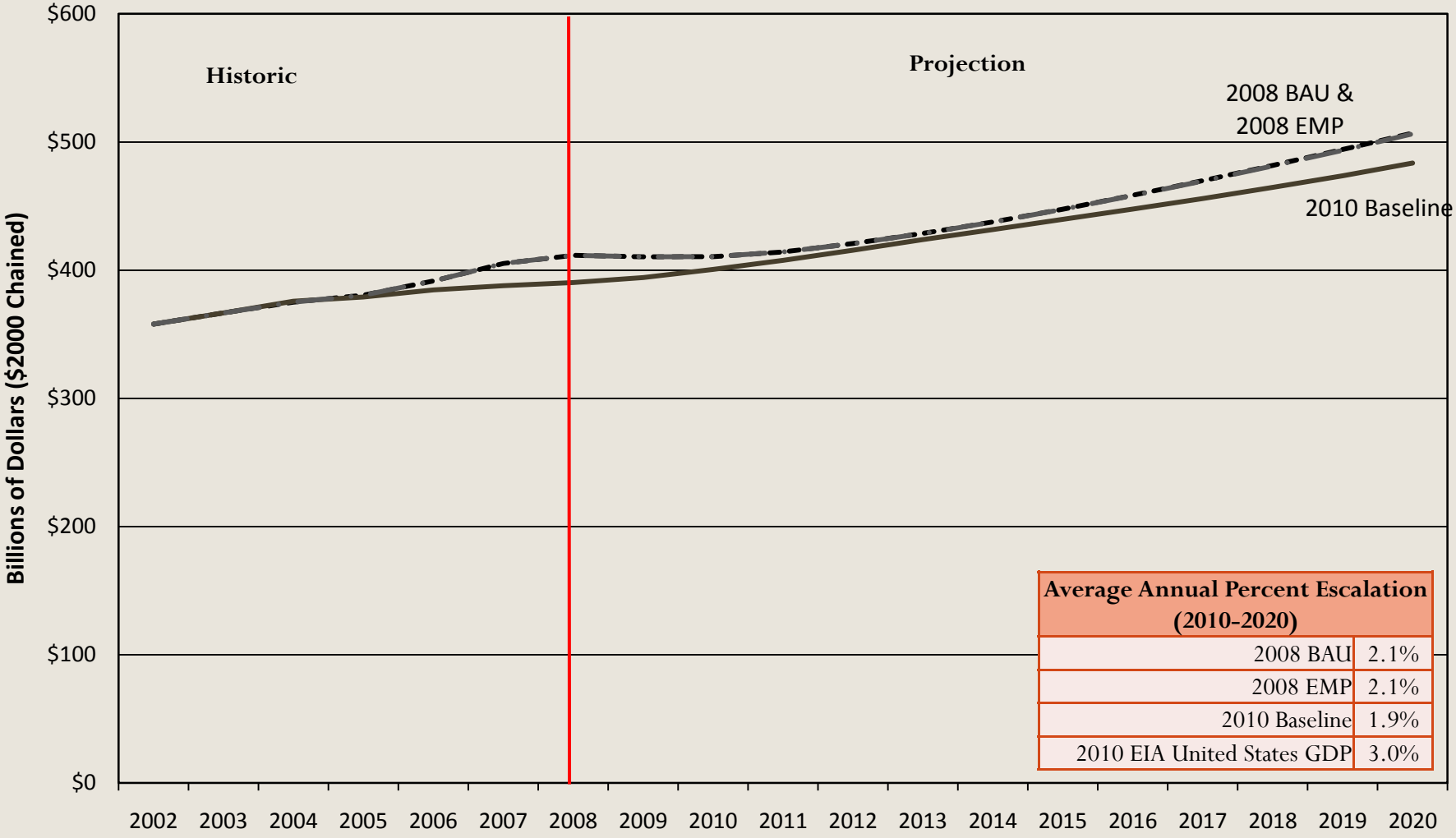
New Jersey Gross State Product



Average Annual Percent Escalation (2010-2020)	
2008 BAU	2.1%
2008 EMP	2.1%
2010 Baseline	1.9%
2010 EIA United States GDP	3.0%

The values are adjusted for the year 2000.

References: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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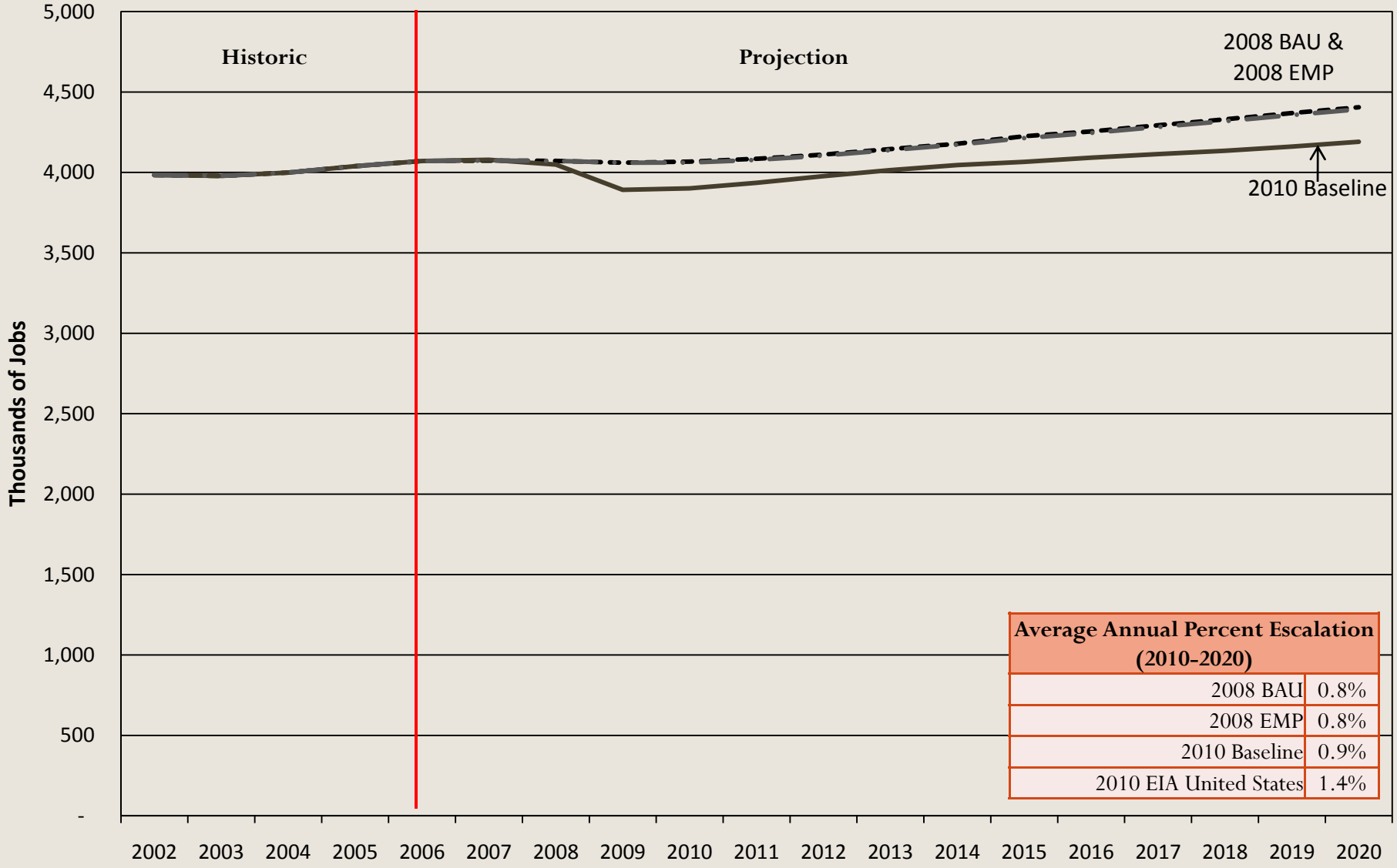
New Jersey Non-Agricultural Employment



Average Annual Percent Escalation (2010-2020)	
2008 BAU	0.8%
2008 EMP	0.8%
2010 Baseline	0.9%
2010 EIA United States	1.4%

References: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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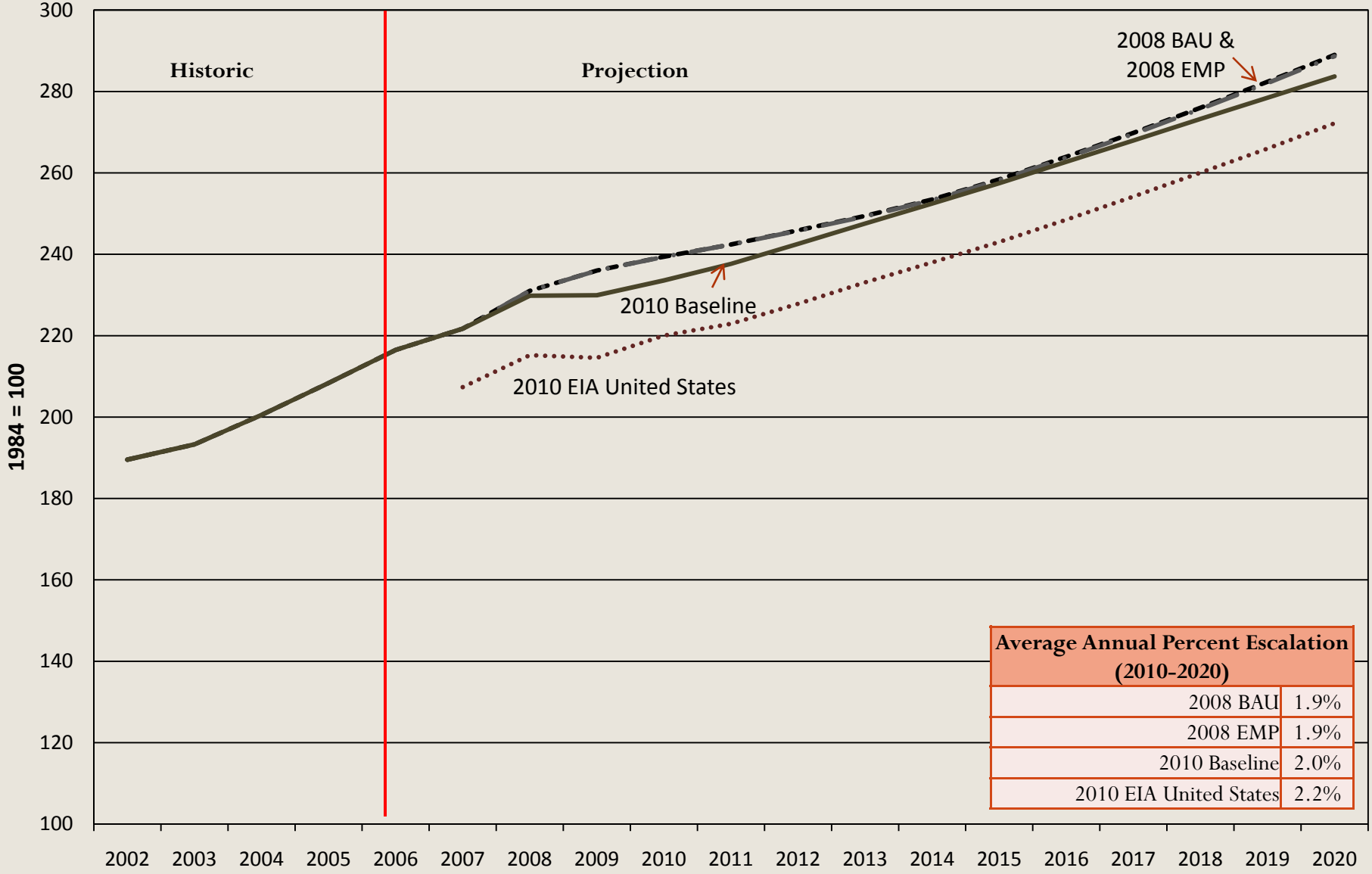
Consumer Price Index



Average Annual Percent Escalation (2010-2020)	
2008 BAU	1.9%
2008 EMP	1.9%
2010 Baseline	2.0%
2010 EIA United States	2.2%

References: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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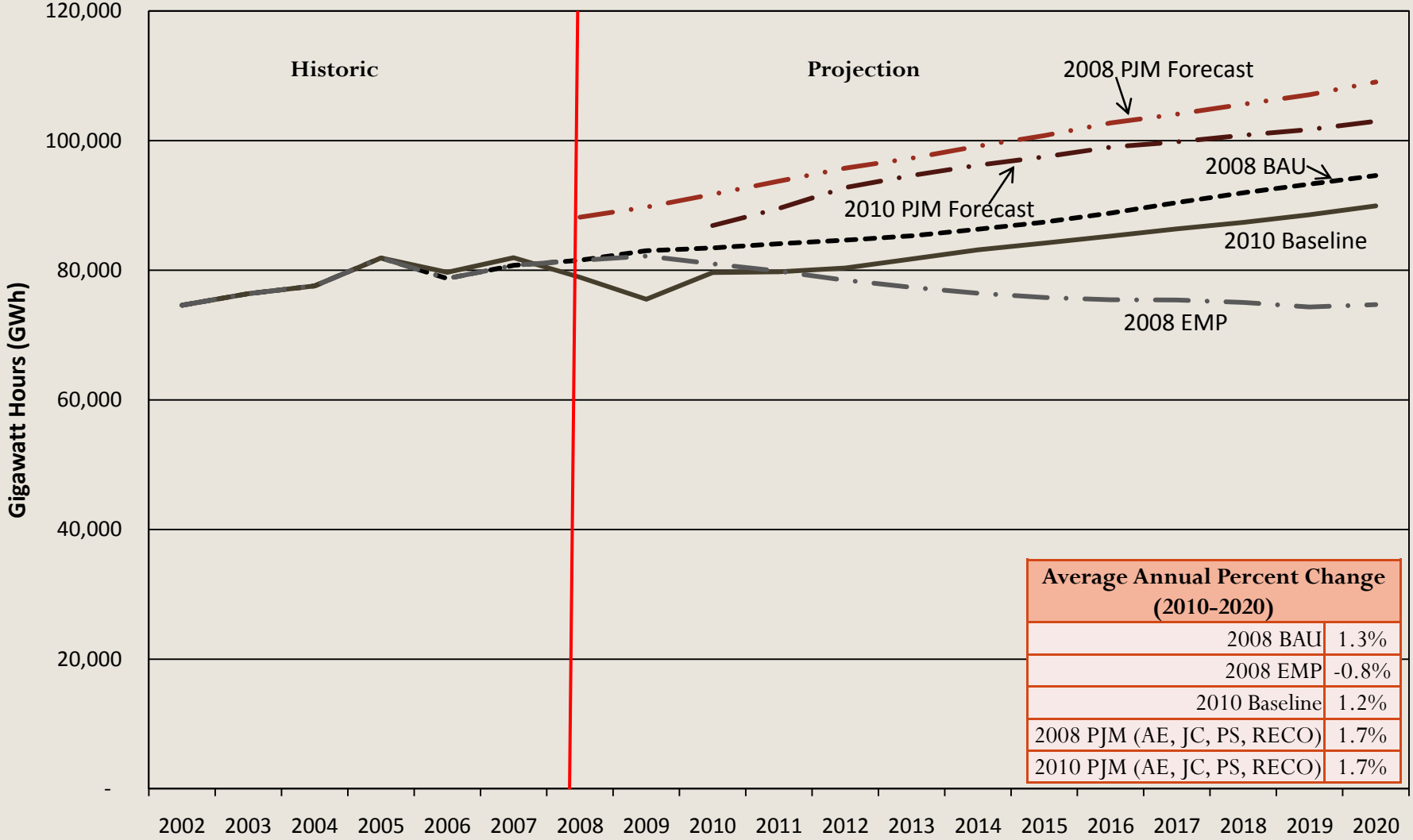
Total Electricity Demand



Average Annual Percent Change (2010-2020)	
2008 BAU	1.3%
2008 EMP	-0.8%
2010 Baseline	1.2%
2008 PJM (AE, JC, PS, RECO)	1.7%
2010 PJM (AE, JC, PS, RECO)	1.7%

Note: R/ECON not weather normalized, PJM weather normalized.

PJM forecast is at transmission-distribution interface.

Reference: R/ECON™ (9/30/08) and (7/22/10).

PJM Load Forecast Report s. Accessed at www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process.aspx

Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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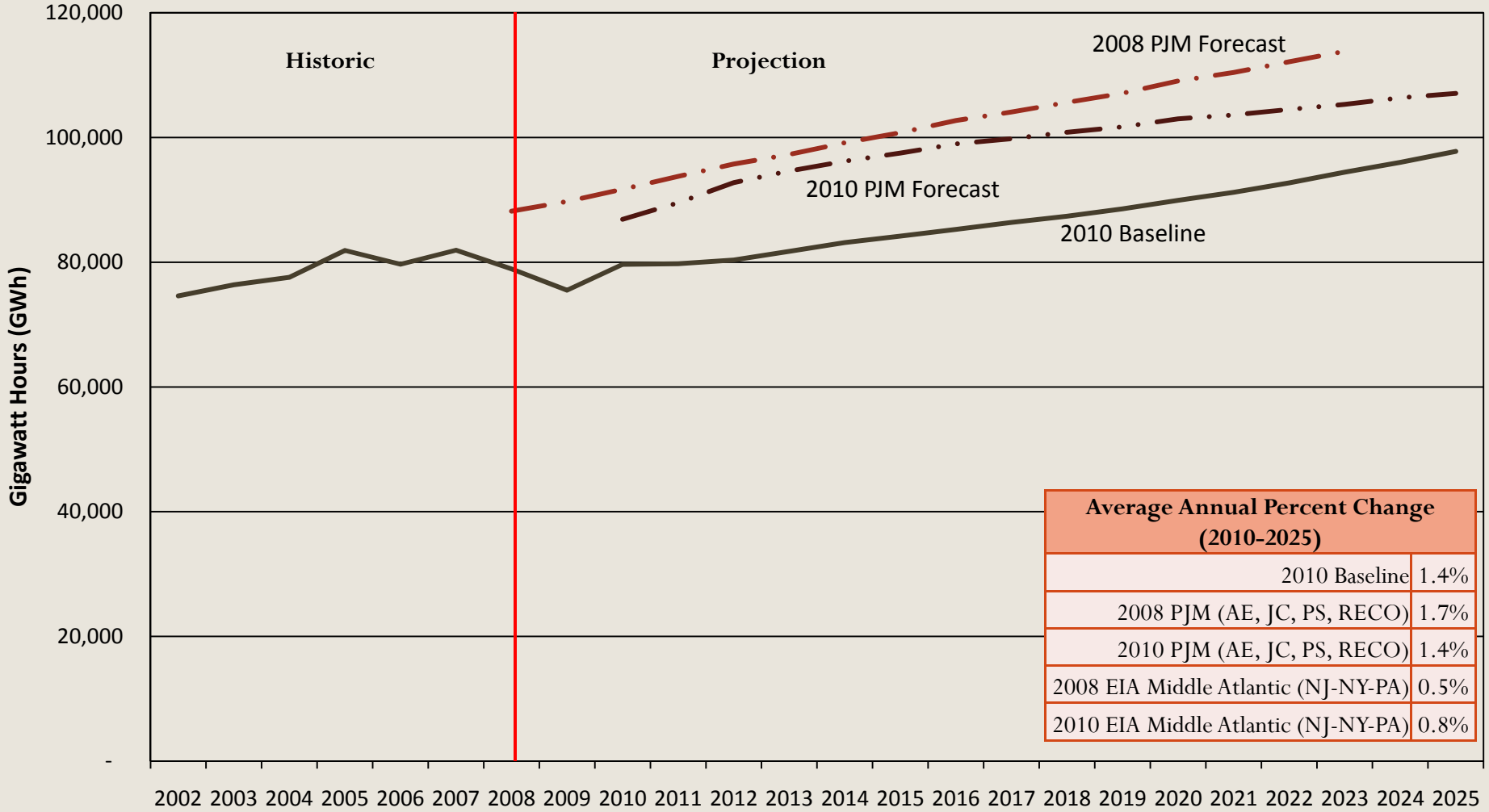
Total Electricity Demand through 2025



Average Annual Percent Change (2010-2025)	
2010 Baseline	1.4%
2008 PJM (AE, JC, PS, RECO)	1.7%
2010 PJM (AE, JC, PS, RECO)	1.4%
2008 EIA Middle Atlantic (NJ-NY-PA)	0.5%
2010 EIA Middle Atlantic (NJ-NY-PA)	0.8%

Note: R/ECON not weather normalized, PJM weather normalized.
PJM forecast is at transmission-distribution interface.

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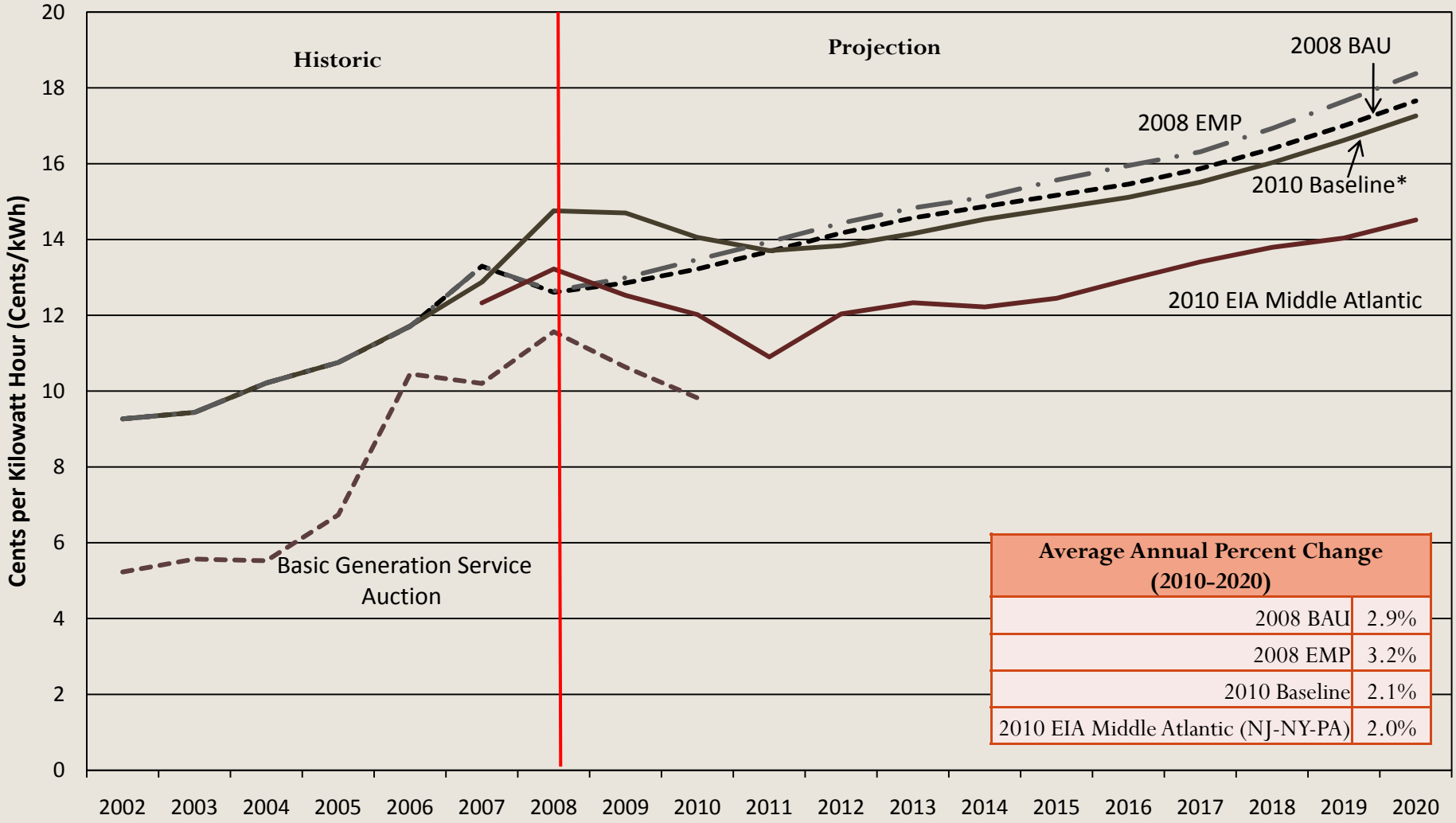
Reference: R/ECON™ (9/30/08) and (7/22/10).
PJM Load Forecast Report s. Accessed at www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process.aspx

Weighted Average Electricity Rate



Average Annual Percent Change (2010-2020)	
2008 BAU	2.9%
2008 EMP	3.2%
2010 Baseline	2.1%
2010 EIA Middle Atlantic (NJ-NY-PA)	2.0%

Note: not weather normalized; Residential portion of 2010 Baseline price model output under review

10 cents/kWh = $100/MWh

Reference: R/ECON™ (9/30/08) and (7/22/10). *Residential portion adjusted and under review.
Annual BGS-FP Auction Results. Accessed at www.bgs-auction.com/bgs.auction.prev.asp
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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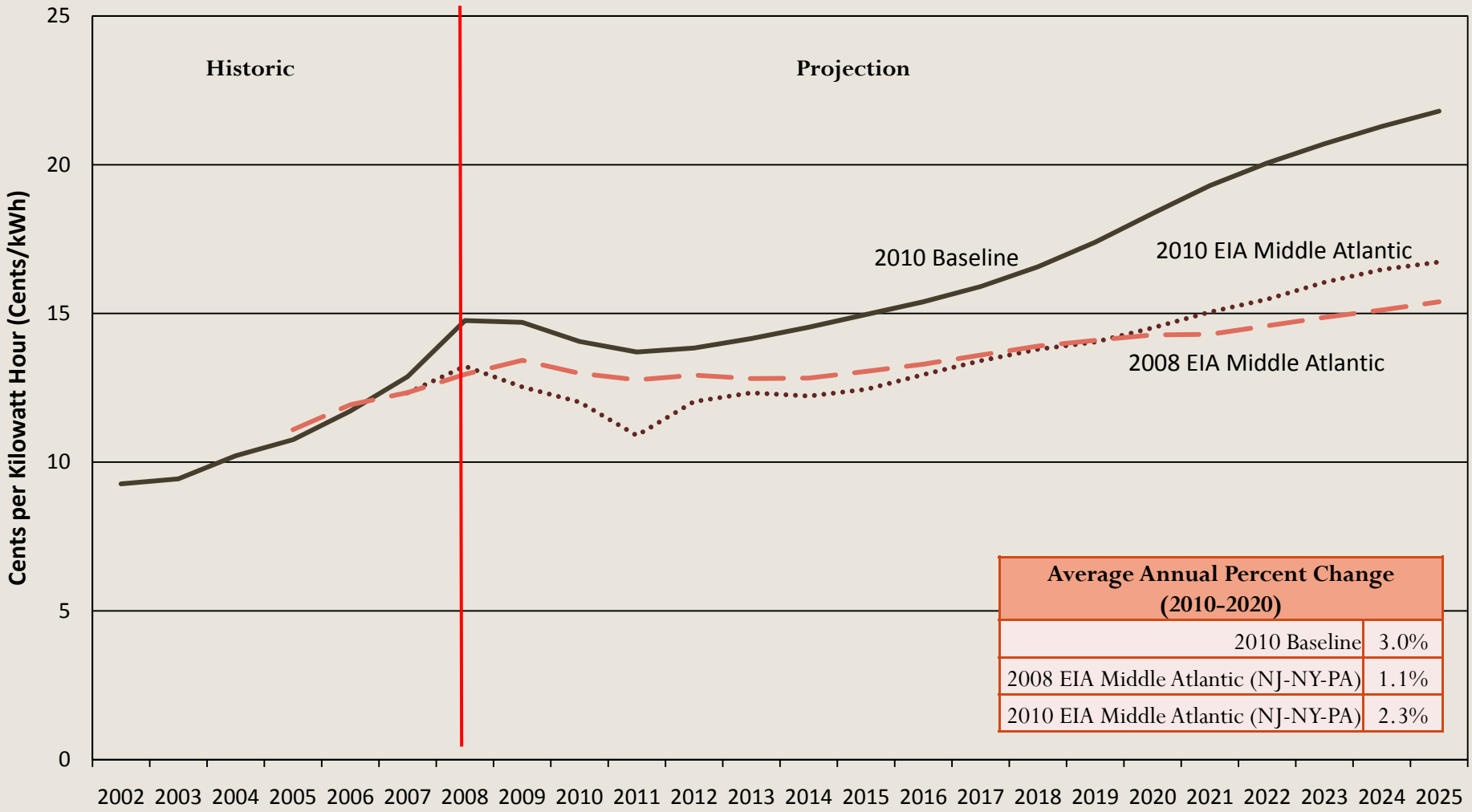
Weighted Average Electricity Rate through 2025



Average Annual Percent Change (2010-2020)	
2010 Baseline	3.0%
2008 EIA Middle Atlantic (NJ-NY-PA)	1.1%
2010 EIA Middle Atlantic (NJ-NY-PA)	2.3%

Note: not weather normalized

10 cents/kWh = $100/MWh

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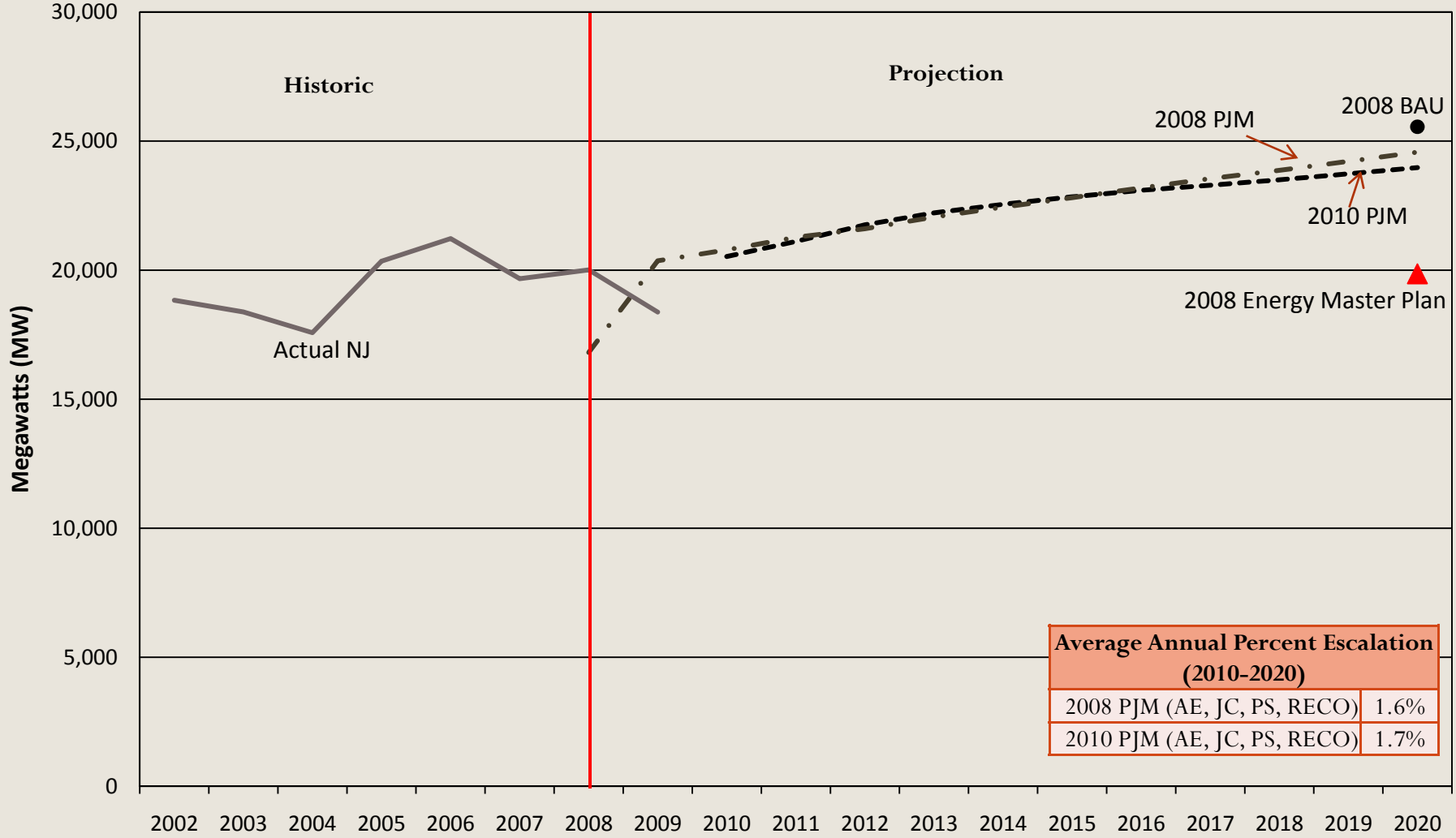
Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Peak Electric Demand



Average Annual Percent Escalation (2010-2020)	
2008 PJM (AE, JC, PS, RECO)	1.6%
2010 PJM (AE, JC, PS, RECO)	1.7%

Note: not weather normalized.

PJM forecast is at transmission-distribution interface.

References: New Jersey Energy Master Plan (October 2008). Accessed at www.nj.gov/emp/
Historic PJM Annual Reports. Accessed at www.epowermarkets.com/services/system-performance/historical.html
PJM Load Forecast Report . Accessed at www.pjm.com/planning/resource-adequacy-planning/load-forecast-dev-process.aspx

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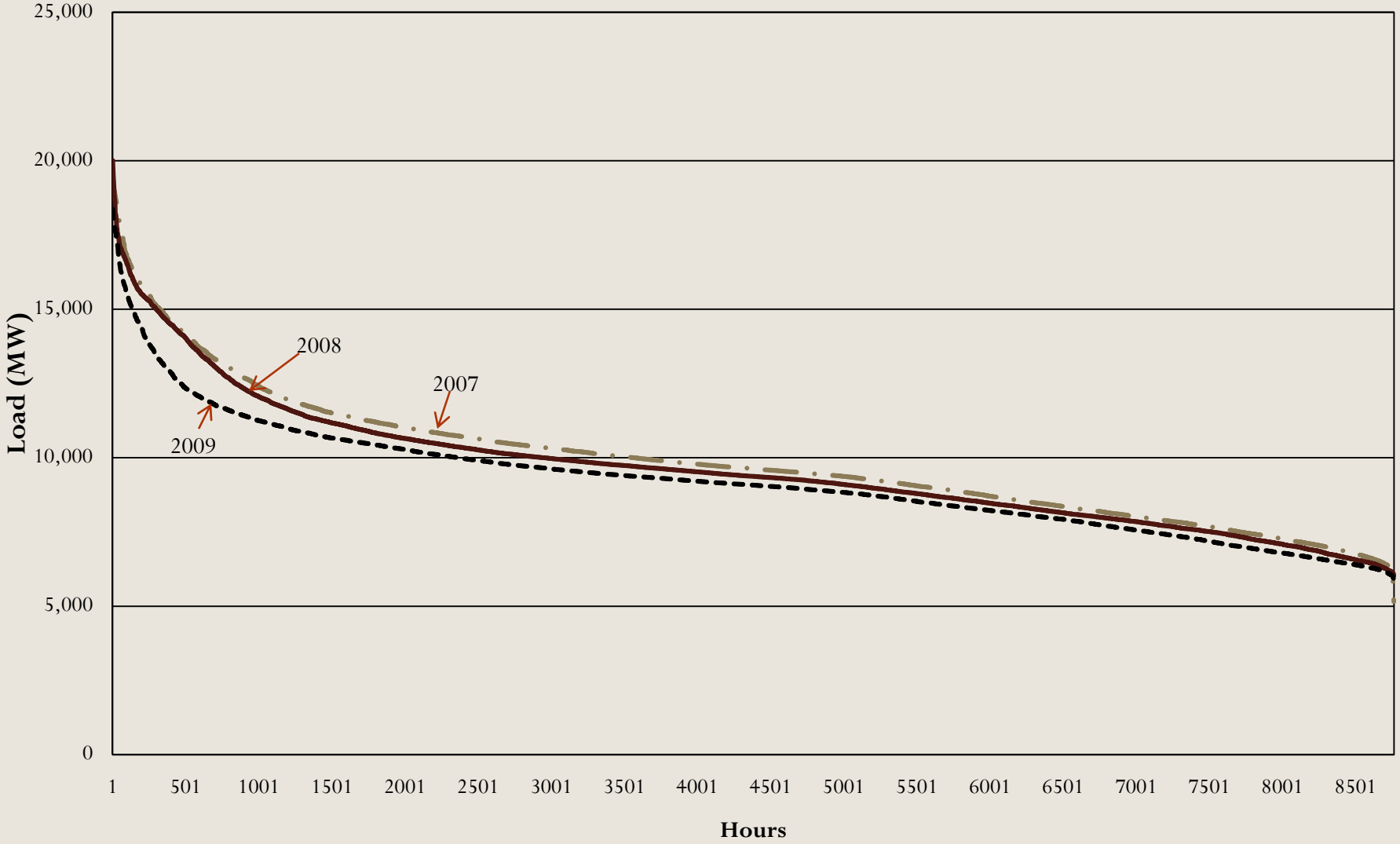
New Jersey Load Duration Curves 2007-2009



Note: Total load is the sum of the hourly loads of New Jersey based utilities (AE, RECO, JC and PS). A non-leap year has 8760 hours.

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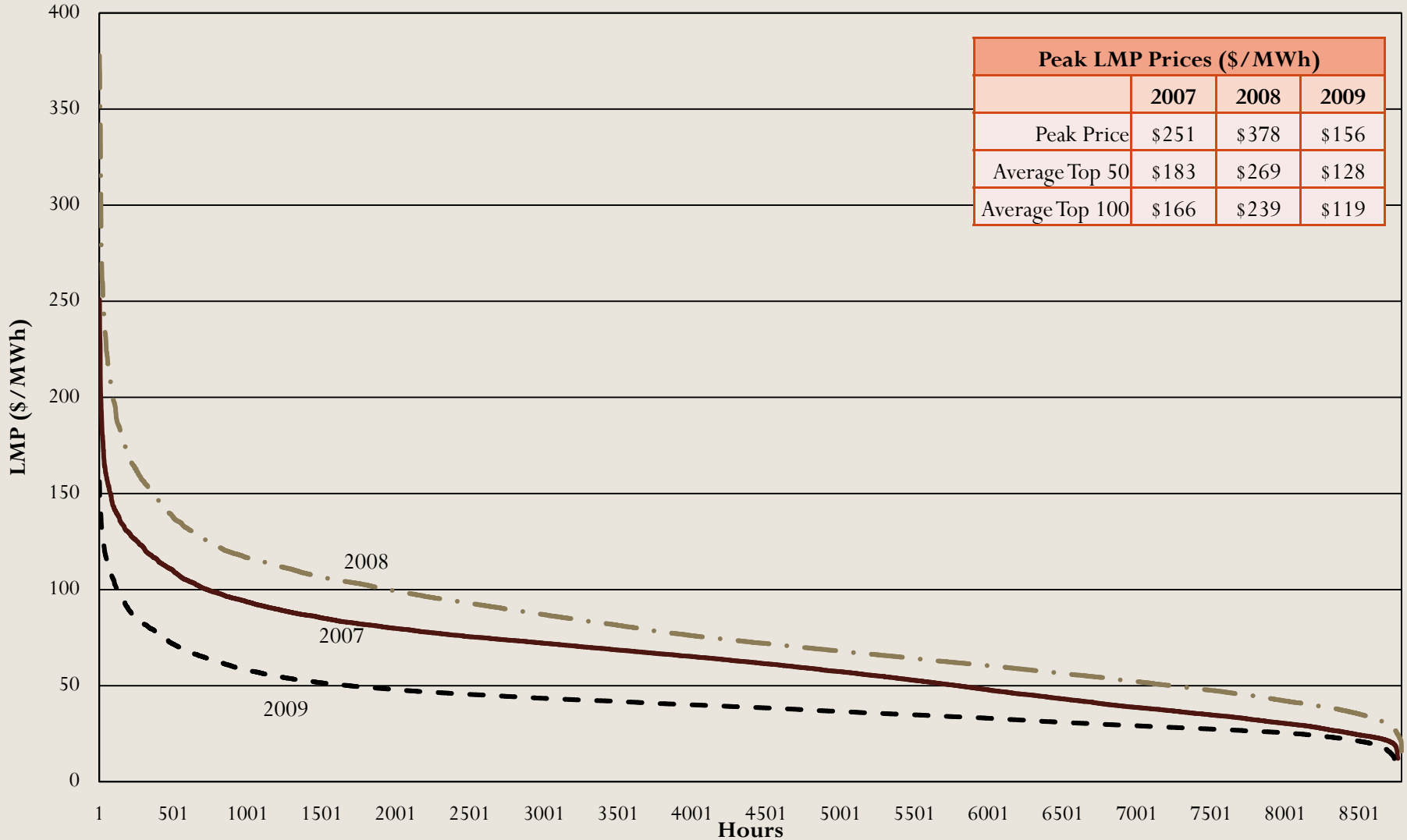
Reference: Historic PJM Annual Reports. Accessed at www.epowermarkets.com/services/system-performance/historical.html

New Jersey Electricity Price (LMP) Duration Curves 2007-2009



Peak LMP Prices ($/MWh)			
	2007	2008	2009
Peak Price	$251	$378	$156
Average Top 50	$183	$269	$128
Average Top 100	$166	$239	$119

Note: Locational Marginal Prices (LMPs) are the load weighted average of New Jersey based utilities (AE,RECO, JC and PS). A non-leap year has 8760 hours.

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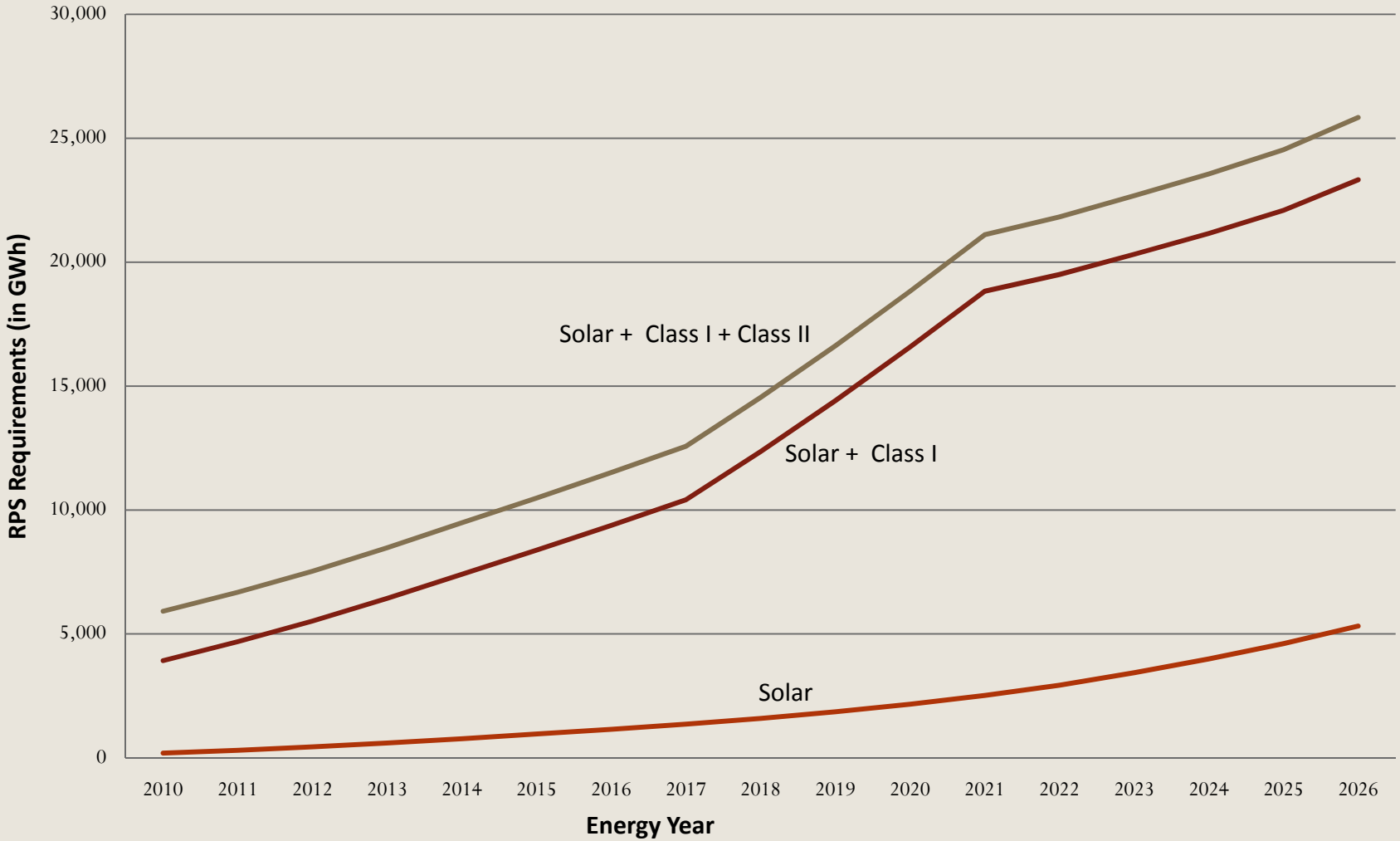
Reference: PJM Load and LMP Data (2007, 2008 and 2009).

Current Renewable Portfolio Standard Requirements



Note: "Energy year" means the 12-month period from June 1st through May 31st, numbered according to the calendar year in which it ends.

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Reference: Solar Advancement and Fair Competition Act (A3520)

Current Renewable Portfolio Standard Requirements

Energy Year	Solar Requirement (GWh)	Class I (%)	Class I (GWh)	Class II (%)	Class II (GWh)	Total RPS (GWh)
2010	192	4.69%	3,732	2.50%	1,991	5,915
2011	306	5.49%	4,380	2.50%	1,994	6,680
2012	442	6.32%	5,078	2.50%	2,009	7,529
2013	596	7.14%	5,839	2.50%	2,044	8,479
2014	772	7.98%	6,633	2.50%	2,079	9,484
2015	965	8.81%	7,415	2.50%	2,105	10,485
2016	1,150	9.65%	8,228	2.50%	2,132	11,510
2017	1,357	10.49%	9,057	2.50%	2,160	12,574
2018	1,591	12.33%	10,770	2.50%	2,185	14,546
2019	1,858	14.18%	12,554	2.50%	2,214	16,626
2020	2,164	16.03%	14,415	2.50%	2,248	18,827
2021	2,518	17.88%	16,309	2.50%	2,280	21,107
2022	2,928	17.88%	16,578	2.50%	2,318	21,824
2023	3,433	17.88%	16,886	2.50%	2,361	22,680
2024	3,989	17.88%	17,169	2.50%	2,401	23,559
2025	4,610	17.88%	17,482	2.50%	2,444	24,536
2026	5,316	17.88%	18,007	2.50%	2,518	25,841

Total RPS = Solar Requirement + Class I + Class II

The current Renewable Portfolio Standard compliance schedule ends in Energy Year 2021. By statute, the BPU will adopt rules to determine the minimum percentages for energy year 2022 and beyond. The requirements must be equal to or greater than the minimum percentages required for reporting year 2021.

Reference: Solar Advancement and Fair Competition Act (A3520)
New Jersey Administrative Code at N.J.A.C. 14:8-2.1

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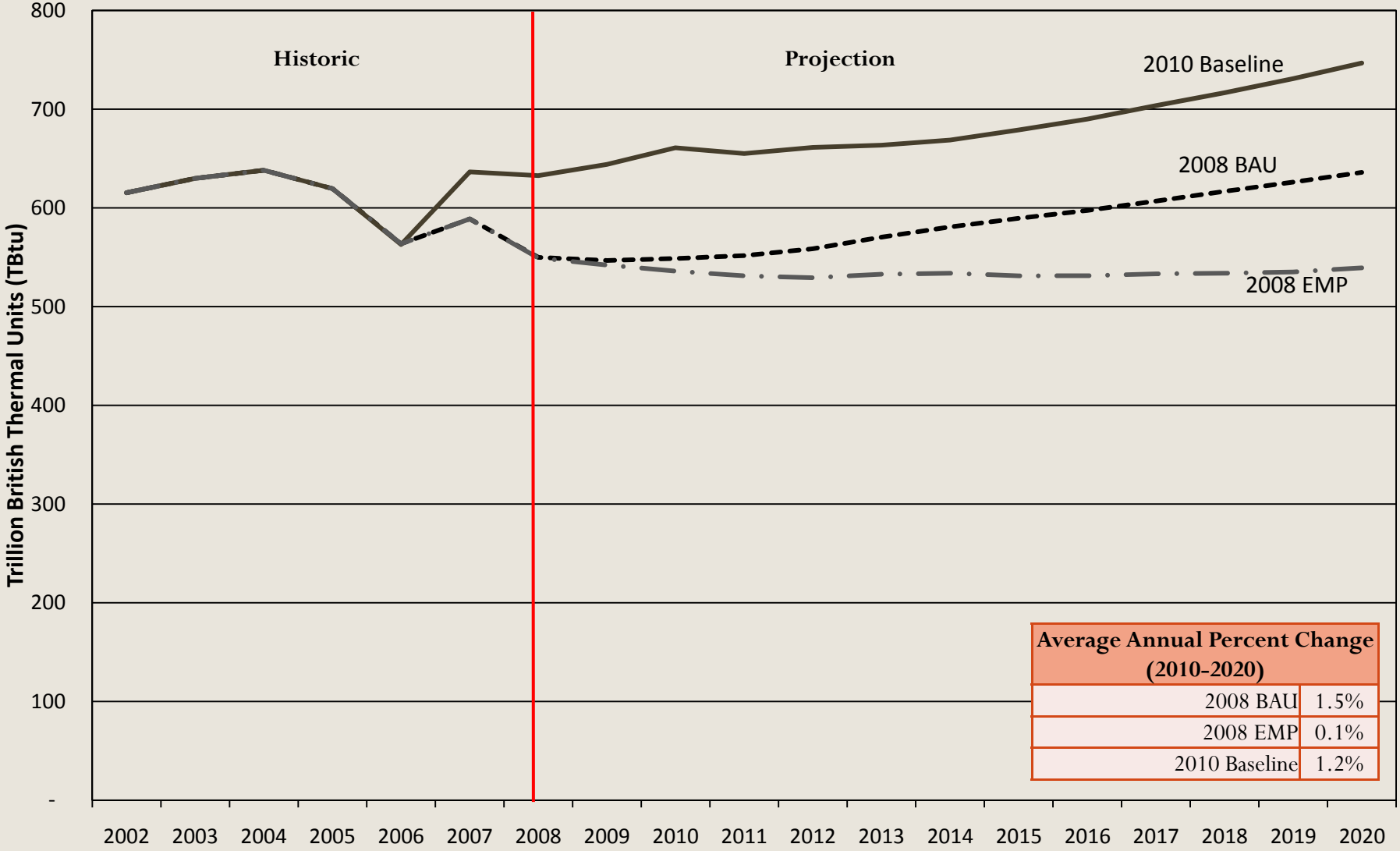
Total Natural Gas Demand (including Electric Generation)



Average Annual Percent Change (2010-2020)	
2008 BAU	1.5%
2008 EMP	0.1%
2010 Baseline	1.2%

Note: not weather normalized

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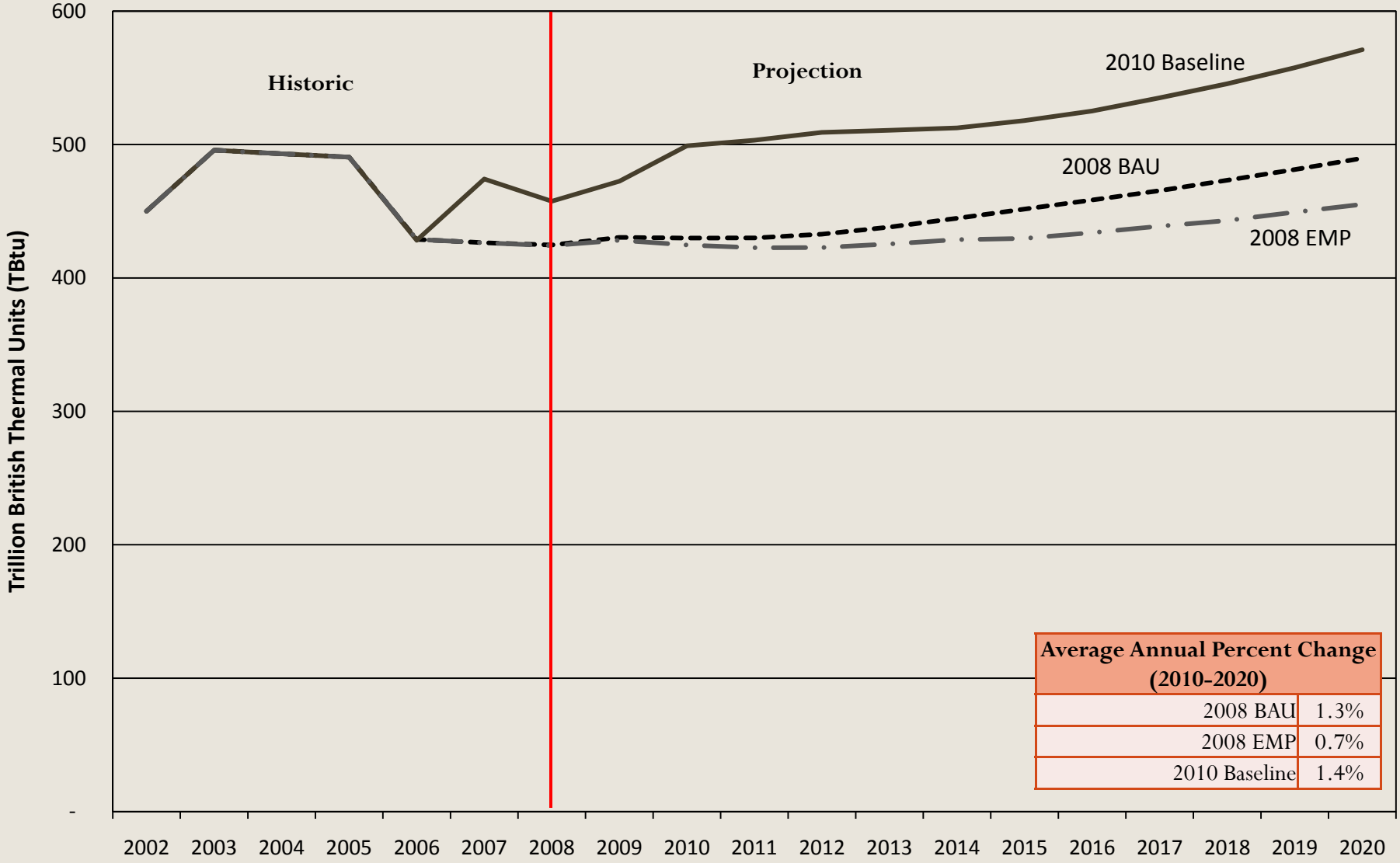
Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Total Retail Natural Gas Demand (not including Electric Generation)



Average Annual Percent Change (2010-2020)	
2008 BAU	1.3%
2008 EMP	0.7%
2010 Baseline	1.4%

Note: not weather normalized

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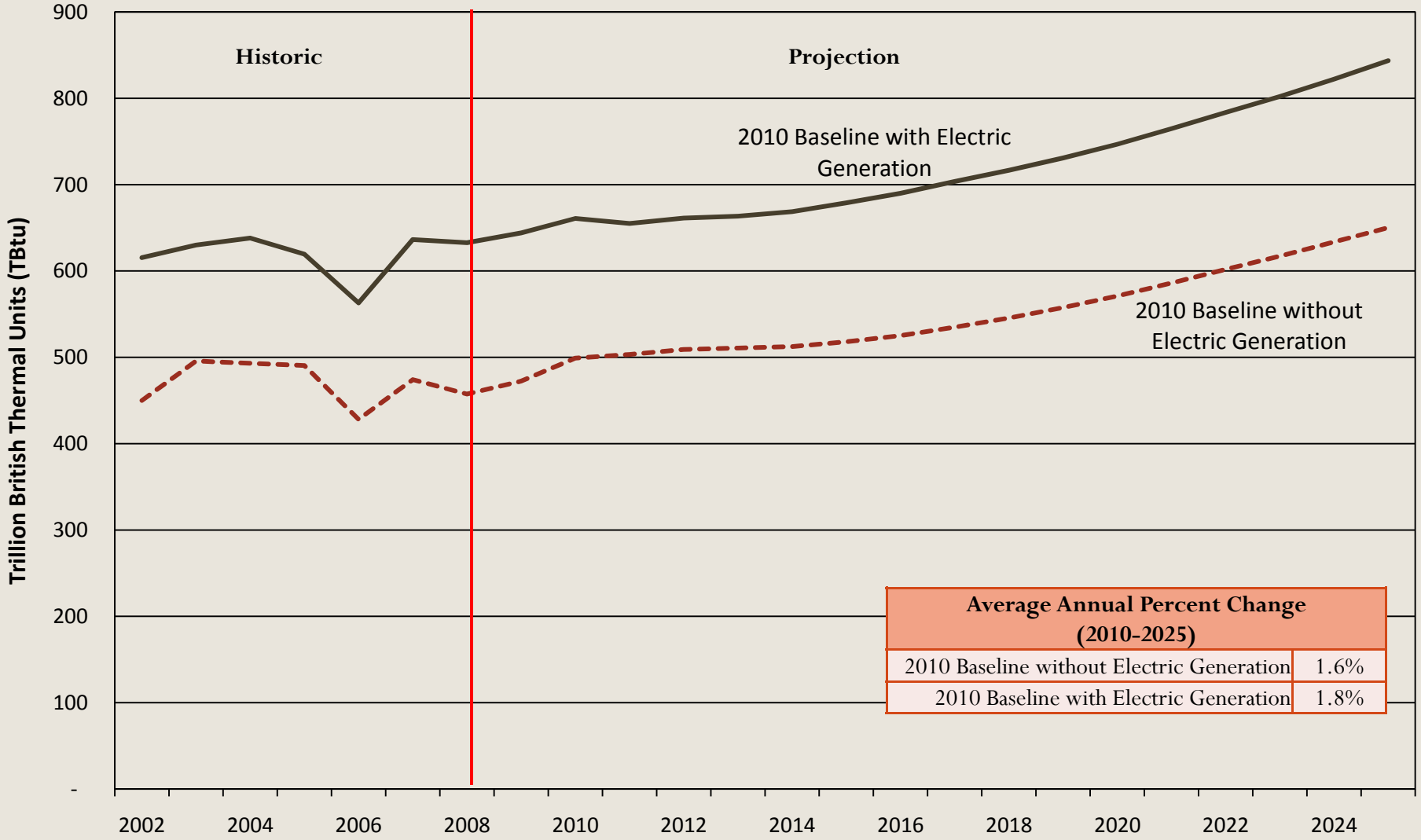
Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Total Natural Gas Demand through 2025



Average Annual Percent Change (2010-2025)	
2010 Baseline without Electric Generation	1.6%
2010 Baseline with Electric Generation	1.8%

Note: not weather normalized

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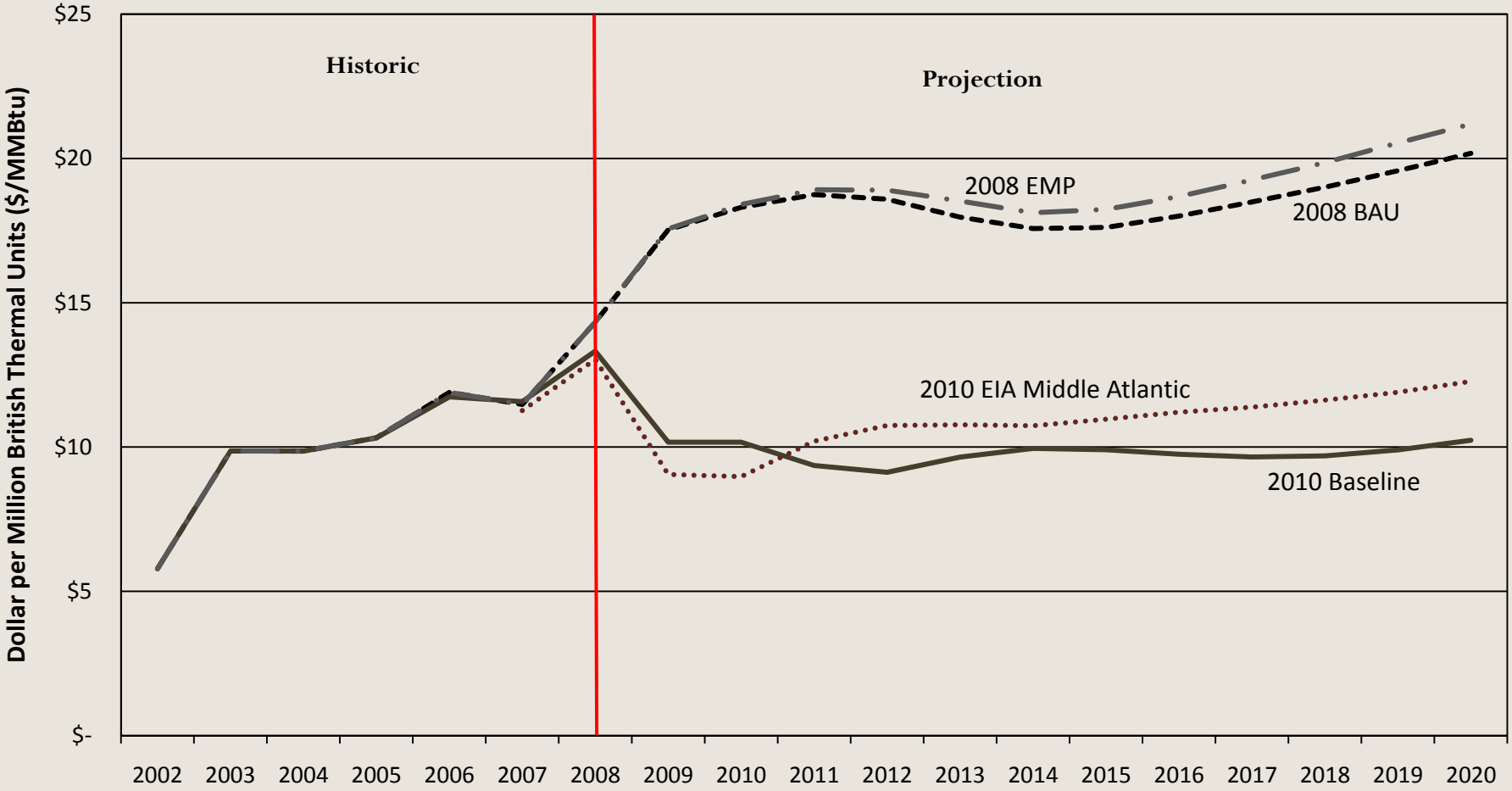
Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Weighted Average Natural Gas Rate (including Electric Generation)



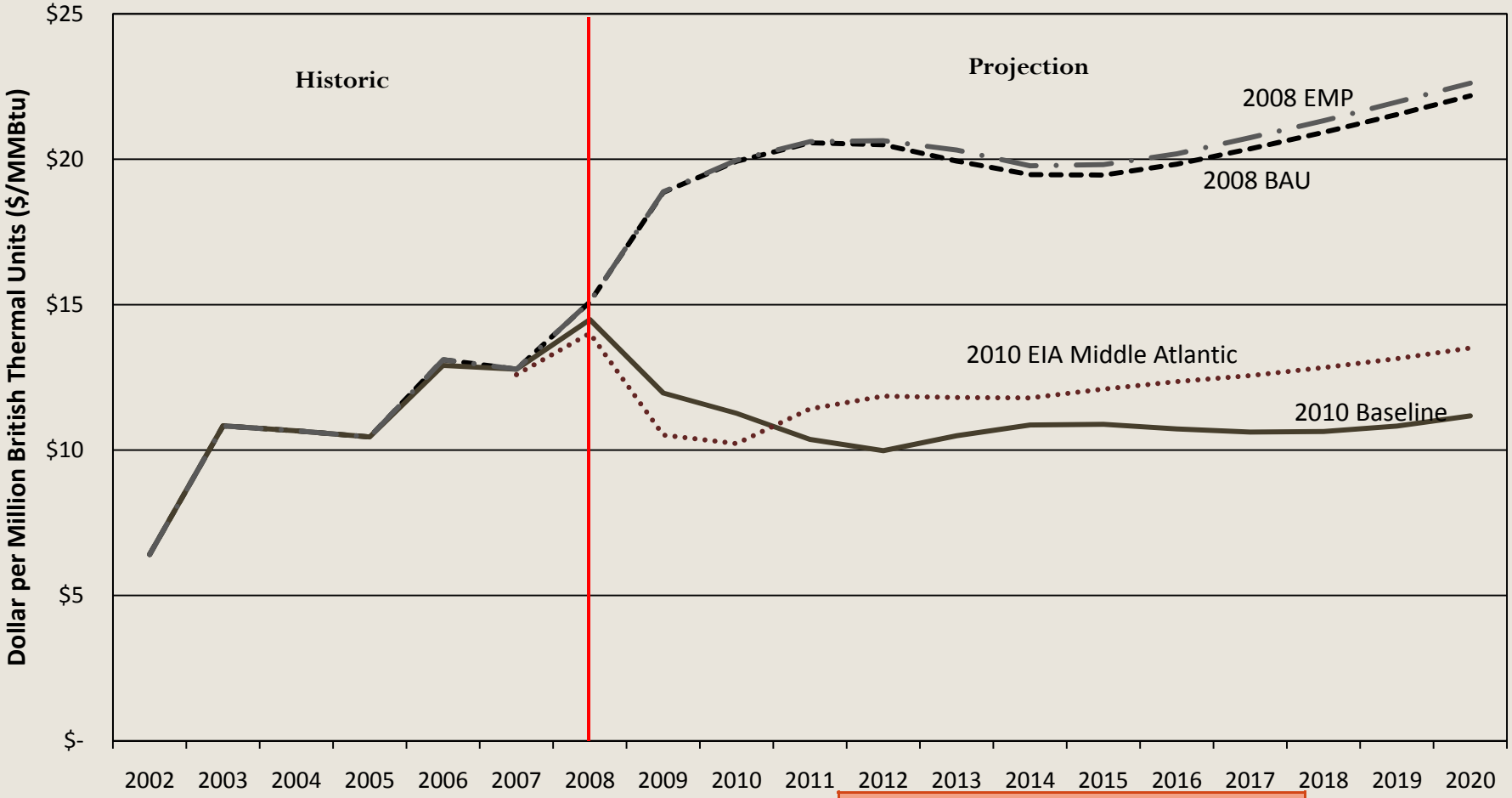
Average Annual Percent Change (2010-2020)	
2008 BAU	1.0%
2008 EMP	1.4%
2010 Baseline	0.1%
2008 EIA Middle Atlantic (NJ-NY-PA)	0.7%
2010 EIA Middle Atlantic(NJ-NY-PA)	3.2%

Note: not weather normalized

DRAFT

Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Weighted Average Natural Gas Rate (not including Electric Generation)



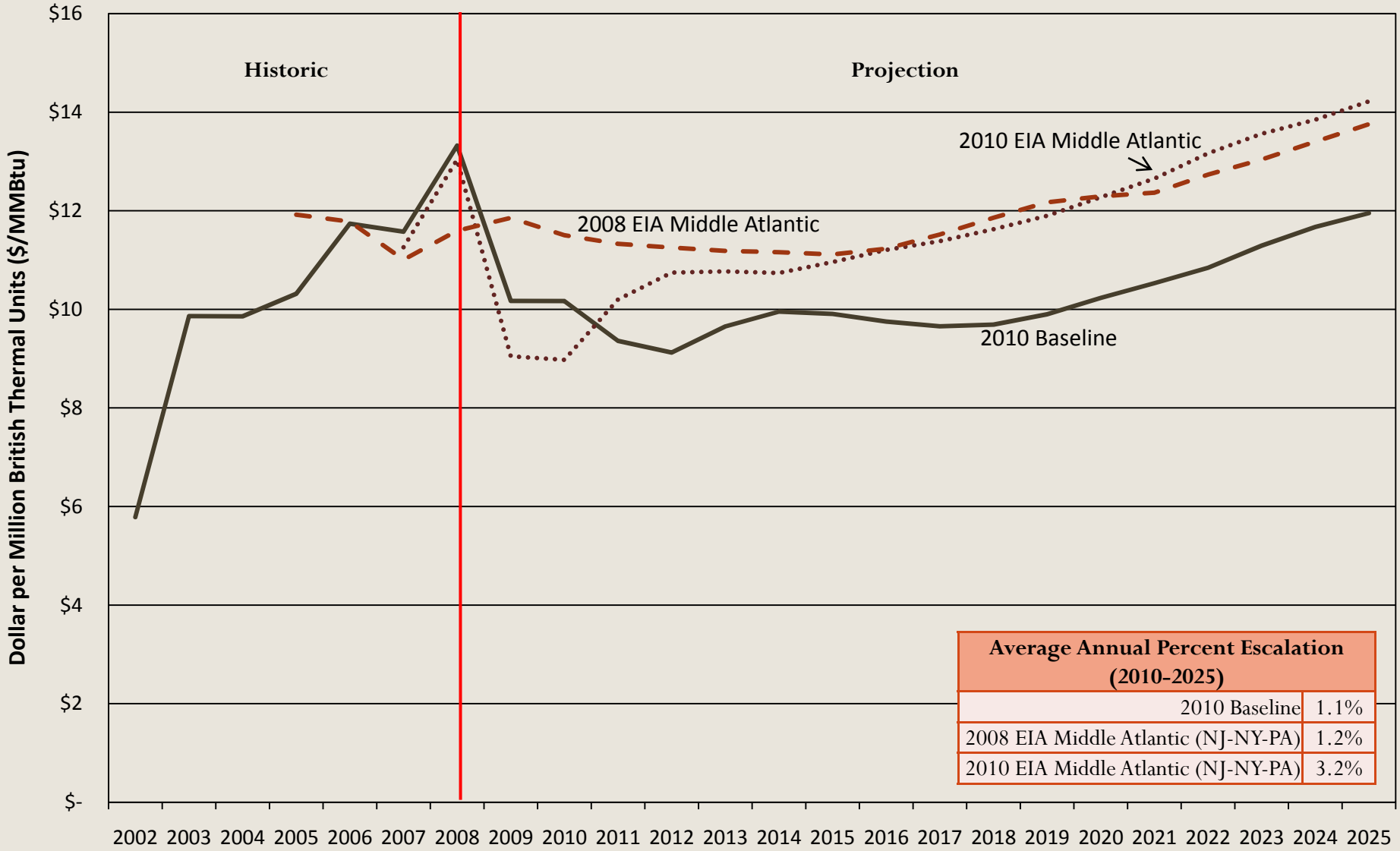
Average Annual Percent Escalation (2010-2020)	
2008 BAU	1.1%
2008 EMP	1.3%
2010 Baseline	-0.1%
2008 EIA Middle Atlantic (NJ-NY-PA)	0.7%
2010 EIA Middle Atlantic (NJ-NY-PA)	2.9%

Note: not weather normalized

DRAFT

Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Weighted Average Natural Gas Rate through 2025 (including Electric Generation)



Average Annual Percent Escalation (2010-2025)	
2010 Baseline	1.1%
2008 EIA Middle Atlantic (NJ-NY-PA)	1.2%
2010 EIA Middle Atlantic (NJ-NY-PA)	3.2%

Note: not weather normalized

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Reference: R/ECON™ (9/30/08) and (7/22/10).
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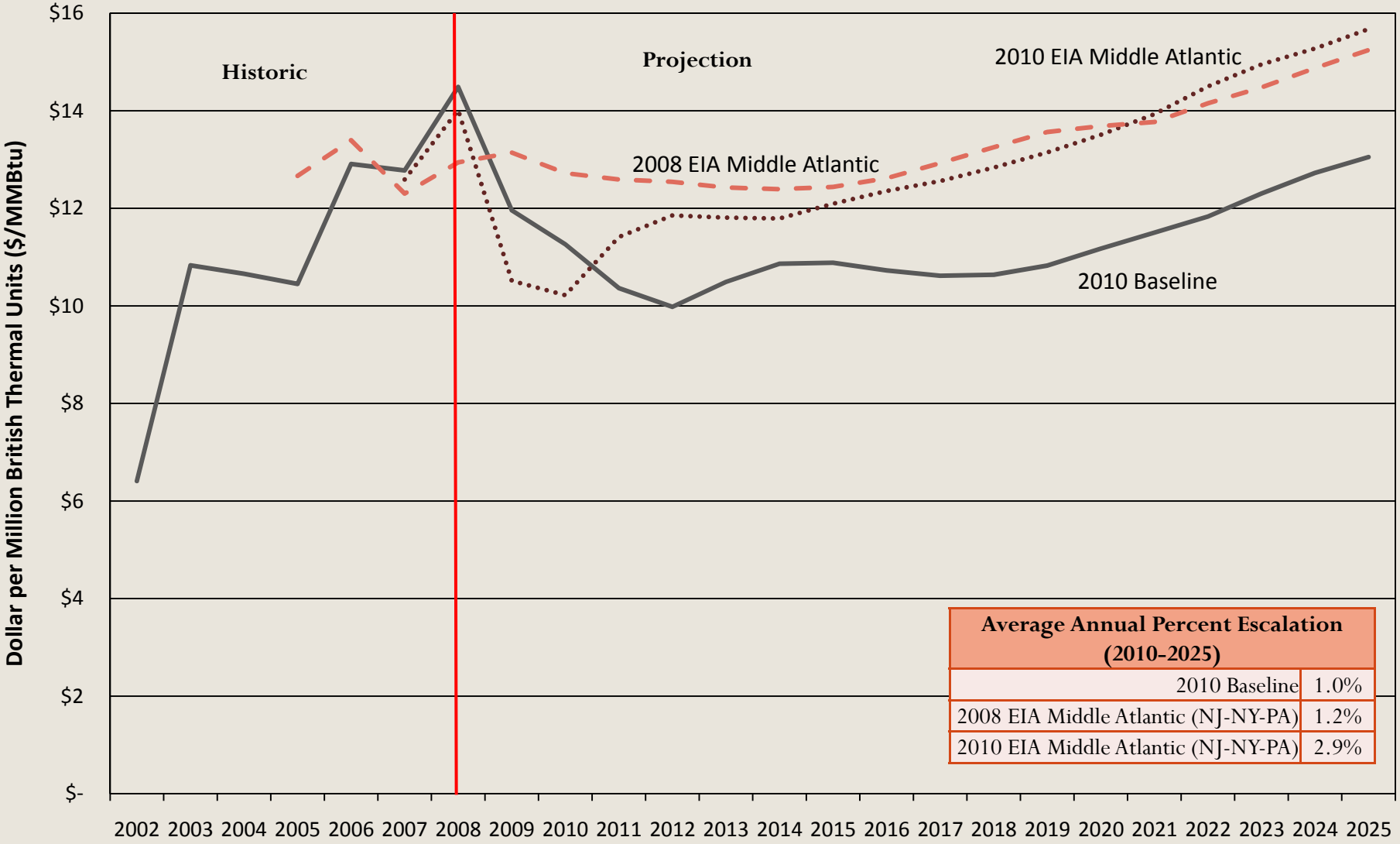
Weighted Average Natural Gas Rate through 2025 (not including Electric Generation)



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2010 Baseline	1.0%
2008 EIA Middle Atlantic (NJ-NY-PA)	1.2%
2010 EIA Middle Atlantic (NJ-NY-PA)	2.9%

Note: not weather normalized

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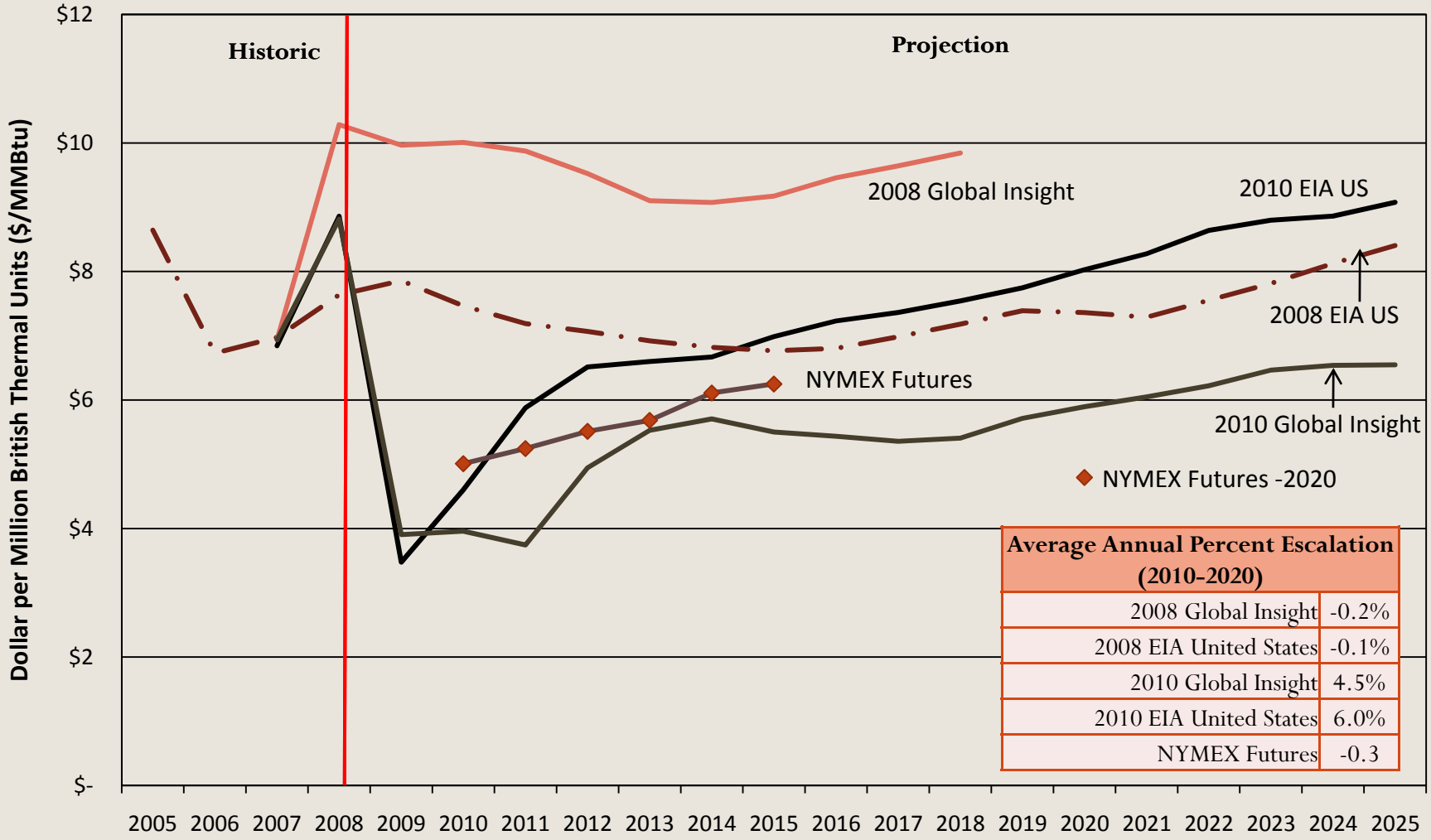
Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

Wholesale Natural Gas Prices at Henry Hub



Average Annual Percent Escalation (2010-2020)	
2008 Global Insight	-0.2%
2008 EIA United States	-0.1%
2010 Global Insight	4.5%
2010 EIA United States	6.0%
NYMEX Futures	-0.3

Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.
NYMEX Henry Hub Futures. Accessed at www.cmegroup.com/trading/energy/natural-gas/natural-gas.html on 8/2/2010 at 11:00 AM.

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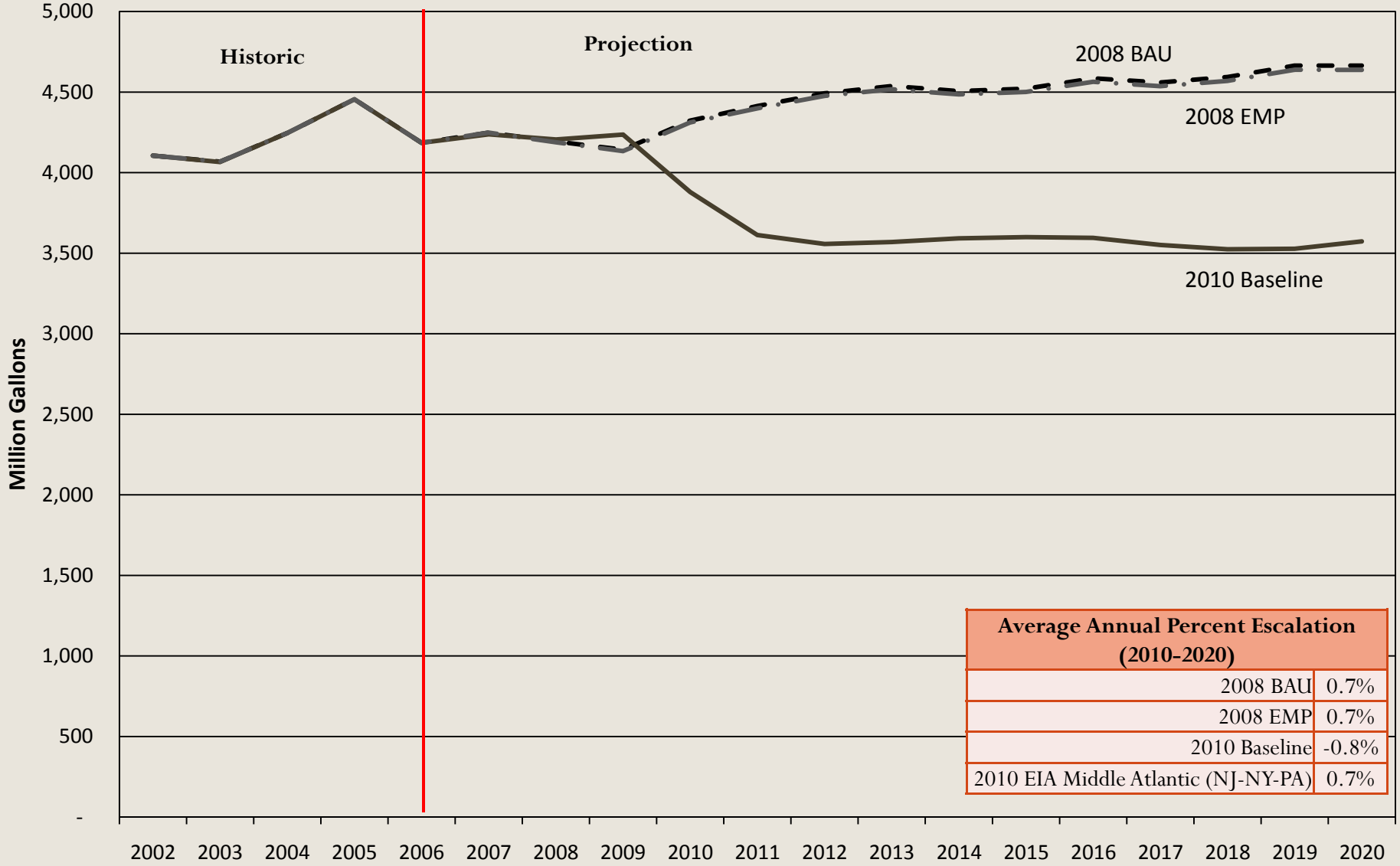
Gasoline Consumption



Average Annual Percent Escalation (2010-2020)	
2008 BAU	0.7%
2008 EMP	0.7%
2010 Baseline	-0.8%
2010 EIA Middle Atlantic (NJ-NY-PA)	0.7%

Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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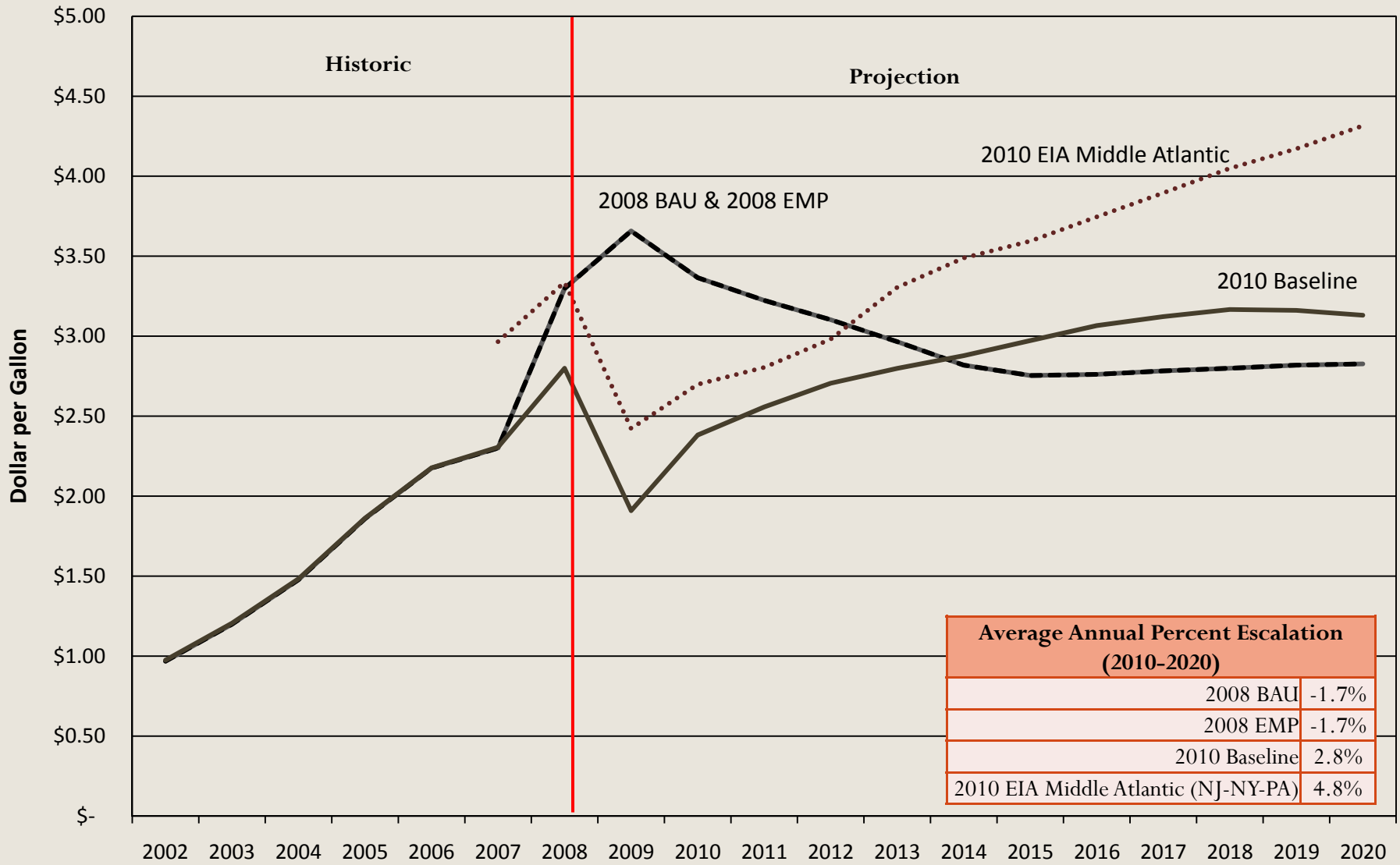
Gasoline Price



Average Annual Percent Escalation (2010-2020)	
2008 BAU	-1.7%
2008 EMP	-1.7%
2010 Baseline	2.8%
2010 EIA Middle Atlantic (NJ-NY-PA)	4.8%

Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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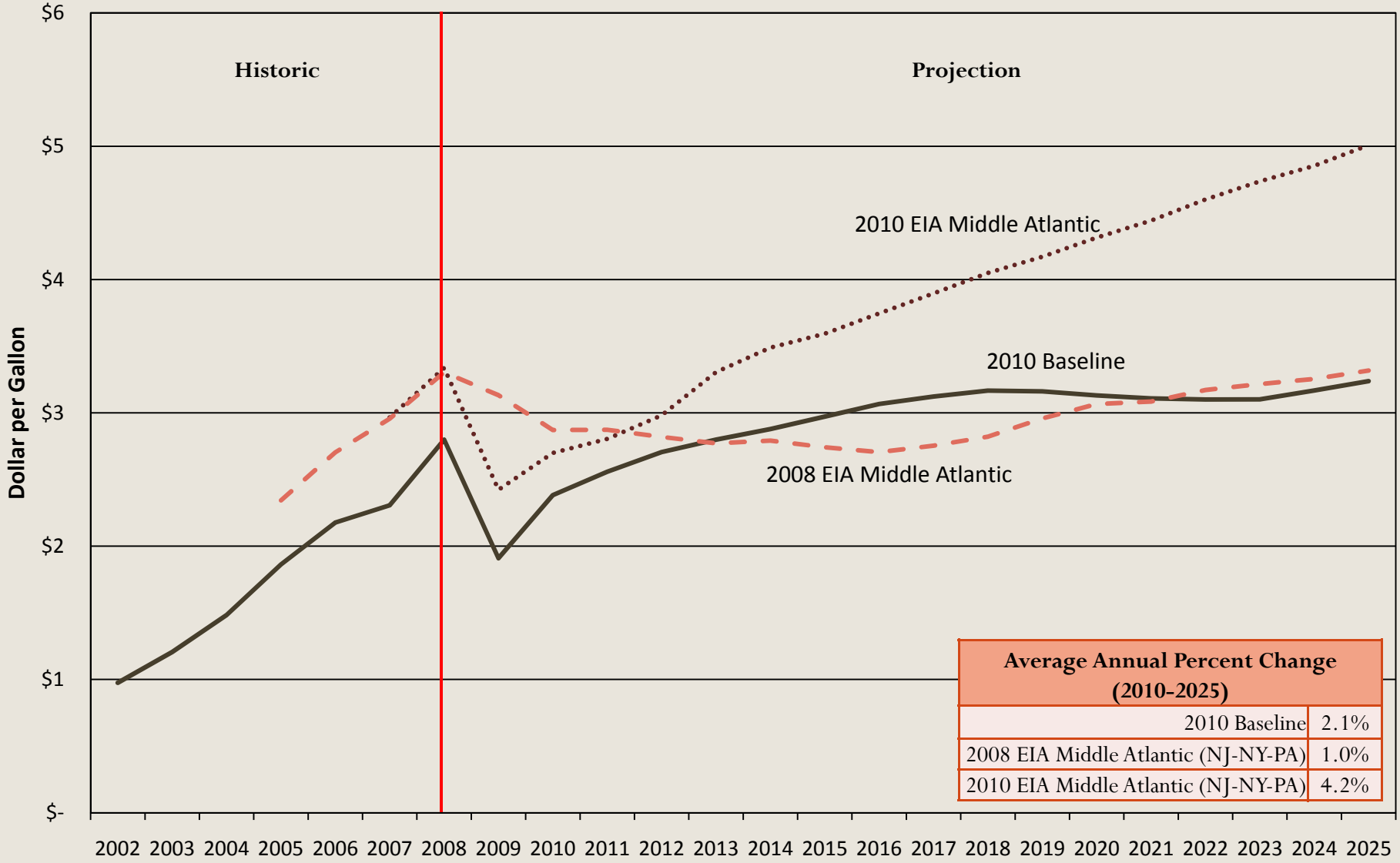
Gasoline Price through 2025



Average Annual Percent Change (2010-2025)	
2010 Baseline	2.1%
2008 EIA Middle Atlantic (NJ-NY-PA)	1.0%
2010 EIA Middle Atlantic (NJ-NY-PA)	4.2%

Reference: R/ECON™ (9/30/08) and (7/22/10).
Energy Information Administration (EIA). United States Department of Energy. Annual Energy Outlook.

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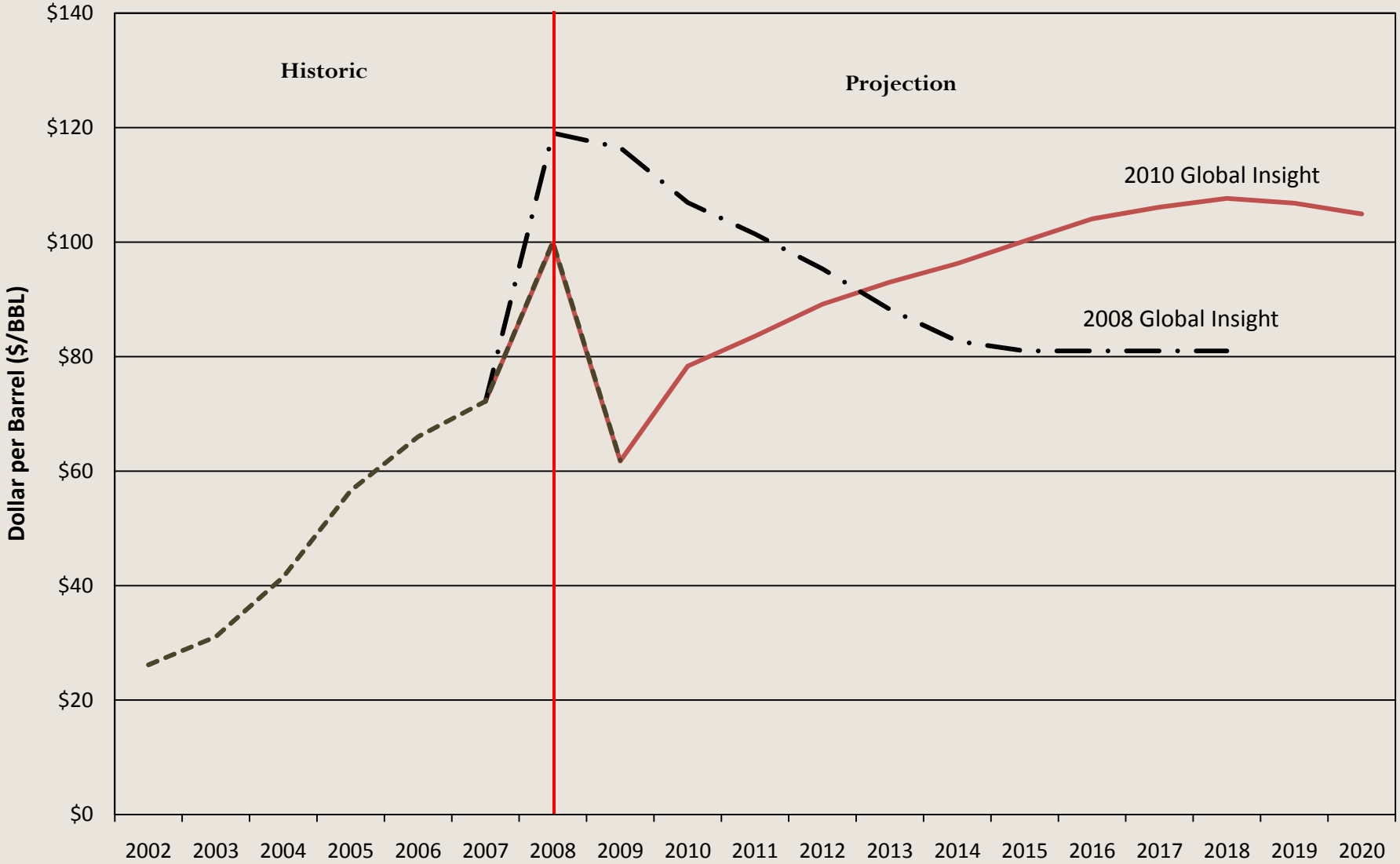
Crude Oil Prices :Western Texas Intermediary at Cushing, OK



Reference: R/ECON™ (9/30/08) and (7/22/10).

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Generation Cost Assumptions

- Levelized Cost of Electricity Comparisons
- Cost Projections and Comparisons

  Capital Costs, Input Variables (Capacity Factors, Discount Rate, Operating Life), Fuel Costs, Heat Rates, O&M Costs, and Fuel Costs for the following technologies:

  - Biomass
  - Combined Cycle
  - Combined Heat & Power
  - Gas Turbine
  - Nuclear
  - Offshore Wind
  - Onshore Wind
  - Solar

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Levelized Cost of Electricity (LCOE)

- The revenue, per unit of energy, required to recoup a plant's initial investment, cover annual costs, and provide equity investors their expected rate of return.
- Limitations of LCOE include:
  - Does not account for the costs associated with emissions (except to the extent those are reflected in fuel costs).
  - Is typically presented for a specific year and as a point-estimate, thus not accounting for how costs may change over time or the uncertainty associated with various cost components.
  - Do not account for the fact that different generation technologies earn different revenue in wholesale electricity markets
  - Do not reflect that there may capacity limits for a given technology.

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Levelized Cost of Electricity in Recent Studies ($/MWh)

	PA AEPS (2009)	EIA – AEO (2008)	Lazard (2008)	National Research Council (2008)	EMP 08 (2008)	CEEEP RPS Report (2004)	IEA (2010)
Nuclear		$136	$107-$138	$60-$130	$117		
Biomass	$50-$130	$127	$65-$113	$80-$100	$99		
Combined Cycle		$83	$69 - $96	$40 - $70	$90		
Onshore Wind	$80-$130	$170	$107-$138	$40-$100	$187	$82 (2010) $75 (2015)	
Offshore Wind	$150	$218		$50-$180	$123		
Gas Turbine		$140	$216 - $334		$188		
Solar	$240-$400	$453	$187-$280	$140-$300	$806*	$504 (2010) $390 (2015)	$360-$720 (Res) $240-$480 (Utility)

RPS: Renewable Portfolio Standards

Tax credits were not included in any of the levelized cost of electricity estimates above, except for in the Lazard study. The Lazard study LCOE estimate was adjusted to no longer include the tax credits, for comparison purposes only.

* For marginal solar panel setting the SREC price.

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Biomass Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	NREL (2006): Direct-fired	NREL (2006): Gasification	Rutgers 25MW Solid Bio (2007)	Rutgers 1.5MW Gasifier IC (2007)	EMP (2008)	Summit Blue (2008)	Navigant Direct Combustion (2008)	Lazard (2009)*	NJCEP (2009)	EIA-AEO (2010)	PA-AEPS (2010)
2008					$2,500-$3,500	$3,232		$3,150-$4,000			
2009							$,4000		$7,252	$3,995	$1,500-$5,500
2010	$1,838	$1,999	$1,970	$4,148							
2015	$1,845	$2,040	$2,050	$4,327			$4,705			$6,133	
2020	$1,844	$2,080					$5,432				
2025										$4,296	
Capacity Factor (%)	80%	80%	85%	85%	85%	70-85%	85%	80%		83%	80-90%
Discount Rate (%)					12-15%			8%		8.5%	7.5%
Lifetime (years)			25	25	20		25	20			20
Heat Rate (Btu/kWh)	12,322	9,222	16,250	16,250	14,250			14,500			
Fuel Cost ($/MMBTu)							$9-$13	$0-$3			$0-$8

* Production Tax Credit of 1.1 cents to 2.2 cents/kWh is not included in any of the above studies except for the Lazard study.

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Biomass Installed Fixed O&M Cost (Nominal $/kW)

	NREL: Direct-fired (2006)	NREL: Gasification (2006)	Rutgers 25MW Solid Bio (2007)	Rutgers 1.5MW Gasifier IC (2007)	EMP (2008)	Summit Blue (2008)	Navigant (2008)	Lazard (2009)	NJCEP (2009)	EIA – AEO (2010)	PA-AEPS (2010)
2008					$50-$60			$83		$66-$117	
2009							$125				$60-$120
2010	$83	$60									
2015	$83	$66					$131				
2020	$83	$73					$137				

Biomass Installed Variable O&M Cost (Nominal $/MWh)

	NREL: Direct-fired (2006)	NREL: Gasification (2006)	Rutgers 25MW Solid Bio (2007)	Rutgers 1.5MW Gasifier IC (2007)	EMP (2008)	Summit Blue (2008)	Navigant (2008)	Lazard (2009)	NJCEP (2009)	EIA – AEO (2010)	PA-AEPS (2010)
2008					$2-$4			$11		$7	
2009							$2.50				$10-$15
2010	$10	$6									
2015	$9	$6					$2.80				
2020	$10	$7					$3.09				

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Combined Cycle Turbine Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	EMP (2008)	DOE (2008)	PJM Cost of New Entry (EMAAC) (2008)	Navigant (2008)	Lazard (2009)	EIA – AEO (2010)
2004						
2008	$900-$1,050		$1,131		$950-$1,175	$984
2009				$910		
2010		$842				
2015		$928		$1,288		
2020		$1,022		$1,543		
Capacity Factor (%)	38.3%			85%	40-85%	
Discount Rate (%)	12-5%		9.5%			
Lifetime (years)	40	30	20	25	20	
Heat Rate (Btu/kWh)	6,875	6,870	6,979	7,100	6,800-7,220	7,196
Fuel Cost	$8				$6	

* EMAAC encompasses the PS, JCP&L, AE, PECO, DPL, and RECO zones.

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Combined Cycle Turbine Installed Fixed O&M Cost (Nominal $/kW)

	EMP (2008)	DOE (2008)	PJM Cost of New Entry (EMAAC) (2008)	Navigant (2008)	Lazard (2009)	EIA – AEO (2010)
2004						
2008	$6.50-$13.00		$18		$5.50-$6.20	$12.76
2009				$		
2010		$16				
2015		$17				
2020		$19				

Combined Cycle Turbine Installed Variable O&M Cost (Nominal $/MWh)

	EMP (2008)	DOE (2008)	PJM Cost of New Entry (EMAAC) (2008)	Navigant (2008)	Lazard (2009)	EIA – AEO (2010)
2004						
2008	$2-$3		2.80		$2-$3.50	$2.11
2009				$4.20		
2010		$3.24				
2015		$3.57		$5.49		
2020		$3.93		$6.54		

* EMAAC encompasses the PS, JCP&L, AE, PECO, DPL, and RECO zones.

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Combined Heat and Power (CHP) Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	Lemar (2001)	EERE: 100 kW micro-turbine (2005)	EERE: 1 MW Gas Turbine (2005)	Onovwiona (2006)	Karki (2007)	EMP (2008)	EIA – AEO (2010)
2001	$270-$2,200						
2006				$800-$2,800			
2007					$1,339-$2,516		
2008						$1,000-$1,500	$1,334-$1,601
2010		$1,356	$1,701				
2015		$1,459	$1,923				
2020		$1,596	$2,031				
2025		$1,764	$2,203				
Capacity Factor (%)	80 – 90%	80%	84%	75%		80%	
Discount Rate (%)	7%					12-15%	
Lifetime (years)	20					25	
Heat Rate (Btu/kWh)	6,450-11,000					10,000	9,050-10,069

Note: ICF Consulting is conducting a CHP assessment study for NJ at the present time. Results will be updated, as appropriate, when the study is complete.
The value of the steam needs to be considered.

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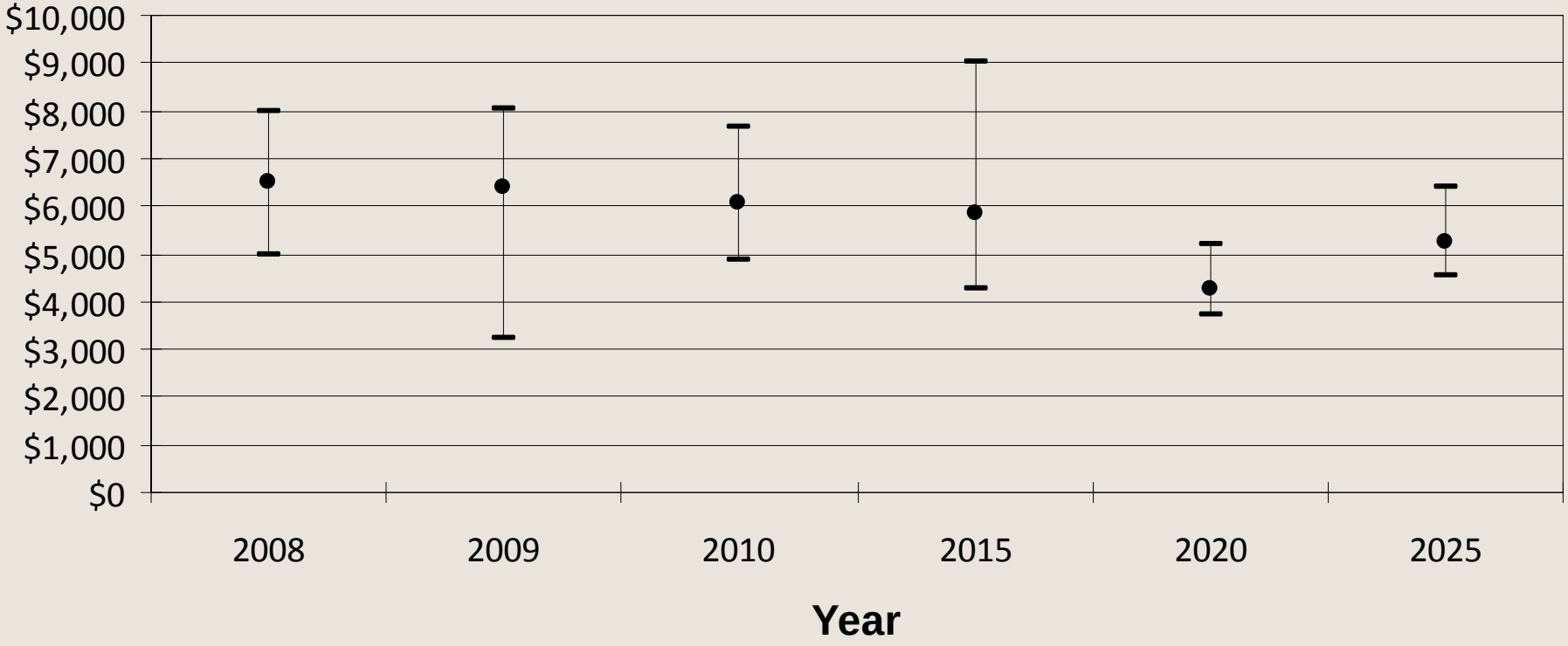
CHP Installed Capital Cost (Nominal $/kW)



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CHP Installed Fixed O&M Cost (Nominal $/kW)

	Lemar (2001)	EERE (2005)	Onovwiona (2006)	Karki (2007)	EMP (2008)	EIA – AEO (2010)
2001	$4-$10					
2006			$6-$26			
2007				$10		
2008					$30-$45	$16

CHP Installed Variable O&M Cost (Nominal $/MWh)

	Lemar (2001)	EERE (2005)	Onovwiona (2006)	Karki (2007)	EMP (2008)	EIA – AEO (2010)
2008					$4-$6.50	$7
2010		$15.90				
2015		$15.90				
2020		$15.90				
2025		$15.90				

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Gas Turbine Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	IEA/NEA (2005)	DOE (2008)	EMP (2008)	Navigant (2008)	PJM Cost of New Entry (EMAAC) (2008)	Lazard (2009)	EIA – AEO (2010)
2004	$600						
2008			$600-$800		$953	$675-$1,575	$685
2009				$670			
2010		$809					
2015		$892		$952			
2020		$983		$1,160			
Capacity Factor (%)			10.7%	15%		10%	
Discount Rate (%)	5%		12-15%		9.5%		
Lifetime (years)	20-30	30	20	20		20	
Heat Rate (Btu/kWh)		8,900	10,750	10,700	10,554	10,200-10,880	10,788
Fuel Cost	$4.58-$4.96		$8			$6	

* EMAAC encompasses the PS, JCP&L, AE, PECO, DPL, and RECO zones.

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Gas Turbine Installed Fixed O&M Cost (Nominal $/kW)

	IEA/NEA (2005)	DOE (2008)	EMP (2008)	Navigant (2008)	PJM Cost of New Entry (EMAAC) (2008)	Lazard (2009)	EIA – AEO (2010)
2004	$14-$26						
2008			$6.50-$8.50			$7-$27	$12.38
2009							
2010		$7					
2015		$8					
2020		$9					

Gas Turbine Installed Variable O&M Cost (Nominal $/MWh)

	IEA/NEA (2005)	DOE (2008)	EMP (2008)	Navigant (2008)	PJM Cost of New Entry (EMAAC) (2008)	Lazard (2009)	EIA – AEO (2010)
2004							
2008			$3.50-$6			$5-$28	$3.65
2009				$10.40			
2010		$3					
2015		$3.30		$13.67			
2020		$3.60		$16.17			

* EMAAC encompasses the PS, JCP&L, AE, PECO, DPL, and RECO zones.

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Nuclear Installed Capital Cost (Nominal $/kW)

	U of Chicago (2004)	NEA/IEA (2005)	FP&L (2007)	EMP (2008)	DOE (2008)	Navigant (2008)	Progress Florida (2008)	Brattle Group (2008)	Lazard (2009)	MIT (2009)	NEI (2010)	EIA – AEO (2010)
2003		$1,074-$2,510										
2004	$1,200-$1,800											
2007			$3,596-$4,540				$4,200			$4,000		
2008				$4,500-$7,000				$4,038	$6,325-$8,375			
2009											$4,000-$4,500	$3,822
2010					$3,420							
2015					$3,592	$8,802						$4,581
2020					$3,853	$9,505						$4,531
2025												$4,460

The capital costs do not include decommissioning costs.

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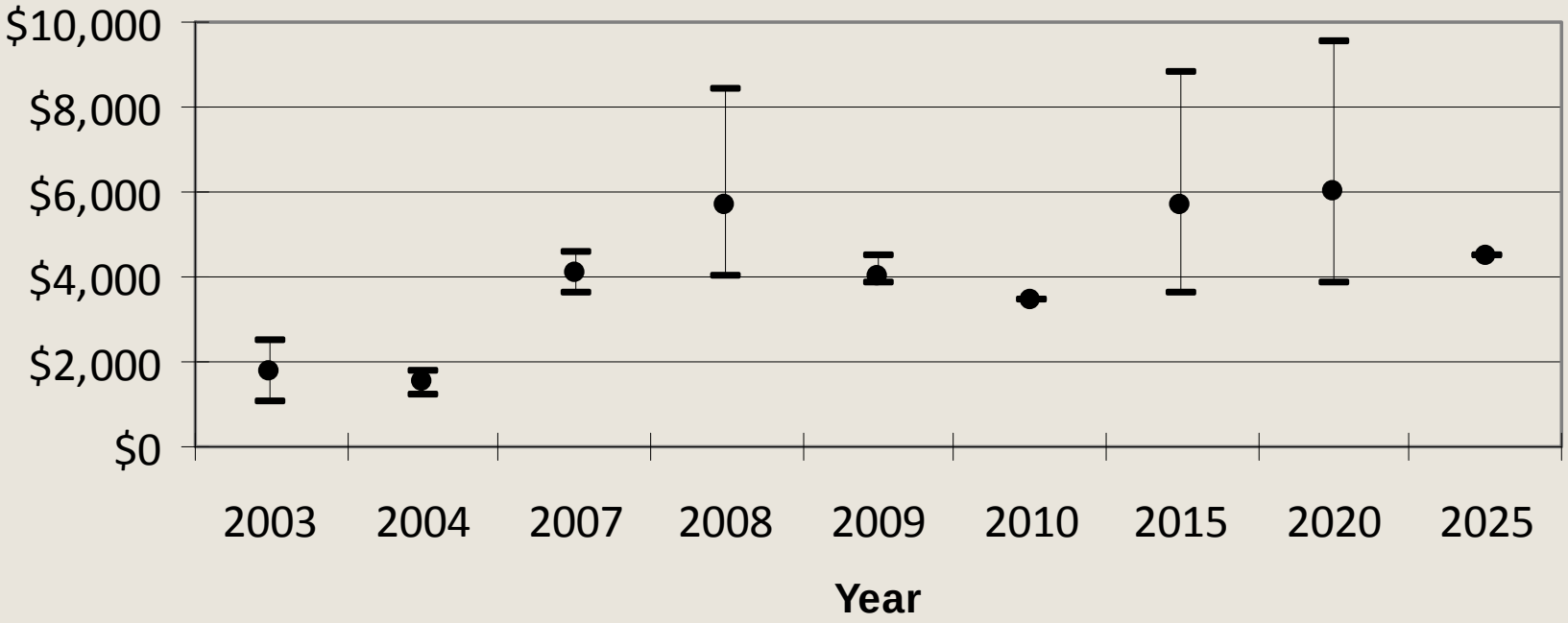
Nuclear Installed Capital Cost (Nominal $/kW)



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Nuclear Installed Input Variable Estimates

	U of Chicago (2004)	NEA/IEA (2005)	FP&L (2007)	EMP (2008)	DOE (2008)	Navigant (2008)	Progress Florida (2008)	Brattle Group (2008)	Lazard (2009)	MIT (2009)	NEI (2010)	EIA – AEO (2010)
Capacity Factor (%)	85%					94%			90%	85%		90%
Discount Rate (%)				12-15%					8%	8%		8.5%
Lifetime (years)	40			40		40	60			40		
Heat Rate (BTU/kWh)				10,400		10,400				10,400		
Fuel Cost ($/MMBTU)	$4.35	$4.64		$5.20		$2.93				$6.97	$7.50	

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Nuclear Installed Fixed O&M Cost (Nominal $/kW)

	U of Chicago (2004)	NEA/IEA (2005)	FP&L (2007)	EMP (2008)	DOE (2008)	Navigant (2008)	Progress Florida (2008)	Brattle Group (2008)	Lazard (2009)	MIT (2009)	NEI (2010)	EIA – AEO (2010)
2003											$63	
2004	$60											
2007										$56		$92
2008				$80-$120					$12.80			
2009												
2010					$97							
2015					$107	$137						
2020					$118	$148						

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Nuclear Installed Variable O&M Cost (Nominal $/MWh)

	U of Chicago (2004)	NEA/IEA (2005)	FP&L (2007)	EMP (2008)	DOE (2008)	Navigant (2008)	Progress Florida (2008)	Brattle Group (2008)	Lazard (2009)	MIT (2009)	NEI (2010)	EIA – AEO (2010)
2003												
2004	$2.10											
2007										$0.42		$0.51
2008				$0.65-$1.20					$11			
2009												
2010					$0.51							
2015					$0.56	$17.15						
2020					$0.62	$18.52						

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Offshore Wind Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	EERE (2005)	PACE (2007)	EMP (2008)	DOE (2008)	NJ Bluewater (2008)	NJ GSOE (2008)	NJ Fishermen Energy (2008)	Summit Blue (2008)	Navigant (2008)	Lazard (2009)	EWEA (2009)	EIA-AEO (2010)	PA-AEPS (2010)
2006					$3,729	$2,873	$4,147	$2,972					
2007		$5,736											
2008			$3,100-$4,100										
2009												$3,937	$4,000-$5,000
2010	$2,337 (20-50 miles) $1,391 (5-20 miles)			$2,337							$2,875		
2015				$2,465					$5,187		$1,844	$4,611	
2020	$2,654 (20-50 miles) $1,602 (5-20 miles)			$2,654					$5,345		$1,593		
2025				$2,966							$1,550	$4,696	
Capacity Factor (%)	36%	36%	34%	34-55%				34%	35%		24.1%	43-45%	35- 40%
Discount Rate (%)	8%	9%	12-15%	7%						8%		8.5%	7.5%
Lifetime (years)			20		25	20	24		25	20	20-25		

Production Tax Credit of 2.2 cents/kWh and decommissioning costs are not included in the above studies.

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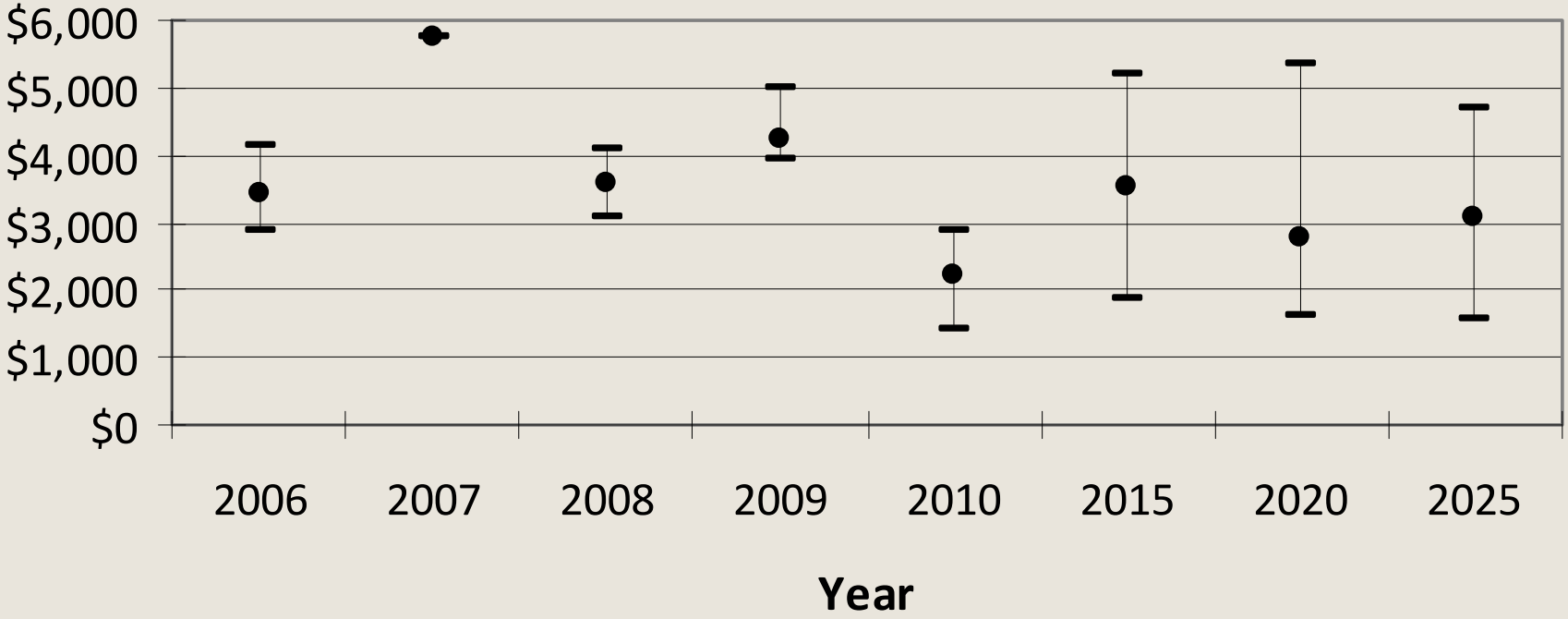
Offshore Wind Installed Capital Cost (Nominal $/kW)



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Offshore Wind Installed Fixed O&M Cost (Nominal $/kW)

	EERE (2005)	PACE (2007)	EMP (2008)	DOE (2008)	NJ Bluewater (2008)	NJ GSOE (2008)	NJ Fishermen Energy (2008)	Summit Blue (2008)	Navigant (2008)	Lazard (2009)	EWEA (2009)	EIA-AEO (2010)	PA-AEPS (2010)
2008			$50-$100										
2009													$140
2010	$61			$16								$87	
2015				$18					$26				
2020	$61			$20					$28				
2025				$23									

Offshore Wind Installed Variable O&M Cost (Nominal $/MWh)

	EERE (2005)	PACE (2007)	EMP (2008)	DOE (2008)	NJ Bluewater (2008)	NJ GSOE (2008)	NJ Fishermen Energy (2008)	Summit Blue (2008)	Navigant (2008)	Lazard (2009)	EWEA (2009)	EIA-AEO (2010)	PA-AEPS (2010)
2008			$1-$2			$33.54*	$38.57*						
2009													
2010				$19								$0	
2015				$19					$29				
2020				$18					$30				
2025				$19									

* Garden State Offshore Energy and Fisherman's Energy O&M costs represent total O&M in $/MWh, not just variable O&M costs.

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Onshore Wind Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	EERE (2005)	Navigant (2008)	Summit Blue (2008)	EMP (2008)	DOE (2008)	EWEA (2008)	Lazard * (2009)	NJCEP (2009)	EIA-AEO (2010)	PA-AEPS (2010)	NY ISO (2010)
2008				$2,000-$2,500			$1,900-$2,500				
2009		$2,471						$6,645	$1,967	$2,100-$3,000	
2010	$1,210 (Class 4) $1,100 (Class 5)				$1,780	$1,438					
2015		$2,621			$1,915	$1,074			$2,852		
2020	$1,337 (Class 4) $1,226 (Class 5)	$2,839			$2,058	$1,033					
2025					$2,262	$1,009			$3,099		
Capacity Factor (%)	40% (Class 4) 44% (Class 5)	18%	15-29%	32%	39 -40%	24%	28-36%		44-46%	25-40%	26.4-34%
Discount Rate (%)	8%			12 -15%	7%		8%		8.5%	7.5%	
Lifetime (years)		25		20		20-25	20			20	

* Production Tax Credit of 2.2 cents/kWh is not included in any of the above studies except for the Lazard study. The PTC has a very small effect on the capital cost.

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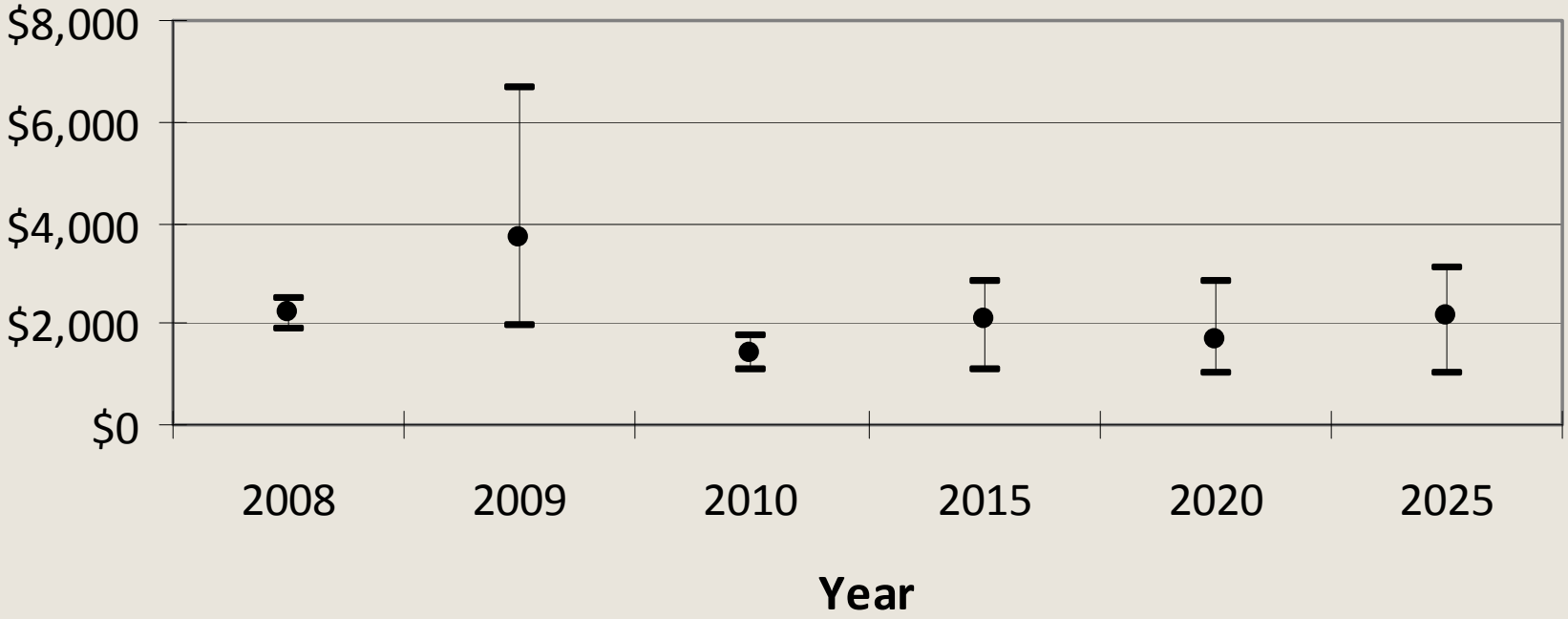
Onshore Wind Installed Capital Cost (Nominal $/kW)



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Onshore Wind Installed Fixed O&M Cost (Nominal $/kW)

	EERE (2005)	Navigant (2008)	Summit Blue (2008)	EMP (2008)	DOE (2008)	EWEA (2008)	Lazard (2009)	NJCEP (2009)	EIA – AEO (2010)	PA-AEPS (2010)	NY ISO (2010)
2008				$30-$45			$40-$50				
2009										$60	
2010	$25				$12				$31		
2015					$14						
2020	$22				$25						
2025					$17						

Onshore Wind Installed Variable O&M Cost (Nominal $/MWh)

	EERE (2005)	Navigant (2008)	Summit Blue (2008)	EMP (2008)	DOE (2008)	EWEA (2008)	Lazard (2009)	NJCEP (2009)	EIA – AEO (2010)	PA-AEPS (2010)	NY ISO (2010)
2008				$1-$2							
2009											
2010					$6						
2015					$6						
2020					$6						
2025					$7						

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Solar Installed Capital Cost (Nominal $/kW) & Input Variable Estimates

	SEIA (2004)	EERE (2005)	EMP (2008)	NREL (2008)	Navigant (2008)	Lazard* (2009)	Open PV (2009)	NJCEP (2009)	LBNL (2009)	IEA (2010)	EIA-AEO (2010)	PA-AEPS (2010)
2008			$5,000-$8,000			$4,643-$7,143			$7,500	$6,000 (Res) $5,000 (C&I)		
2009					$8,104 (Res) $7,303 (C&I)		$8,050	$7,195			$6,174	$4,000-$7,200
2010	$4,870	$7,669 (Res) $5,375 (C&I)		$6,320								
2015	$4,240	$6,580 (Res) $4,981 (C&I)		$5,399	$6,609 (Res) $5,937 (C&I)						$9,000	
2020	$3,760	$5,185 (Res) $4,359 (C&I)			$6,049 (Res) $5,432 (C&I)					$3,333 (Res) $2,778 (C&I)		
2025		$4,699 (Res) $4,554 (C&I)									$6,410	
Capacity Factor (%)	9-14%		13.5%	18-24%	18-20% (Res) 17-19% (C&I)	20-27%			14%	14-20%	21%	15- 19.5%
Discount Rate (%)		8%	12 -15%			8%				10%	8.5%	7.5%
Lifetime (years)	25		20		25	20						20

*The Lazard study capital costs include the Investment Tax Credit of 30%. The ITC is not included in this analysis, for comparison purposes only.
System capital costs vary with system size.
T&D savings (11%) due to solar are not accounted for.

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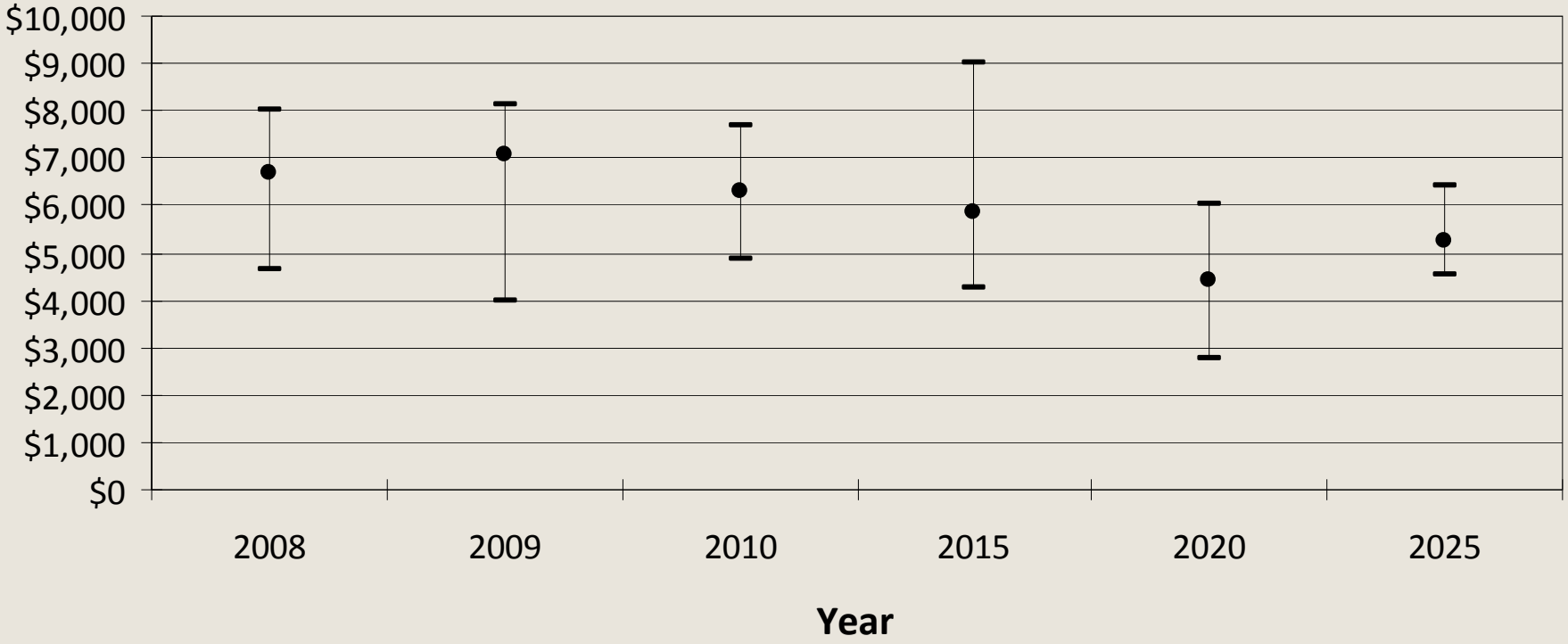
Solar Installed Capital Costs (Nominal $/kW)



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Solar Installed Fixed O&M Cost (Nominal $/kW)

	SEIA (2004)	EERE (2005)	EMP 2008	NREL (2008)	Navigant (2008)	Lazard (2009)	Open PV (2009)	NJCEP (2009)	LBNL (2009)	IEA (2009)	EIA-AEO (2010)	PA-AEPS (2010)
2008			$11-$12			$25						
2009					$41(Res) $34 (C&I)							$40-$65
2010		$41 (Res and C&I)		$39							$58	
2015		$34 (Res and C&I)		$31	$27 (Res) $22 (C&I)							
2020		$21 (Res and C&I)			$16 (Res) $19 (C&I)							
2025		$14 (Res and C&I)										

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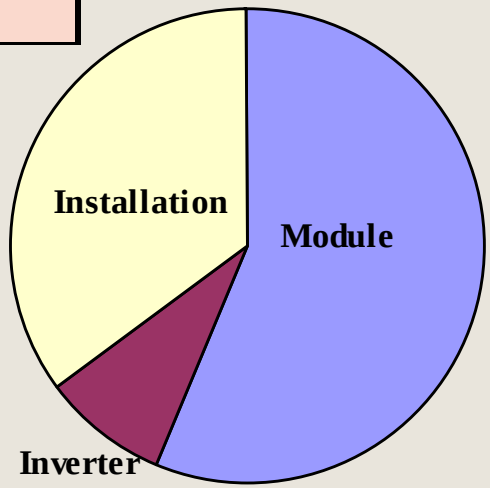
Solar Installed Capital Cost Breakout

	Module	Inverters	Installation
LBNL (2009)	56%-58%	6%-9%	34%-39%
SolarPower.org	60%	10%	30%
SunPower (2009 estimate)	50%-54%	8%	38%-42%
DOE Solar Technology Program	63%	7%	30%



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Appendix A: Energy Master Plan Statute

52:27F-14. Energy Master Plan Committee

a. There is established an **Energy Master Plan** Committee (hereinafter "Committee") which shall be composed of the heads of the following principal departments or their designees: Commerce, Energy and Economic Development; Community Affairs; Environmental Protection; Health; Human Services; Transportation; and Treasury. The Commissioner of Commerce, Energy and Economic Development or his designee shall be the chairperson of the committee. The committee shall be responsible for the preparation, adoption and revision of master plans regarding the production, distribution, and conservation of energy in this State.

b. The committee within one year of the effective date of this act shall prepare or cause to be prepared, and, after public hearings as hereinafter provided, adopt a master plan for a period of 10 years on the production, distribution, consumption and conservation of energy in this State. Such plan shall be revised and updated at least once every three years. The plan shall include long-term objectives but shall provide for the interim implementation of measures consistent with said objectives. The committee may from time to time and after public hearings amend the master plan. In preparing the master plan or any portion thereof or amendment thereto the department shall give due consideration to the energy needs and supplies in the several geographic areas of the State, and shall consult and cooperate with any federal or State agency having an interest in the production, distribution, consumption or conservation of energy.

c. Upon preparation of such master plan, and each revision thereof, the committee shall cause copies thereof to be printed, shall transmit sufficient copies thereof to the Governor and the Legislature, for the use of the members thereof, and shall advertise, in such newspapers as the commissioner determines appropriate to reach the greatest possible number of citizens of New Jersey, the existence and availability of such draft plan from the offices of the committee for the use of such citizens as may request same. In addition, the department shall:

1. Fix dates for the commencement of a series of public hearings, at least one of which shall be held in each geographical area delineated in the master plan. Each such public hearing shall concern the overall content of the plan and those aspects thereof that have relevance to the specific geographical area in which each such public hearing is being held;
2. At least 60 days prior to each public hearing held pursuant to this section, notify each energy industry and each State department, commission, authority, council, agency, or board charged with the regulation, supervision or control of any business, industry or utility engaged in the production, processing, distribution, transmission, or storage of energy in any form of the time and place for the hearing and shall publish such notice in a newspaper of general circulation in the region where the hearing is to be held, and in such newspapers of general circulation in the State as the commissioner determines appropriate to reach the greatest possible number of citizens of New Jersey.

d. Upon the completion of the requirements of subsection c. of this section, the committee shall consider the testimony presented at all such public hearings and adopt the **energy master plan** , together with any additions, deletions, or revisions it shall deem appropriate.

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EMP Statute (cont)

e. Upon the adoption of the **energy master plan** , and upon each revision thereof, the committee shall cause copies thereof to be printed and shall transmit sufficient copies thereof to the Governor and the Legislature, for the use of the members thereof, and to each State department, commission, authority, council, agency, or board charged with the regulation, supervision or control of any business, industry or utility engaged in the production, processing, distribution, transmission, or storage of energy in any form. In addition, the committee shall advertise in the manner provided in subsection c. of this section the existence and availability of the **energy master plan** from the offices of the committee for the use of such citizens of New Jersey as may request same; provided, however, that the committee may charge a fee for such copies of the **energy master plan** sufficient to cover the costs of printing and distributing same.

52:27F-15. Intervention in proceedings of state instrumentalities which regulate energy producers or distributors; notice; guidelines for energy master plan ; siting of energy facilities; jurisdiction; fees

a. The Division of Energy Planning and Conservation is empowered and directed to intervene in any proceedings before, and appeals from, any State department, division, commission, authority, council, agency or board (hereinafter referred to as "State instrumentalities") including the Board of Public Utilities charged with the regulation, supervision or control of any business, industry or utility engaged in the production, processing, distribution, transmission or storage of energy in any form, when, in the discretion of the commissioner, such intervention is necessary to insure the proper consideration by such State instrumentalities of the State **energy master plan** , or any part or aspect thereof, adopted by the department pursuant to section 12 of this act, or any rule or regulation promulgated by the department pursuant to the provisions of this act. To facilitate the intervention provisions of this section, each such State instrumentality shall consider the department a party of interest in any proceedings before such instrumentality with respect to energy and shall give the same notice to the department as is given to every other party of interest in such proceedings of any meeting, public hearing or other proceeding of such instrumentality in implementing its regulatory, supervisory or control powers, responsibilities and duties with respect to such businesses, industries or utilities.

b. It being the intention of the Legislature that the actions, decisions, determinations and rulings of the State Government with respect to energy shall to the maximum extent practicable and feasible conform with the **energy master plan** adopted by the department pursuant to section 12 of this act, the department shall prepare, periodically revise and distribute to each State instrumentality charged with the regulation, supervision or control of any business, industry or utility engaged in the production, processing, distribution, transmission or storage of energy in any form, such guidelines as the department determines to be relevant to assist each such instrumentality in conforming with said **energy master plan** in implementing its regulatory, supervisory or control powers, responsibilities and duties with respect to such businesses, industries or utilities.

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EMP Statute (cont)

c. With respect to the siting of any energy facility in any part of New Jersey, the department shall, the provisions of any law to the contrary notwithstanding, have jurisdiction coextensive with that of any other State instrumentality, and to that end, no State instrumentality with the power to grant or deny any permit for the construction or location of any energy facility shall exercise its powers without referring to the Division of Energy Planning and Conservation, for its review and comments, a copy of such application and all papers, documents and materials appurtenant thereto filed by the applicant with such State instrumentality. Prior to making a final decision with respect to any such application, the State instrumentality with power of approval over such application shall solicit the views of the department thereupon. Such views shall be communicated to the State instrumentality with the power of approval over such application in the form of a report describing the findings of the department with respect to such application. Such report shall be prepared by the Director of the Division of Energy Planning and Conservation and shall be signed by said director and by the commissioner. In the event that such report is not prepared and transmitted to the State instrumentality with power of approval over such application within 90 days after the department's receipt of such application, such State instrumentality shall act upon such application pursuant to the law providing its power of approval thereof. In the event that the views of the department, as contained in its report, with respect to any such application differ from the views of the State instrumentality with the power of approval over such application, there shall be established an Energy Facility Review Board which shall consist of the Director of the Division of Energy Planning and Conservation, the director or chief executive officer of the State instrumentality with the power of approval over such application, and a designee of the Governor. The decision of the Energy Facility Review Board created with respect to a specific energy facility application shall be binding with respect to such facility and shall be implemented forthwith by the State instrumentality with the power of approval over such application.

In implementing its responsibilities pursuant to this subsection, the department shall have the power to adopt, by regulation, a fee schedule for reviewing applications for the construction or location of energy facilities; provided, however, that fees shall be charged to applicants for permits to construct or locate energy facilities only in those instances where the nature and extent of the proposed energy facility are such as to necessitate the employment of consultants or other expert personnel from without the department before the department can make its determination with respect to any such application, and that such fees shall in any event be the minimum amount necessary to permit the department to fulfill its responsibilities under this section.

The provisions of this section shall not be regarded as to be in derogation of any powers now existing and shall be regarded as supplemental and in addition to powers conferred by other laws, including municipal zoning authority.

52:27F-16. Emergency allocation plan in event of impending shortage of energy

The commissioner shall prepare and adopt an emergency allocation plan specifying actions to be taken in the event of an impending serious shortage of energy which poses grave threats to the public health, safety, or welfare. The commissioner shall direct all State Government departments and agencies, including the Board of Public Utilities, to develop, subject to his approval, contingency plans for dealing with said emergencies.

977, c. 146, s. 14, eff. July 11, 1977.

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2008 EMP Goal 1 Maximize the State's energy conservation and energy efficiency to achieve reduction in energy consumption of at least 20% by 2020

Action Item 1 Redesign and transition the State's current energy efficiency programs to be implemented by the electric and natural gas utilities, and achieve the desired results while remaining cost effective.

- Identify and implement cost-effective energy efficiency measures that could achieve over 15,000 GWh of electric savings and 75 trillion Btus of total heating savings by 2020.

Action Item 2 Work with the Legislature to authorize the development of statewide building codes to result in new construction being at least 30% more energy efficient than current code by July 2009 and develop a strategy to achieve net zero carbon emitting buildings.

- The DCA, DEP and BPU will develop a statewide strategy to achieve net zero carbon emitting buildings for all new and existing building, achieving electricity savings of nearly 1,000 GWh and total heating savings of nearly 20 trillion Btus per year by 2020.

Action Item 3 Work with the Legislature to set minimum energy efficiency standards for new appliances and other types of equipment currently not covered by existing standards by 2009.

- The BPU staff working with the DCA staff will conduct an annual review of new appliance equipment and appliance energy efficiency improvements to determine whether new energy efficiency standards will be necessary.
- The legislation and other recently approved standards are estimated to achieve more than 2,500 GWh of electricity savings and total heating savings of more than 6 trillion Btus by 2020.

Action Item 4 Increase education and outreach in the public and private sectors.

- The BPU Office of Business Energy Ombudsperson will select up to ten industry sectors to create Best Practice Manuals, featuring recommendations for energy efficiency improvements.
- The BPU will create a partnership of public and private sector representatives to review existing education efforts in the public and private sectors and recommend an ongoing mix of education programs and resources to help New Jersey achieve its energy efficiency goals.

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2008 EMP Goal 2 Reduce peak electricity demand by 5,700 MW by 2020

An estimated 900 MW of peak demand can be reduced through specific peak demand initiatives (discussed below) and an additional 4,800 MW of peak demand can be reduced through energy efficiency and cogeneration action items(achieved through other EMP goals)

Action Item 1 Expand incentives for participation in PJM regional demand response programs.

Action Item 2 Involve electric utilities in developing and implementing demand response programs.

Action Item 3 Target all commercial and industrial customers with a peak demand of 500 kW or greater for reduction in peak demand and continue to develop incentives that achieve significant peak demand saving.

- By 2012, the BPU Office of the Energy Ombudsperson will target commercial and industrial customers to educate and inform them about peak demand and energy consumption reduction incentives provided by PJM and the State.
- The BPU Office of the Energy Ombudsperson will develop a best practices guide and a listing of State companies that install and operate demand response equipment.

Action Item 4 Pilot different technologies and rate structures to determine the best way to achieve peak demand reductions for residential customers and all customers with peak demand below 500 kW.

Action Item 5 Monitor the results of all demand response, energy efficiency, and conservation initiatives through 2012 and implement the most effective mix of action steps to achieve a total peak demand reduction of 5,700 MW by 2020.

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2008 EMP Goal 3 Strive to surpass the current RPS goals and achieve 30% of the State's electricity needs from renewable sources by 2020

Action Item 1 Change the solar energy goals from a percentage of 2.12% to a goal of 2,120 GWh by 2020.

Action Item 2 Develop New Jersey's wind energy resources, with at least 1,000 MW of offshore installed by 2012, and at least 3,000 MW of offshore wind and up to 200 MW of onshore wind by 2020.

- The Governor will establish an Offshore Wind Planning Group that will consist of the DEP, BPU, the Rate Counsel and public members to develop the necessary plan to guide the development of offshore wind.

Action Item 3 Develop 900 MW of biofuels and biomass as part of the State's 2020 RPS.

Action Item 4 Increase support of other renewable energy technologies.

- The BPU will consider an RPS 'carve out' model for new and emerging technologies of up to 50 MW a year through 2020.

Action Item 5 Increase the Renewable Portfolio Standard for the years 2021 to 2025.

- The BPU will evaluate the appropriateness of increasing the Renewable Portfolio Standard for the years 2021 to 2025 and have a final proposal by January 1, 2010.

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2008 EMP Goal 4 Develop a 21st Century energy infrastructure that supports the goals and action items of the EMP, ensures reliability of the system and makes available additional tools to consumers to manage their energy consumption

Action Item 1 The State will work with the electric and gas utilities to develop individual utility territory master plans through 2020 that effectively respond to the goals and action items in the EMP, and provides consumers with additional resources to manage their energy consumption.

- The electric and gas utilities will work with the BPU, Rate Counsel and the Governor's Office to develop individual master plans within 12 months of the release of the EMP. These plans will be updated every 3 years.

Action Item 2 Foster the development of 1,500 MW of new cogeneration capacity in New Jersey by 2020.

- The EDA, BPU and DEP will work together to develop economic and regulatory incentives to spur clean generation construction, especially cogeneration, and to smooth regulatory and legal hurdles to turn waste energy into economically smart and environmentally sounder energy.
- The BPU staff will develop a list of necessary regulatory and statutory changes that are necessary to make cogeneration available to more customers.

Action Item 3 Ensure a balance between supply and demand of energy that will ensure reliability of electricity and fuel supplies, serve the State's greenhouse gas targets and provide energy at a reasonable price.

- The State will charge the stakeholder group of the State Energy Council to issue a report to the Governor by the end of 2009 about the following issues concerning nuclear energy: waste storage issues, projected growth to baseload demand, available technologies that can environmentally and economically meet baseload demand while not comprising reliability, impacts to ratepayers, and the appropriate public outreach process that should be undertaken if the State were to consider approving construction of a new nuclear plant.
- The BPU staff will work with the DEP staff and local distribution gas companies to conduct comprehensive analysis and future needs assessment of pipeline capacity and regional natural gas and liquid natural gas supply the ensure a level of stability in prices impacting New Jersey consumers.

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2008 EMP Goal 5 Invest in innovative clean energy technologies and businesses to stimulate the industry's growth in New Jersey

Action Item 1 Expand efforts that encourage the development of clean energy technologies by expanding the Edison Innovation Fund to invest in innovative clean energy technologies and provide support to business incubators that support clean energy business development.

- The BPU, EDA and CST are partnering to expand the Edison Innovation Fund to include an Edison Innovation Clean Energy Technology Commercialization Fund and an Edison Innovation Clean Energy Manufacturing Fund.

Action Item 2 Develop timely and industry recognized job training programs to ensure that sufficient numbers of New Jersey workers have the skills demanded by industry to fill the jobs that are created from the action items in the EMP.

Action Item 3 Establish the Energy Institute of New Jersey to support basic and applied energy research efforts at the colleges and universities in the State.

- The Energy Institute , in its efforts to advance the State's research development and demonstrations efforts in the energy sector, will advance new technologies and channel additional funding sources, such as federal funds and private grants, in support of the goals of the EMP.

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Appendix B: Acronyms

Energy Master Plan (EMP)

New Jersey Board of Public Utilities (BPU)

New Jersey Economic Development Authority (EDA)

New Jersey Commission on Science and Technology (CST)

New Jersey Department of Environmental Protection (DEP)

New Jersey Clean Energy Program (CEP)

Center for Energy, Economic and Energy Policy (CEEEP)

Board of Public Utilities Office of Business Energy Ombudsperson (OBEO)

New Jersey Department of Labor and Workforce Development (LWD)

<u>Energy Units</u>

- Kilowatt Hour (kWh)
- Megawatt Hour (MWh)
- Gigawatt Hour (GWh)
- Megawatt (MW)
- British Thermal Unit (Btu)

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