Synapse
Energy Economics, Inc.

Highlights of AESC 2011 Report

Vermont Presentation
August 22, 2011

AGENDA

Part 1: Introduction and General Approach

Part 2: Avoided Costs of Electricity: Wholesale (Capacity)

Part 2: Avoided Cost of Electricity: Wholesale (Energy, Natural Gas Prices)

Part 3: Avoided Cost of Electricity: Retail (Avoided RPS Costs, Wholesale Risk Premium, Demand Reduction Induced Price effect, $C0_2$ Externalities)

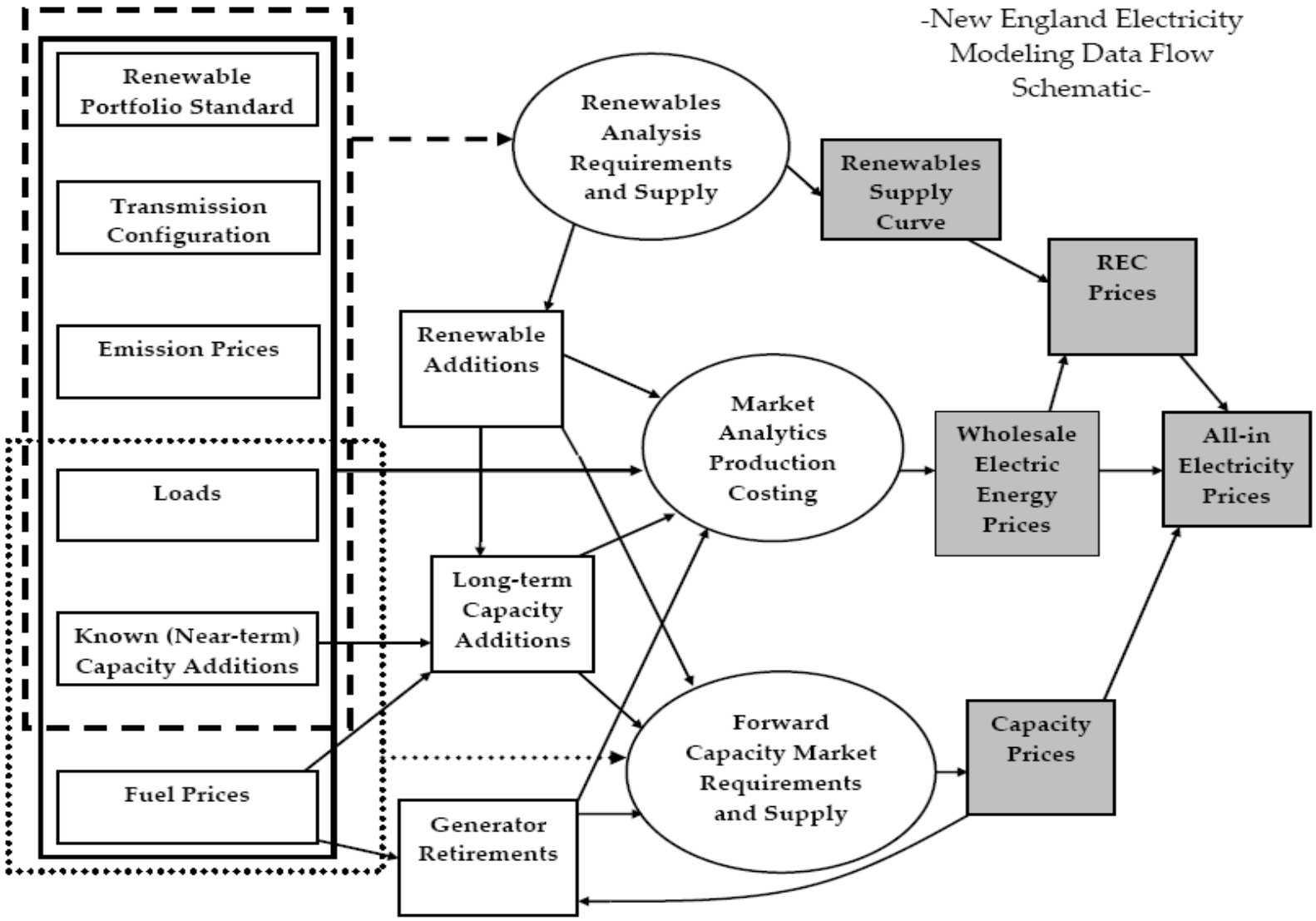
Part 4: Avoided Costs of Natural Gas (production; transmission, storage and peaking; distribution)

Part 5: Avoided Costs of Other Fuels

AESC 2011

Part One: Introduction

AVOIDED ELECTRICITY COSTS – Capacity, Energy and RECs



Avoided Cost of Electricity – Vermont Specific Components

Avoided energy = (wholesale electric energy price + REC cost) X (1 + wholesale risk premium). This is the largest component. For Vermont, 15 year levelized **annual** values are about 15% lower than AESC 2009, is primarily due to lower natural gas prices. (Summer on-peak values about 8% lower).

Avoided capacity = (Revenue from bidding demand reductions into Forward Capacity Market (FCM) + value of avoided capacity from reductions not bid into FCM). For Vermont 15 year levelized avoided capacity value (100% bid in) is 91% higher than AESC 2009. This is primarily due to floor prices through FCA 6 and higher projections of capacity additions after 2020 to replace higher projections of capacity retirements per more stringent air emission regulations.

Energy DRIPE = value of reductions in wholesale energy prices due to kWh reductions. For Vermont, 15 year levelized **annual** energy DRIPE values are approximately 69% higher than AESC 2009. This is primarily due to a longer delay before new generation begins offsetting the reductions.

Capacity DRIPE = value of reductions in FCM prices due to kW reductions. For Vermont 15 year levelized values are 211% higher than AESC 2009. This is due to higher projections of capacity prices and longer dissipation period.

Avoided CO_2 environmental externalities = portion of costs of controlling CO_2 emissions at sustainable level that are not reflected in wholesale energy market prices. Values are higher because AESC 2011 energy prices reflect a smaller portion of total CO_2 emission control costs than AESC 2009.

Avoided local T&D infrastructure. These costs are calculated by each Program Administrator.

Background
AESC 2011 Results (cents/kwh) – Vermont zone

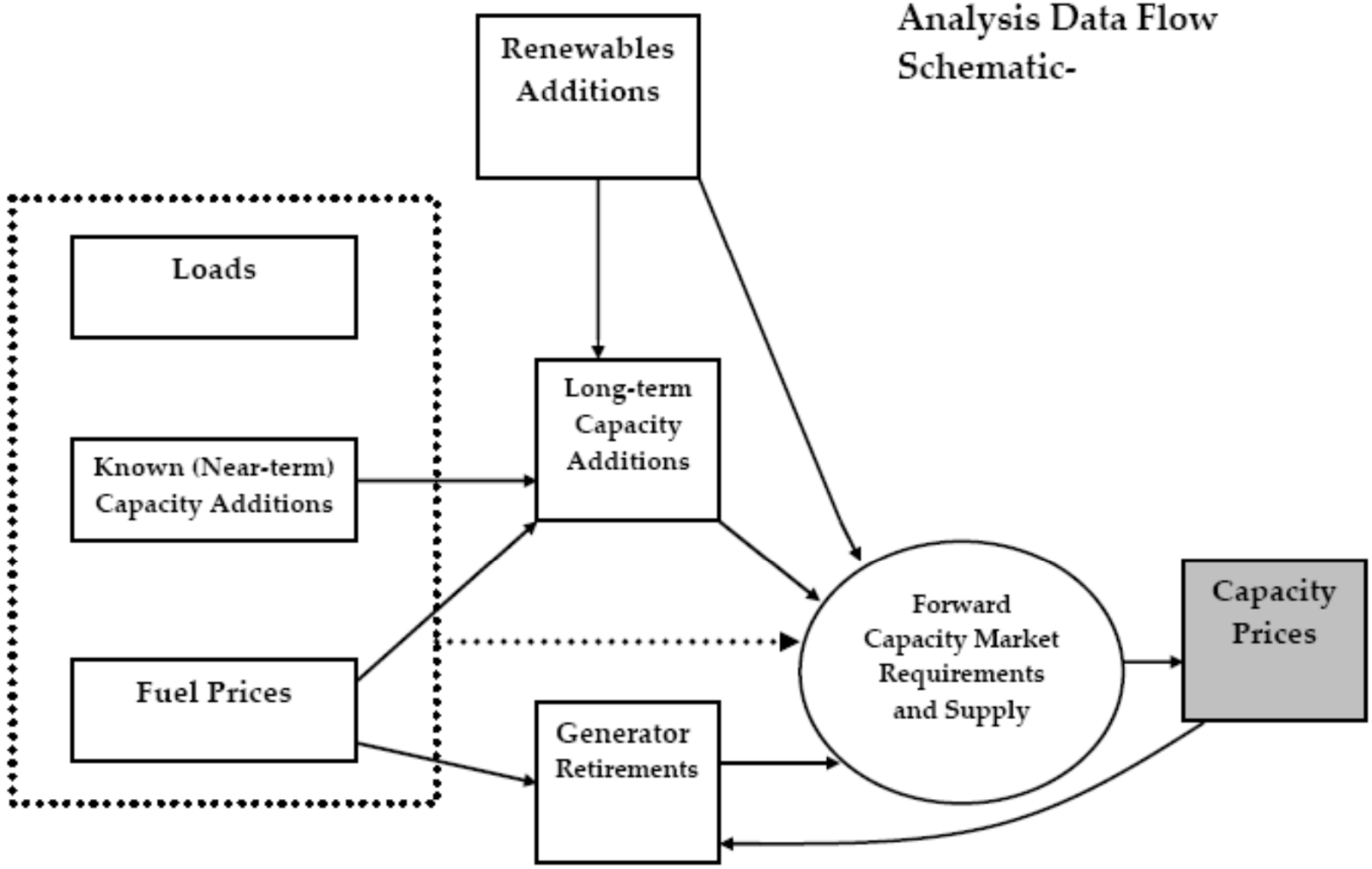
Avoided Electricity Costs for Vermont Zone (Summer On Peak) AESC 2009 vs. AESC 2011- Intrastate Energy DRIPE (Results are 15 year levelized in 2011$)					
Component	**AESC 2009**	**AESC 2011**		**Difference Relative to AESC 2009**	
	cents/kWh	cents/kWh		cents/kWh	% Difference
Avoided Energy Costs	9.52	8.74		-0.79	-8%
Avoided Capacity Costs[1,2]	0.57	1.08		0.51	91%
Energy and Capacity Subtotal	**10.09**	**9.81**		**-0.27**	**-3%**
DRIPE					
Intrastate Energy[3]	0.11	0.19		0.08	74%
Capacity[2]	0.01	0.05		0.03	211%
DRIPE Subtotal	**0.12**	**0.23**		**0.11**	**91%**
Subtotal: Avoided Energy and Capacity + Intrastate DRIPE	**10.21**	**10.05**		**-0.16**	**-2%**
CO_2 Externality[4]	2.95	3.41		0.46	15%
Total	**13.16**	**13.46**		**0.29**	**2%**

Notes
-Values may not sum due to rounding
-Avoided energy costs for Summer On-Peak incorporate avoided REC costs (All Classes for AESC 2011, Class I for AESC 2009)
-AESC 2009 values levelized (2010-2024) escalated to 2011$
1) Avoided capacity costs assumes 100% ***selling*** into Forward Capacity Markets
2) Assuming a 55% load factor
3) Values are for Intrastate *energy* DRIPE
4) 2011 CO_2 prices and physical emission rates

Part Two: Avoided Cost of Electricity: Wholesale

AVOIDED ELECTRICITY COSTS - Capacity

-Forward Capacity Analysis Data Flow Schematic-



AVOIDED ELECTRICITY COSTS - Capacity

Key Drivers

- *Low load growth; capacity from renewable resources added to comply with RPS requirements*
- *New capacity added post 2020 to replace retirements driven by tighter regulation of emissions*

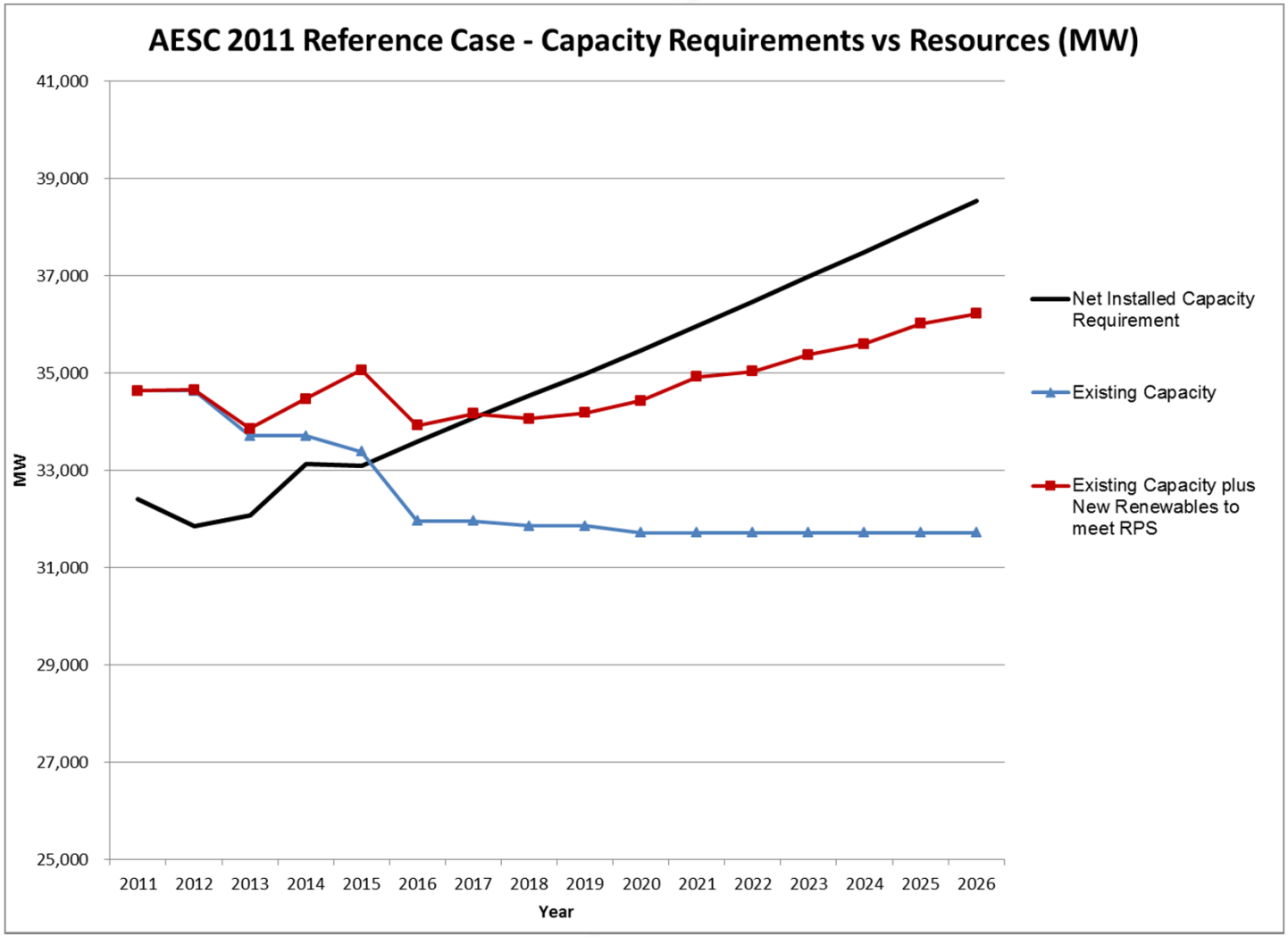
- *AESC 2011 results vs. AESC 2009*
  - *FCM values **91**% higher*

AVOIDED ELECTRICITY COSTS - Capacity

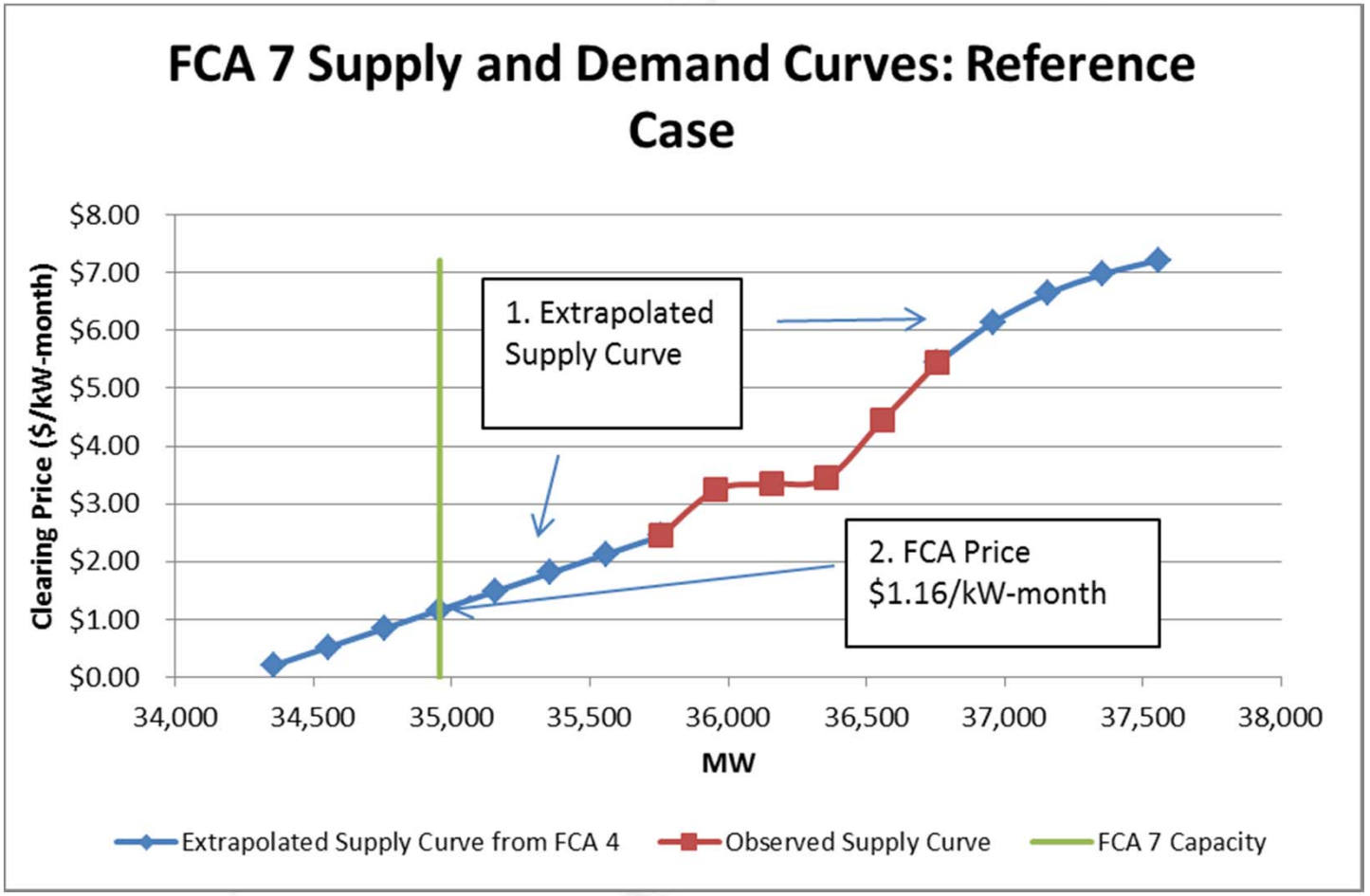
Capacity Exhibit 6-4. Capacity Requirements and Supply

	Starting June	Total Suppy Effect (MW)	Net ME Locked-in MW	Net Change from FCA 4 (MW)	Total Resources at FCA 4 Floor Price	NICR (MW)	Surplus (Shortage) at FCA 4 Floor Price
		[1]	[2]	[3]	[4]	[5]	[6]
FCA3	2012	-600		-600	35,668	31,927	3,741
FCA4	2013	-600		-600	35,668	32,127	3,541
FCA5	2014	-619	85	-689	35,169	33,200	2,364
FCA6	2015	-1,000	-368	-617	35,636	33,099	2,537
FCA7	2016	-1,682	-369	-1,292	34,956	33,593	1,363
FCA8	2017	-1,603	-425	-1,159	35,089	34,076	1,013
FCA9	2018	-1,708	-563	-1,233	35,123	34,542	581
FCA10	2019	-1,551	-357	-1,277	35,074	34,982	92
FCA11	2020	-1,626	-387	-1,317	35,029	35,470	-441
FCA12	2021	-1,512	-625	-971	35,381	35,964	-583
FCA13	2022	-1,441	-657	-870	35,483	36,465	-982
FCA14	2023	-1,341	-688	-737	35,615	36,973	-1,358
FCA15	2024	-1,271	-720	-633	35,717	37,488	-1,771
FCA16	2025	-1,150	-753	-479	35,871	38,010	-2,139
FCA17	2026	-1,101	-786	-395	35,953	38,539	-2,586

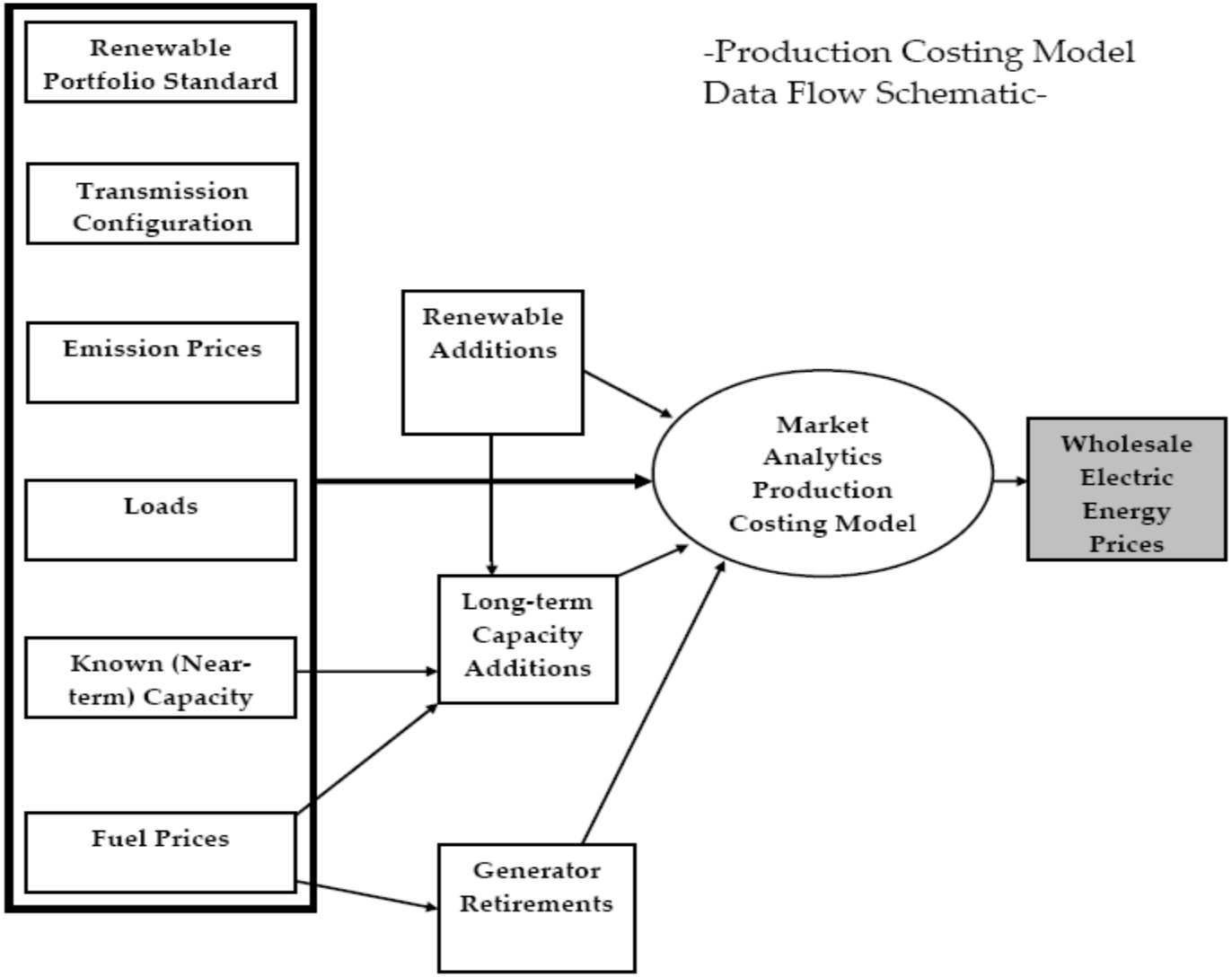
AVOIDED ELECTRICITY COSTS – Capacity Requirements vs Resources with RPS compliance



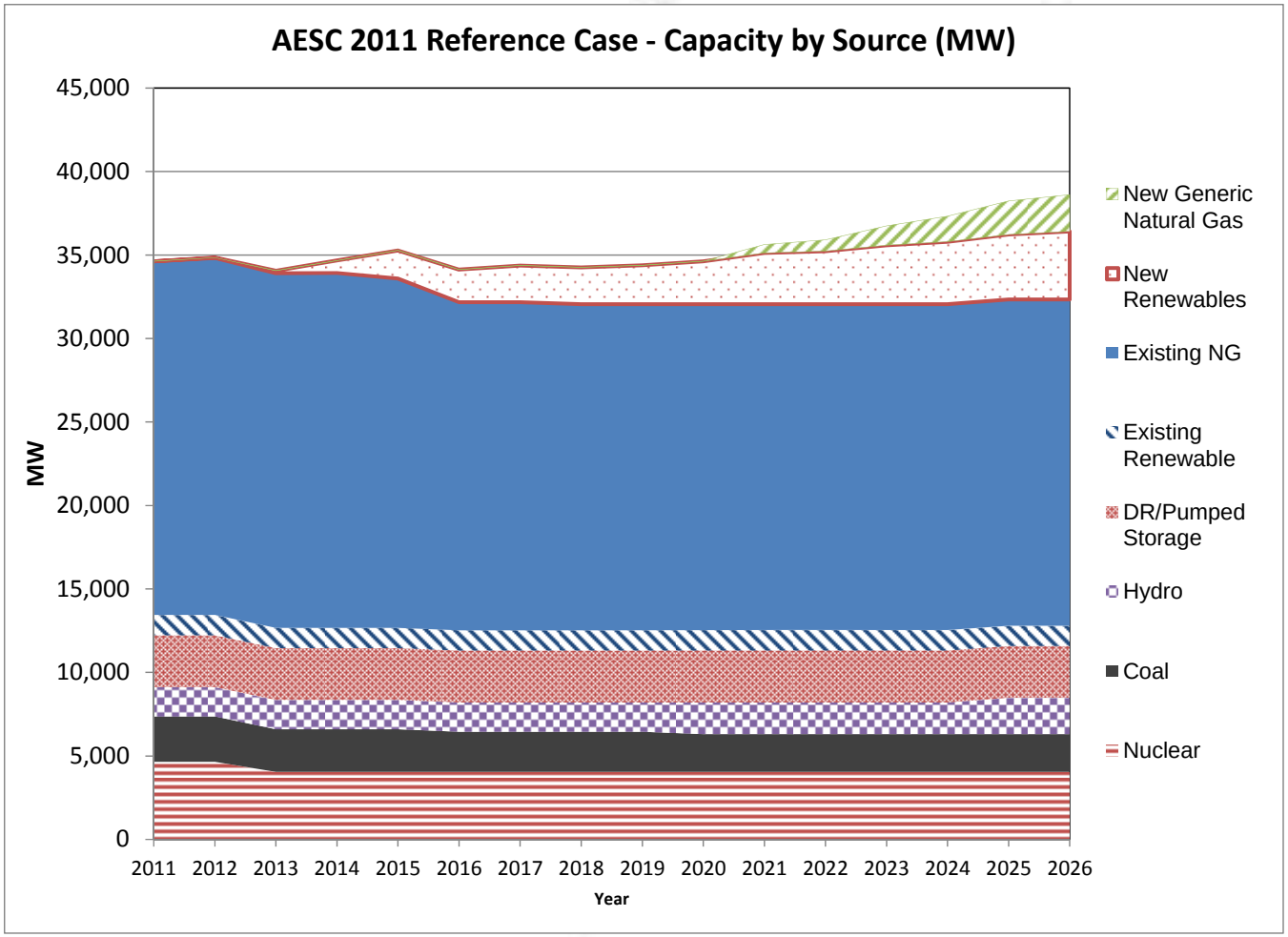
Avoided Electricity Costs
Capacity Costs per FCA 4 Supply Curve



AVOIDED ELECTRICITY COSTS - Energy



AVOIDED ELECTRIC ENERGY COSTS:
Capacity used to simulate energy market



AVOIDED ELECTRICITY COSTS – Energy
Key drivers and results

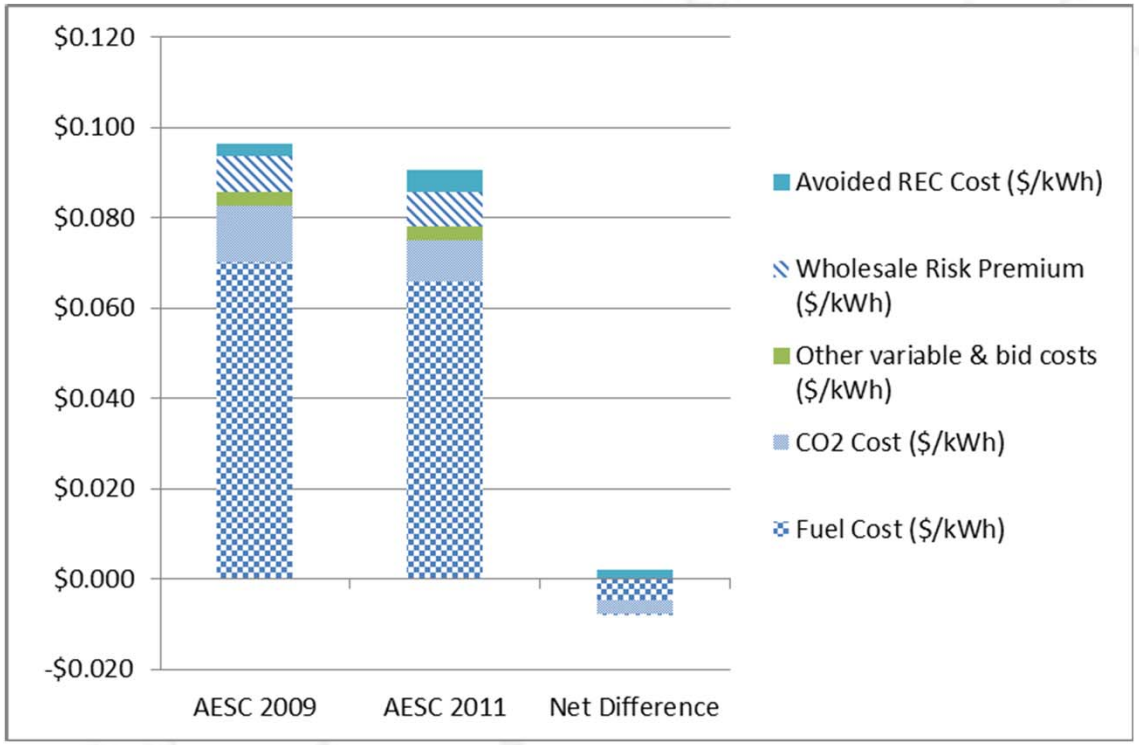
Key Drivers

- *Natural gas prices*
- *Compliance with RPS requirements*
- *Carbon emission regulation per RGGI through 2017 then Federal*

Results for Vermont (15 year levelized) vs. AESC 2009

- *Annual values about 15% lower*
- *Summer On Peak period values 8% lower*

AVOIDED ELECTRICITY COSTS – Illustrative Comparison of Wholesale Energy Components (WCMA Zone)



AVOIDED ELECTRICITY COSTS – Energy
Natural Gas price assumptions

Price of Gas For Electric Generation = Henry Hub + cost of delivery to generating units

Henry Hub prices

- 2011 through 2014 per NYMEX futures (as of March 18, 2011)
- 2015 onward per AEO 2010 "High Shale" Scenario

Cost of delivery to generating units

- Forecast based on analysis of historical differential between monthly average unit costs reported to EIA by generating units and HH prices

Natural Gas assumptions

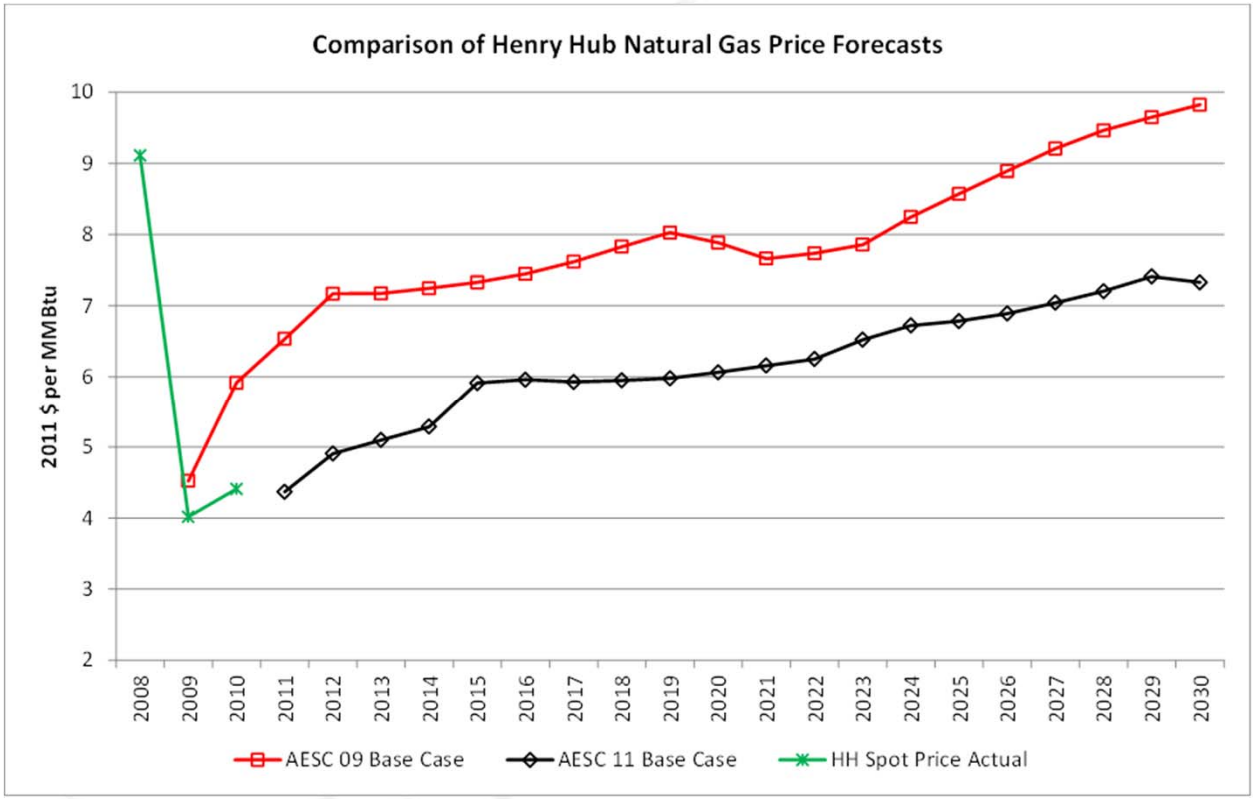
Key Drivers

- *Shale gas as major new marginal resource*

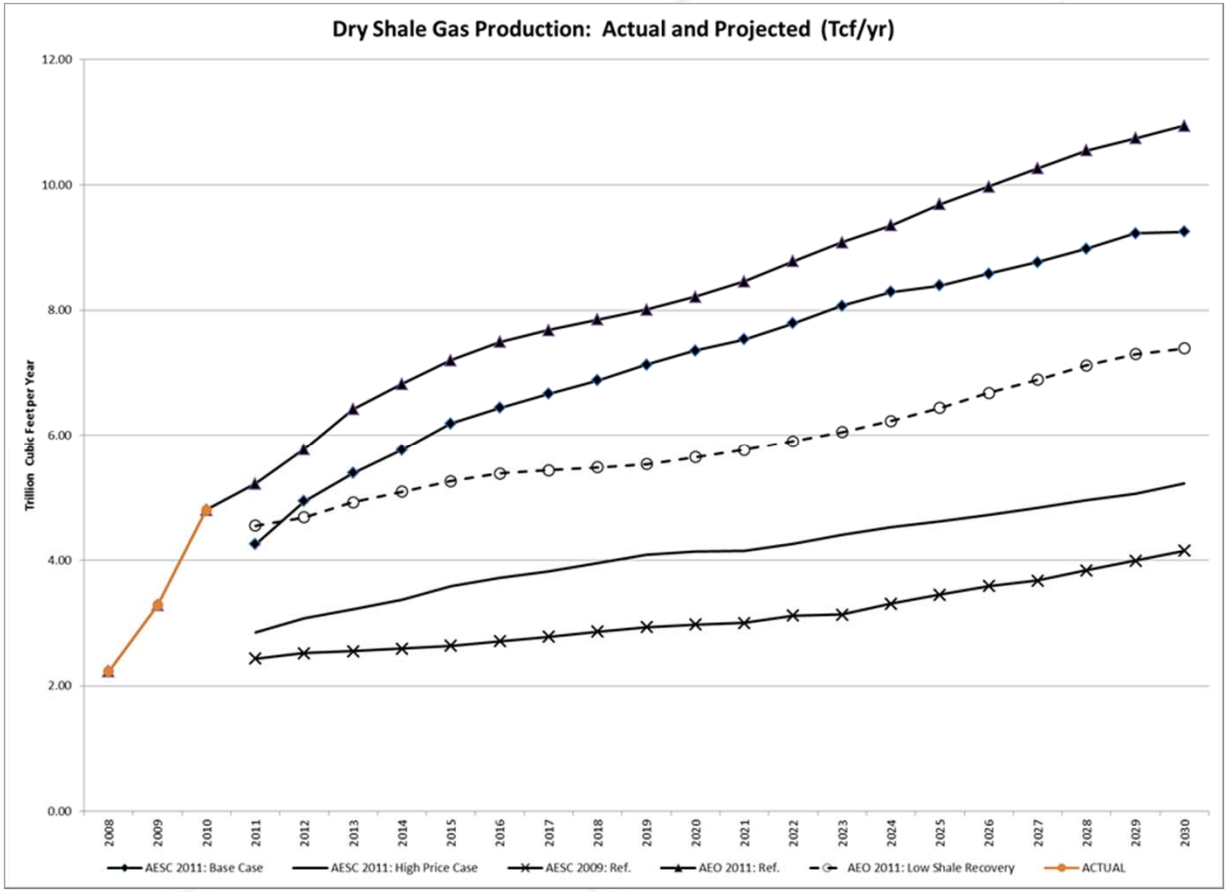
Key results versus AESC 2009 (15 year levelized in 2011$)

- *Henry Hub prices approximately 19% lower*

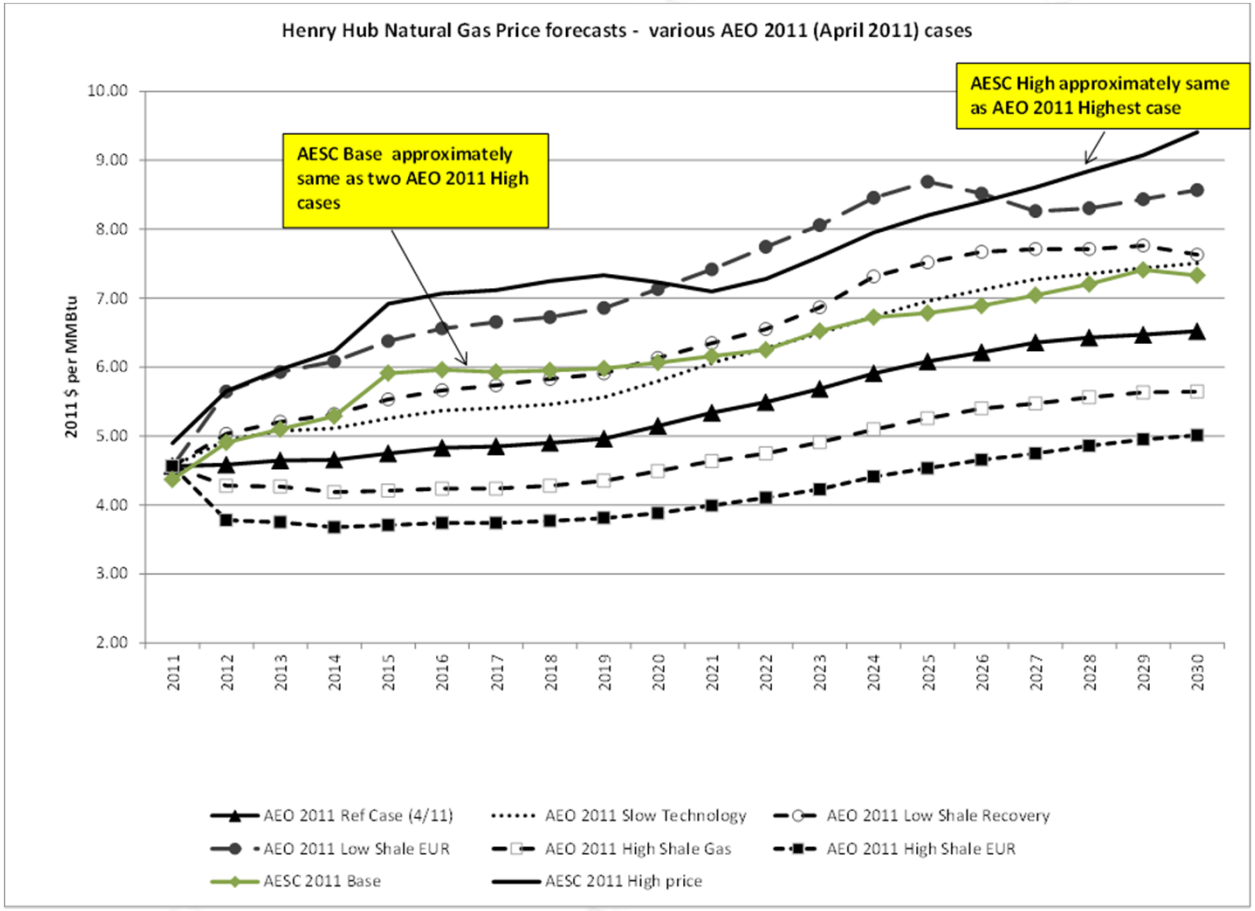
AVOIDED ELECTRICITY COSTS – Energy
Natural Gas Input



AVOIDED ELECTRICITY COSTS – Energy
Natural Gas Input



Avoided Natural Gas Costs

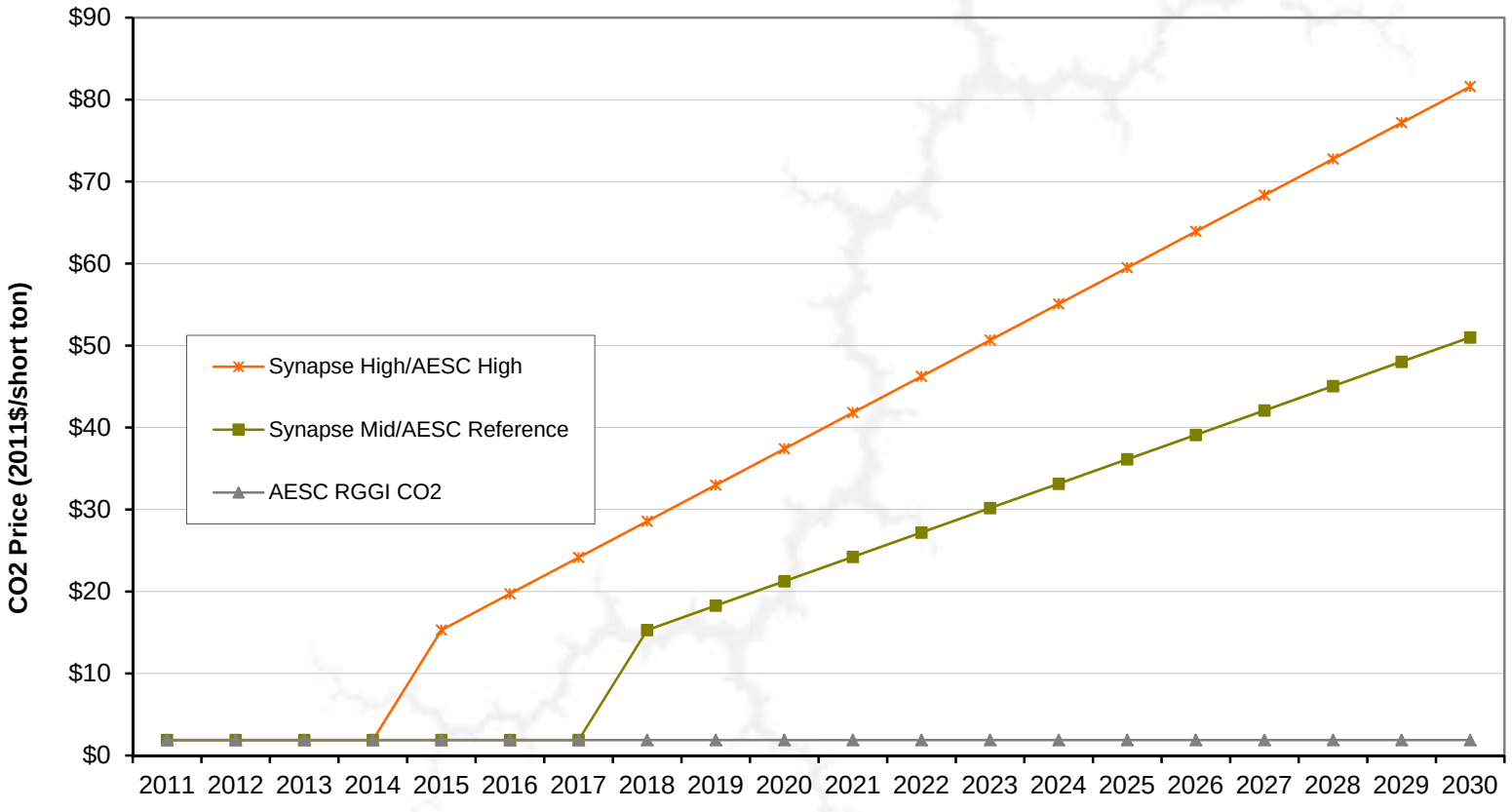


AVOIDED ELECTRICITY COSTS - Energy

- Emission Allowance Prices
  - Emission allowance price forecasts for SO_2, NO_x, and CO_2
  - Price forecasts for SO_2 and NO_x based upon values from allowance futures markets and experience with existing regulations
  - Price forecast for CO_2 assumes Regional Greenhouse Gas Initiative (RGGI) through 2017 and national regulation from 2018 onward.

AVOIDED ELECTRICITY COSTS - Energy

- Carbon Emission Allowance Prices



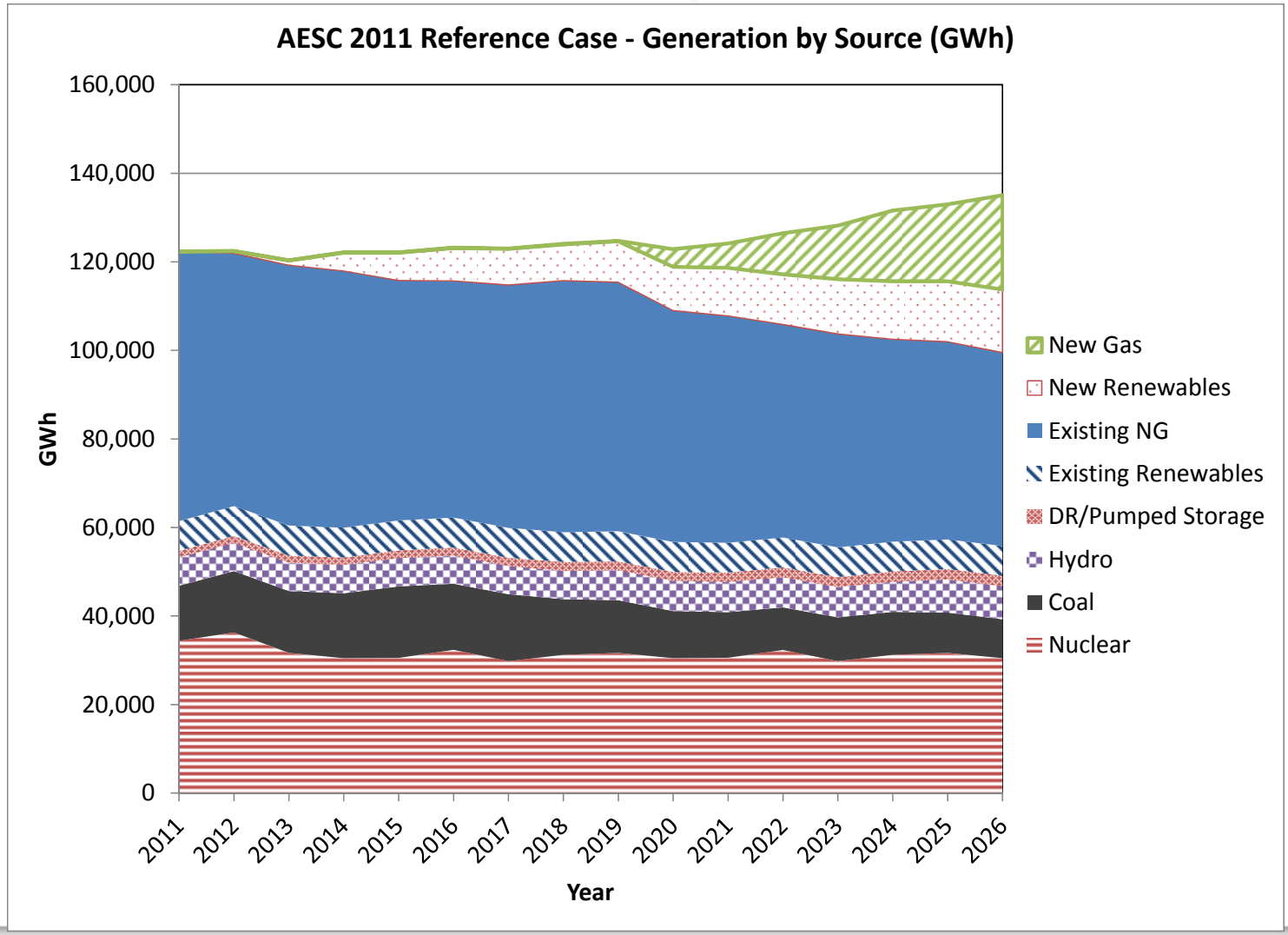
Note: The AESC Reference and High Forecasts begin with the RGGI allowance price in 2011. The forecasts assume implementation of a federal cap-and-trade program, and use the Synapse Mid and High cases in 2018 and 2015.

AVOIDED ELECTRICITY COSTS - Energy

Exhibit 2-4 Allowance Price Summary

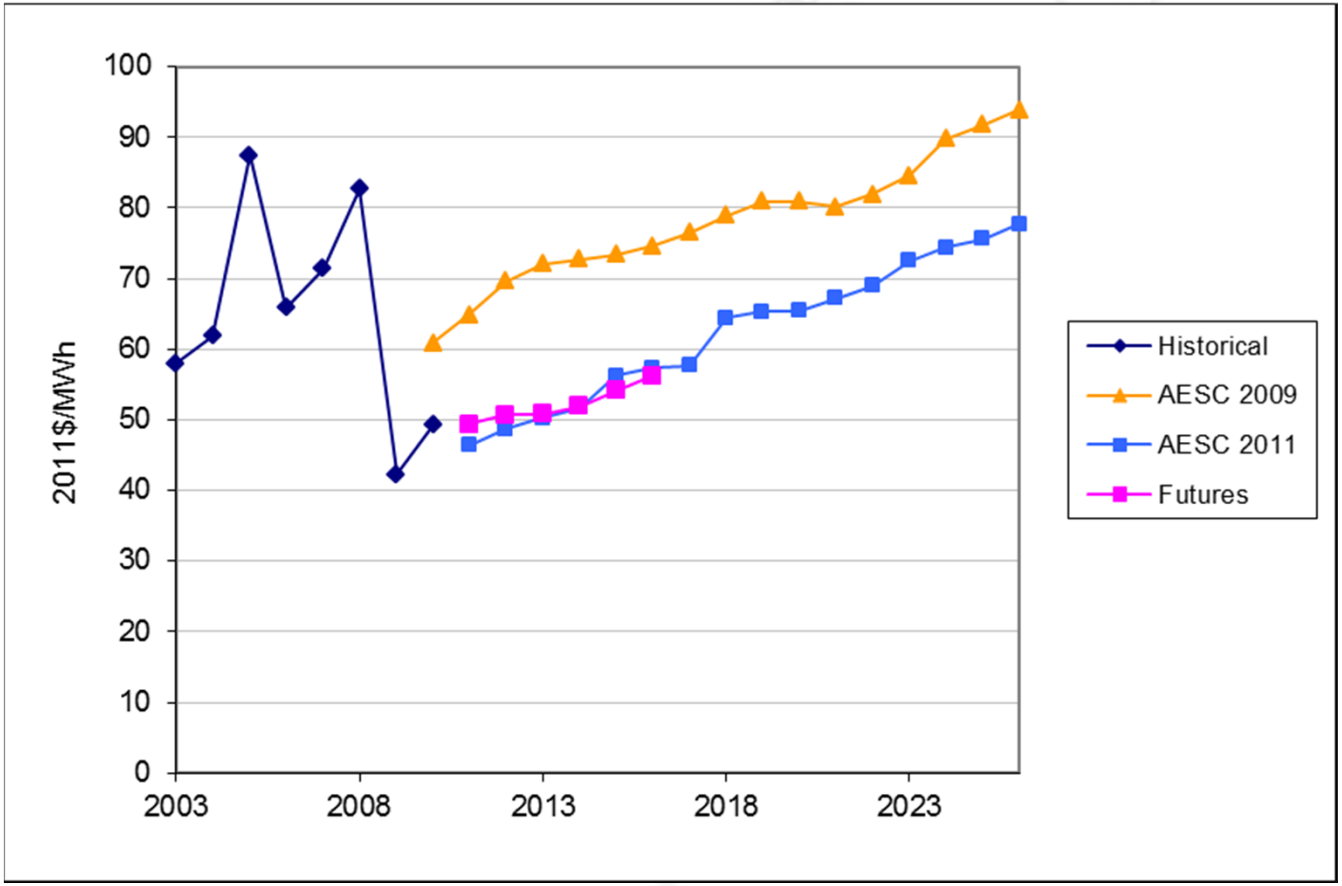
	NOx		SO_2		CO_2 (Synapse)	
Year	2011$	Nominal	2011$	Nominal	2011$	Nominal
2011	230	230	3.75	3.75	1.89	1.89
2012	145	148	3.21	3.27	1.89	1.93
2013	134	139	1.65	1.72	1.89	1.97
2014	132	141	1.62	1.72	1.89	2.01
2015	*132*	143	*1.62*	1.75	1.89	2.05
2016	*132*	146	*1.62*	1.79	1.89	2.09
2017	*132*	149	*1.62*	1.83	1.89	2.13
2018	*132*	152	*1.62*	1.86	15.30	17.57
2019	*132*	155	*1.62*	1.90	18.28	21.41
2020	*132*	158	*1.62*	1.94	21.25	25.40
2021	*132*	161	*1.62*	1.98	24.23	29.53
2022	*132*	165	*1.62*	2.02	27.20	33.82
2023	*132*	168	*1.62*	2.06	30.18	38.27
2024	*132*	171	*1.62*	2.10	33.15	42.88
2025	*132*	175	*1.62*	2.14	36.13	47.67
2026	*132*	178	*1.62*	2.18	39.10	52.62
2027	*132*	182	*1.62*	2.23	42.08	57.76
2028	*132*	185	*1.62*	2.27	45.05	63.08
2029	*132*	189	*1.62*	2.31	48.03	68.59
2030	*132*	193	*1.62*	2.36	51.00	74.30

AVOIDED ELECTRICITY COSTS – Wholesale Energy Market Generation



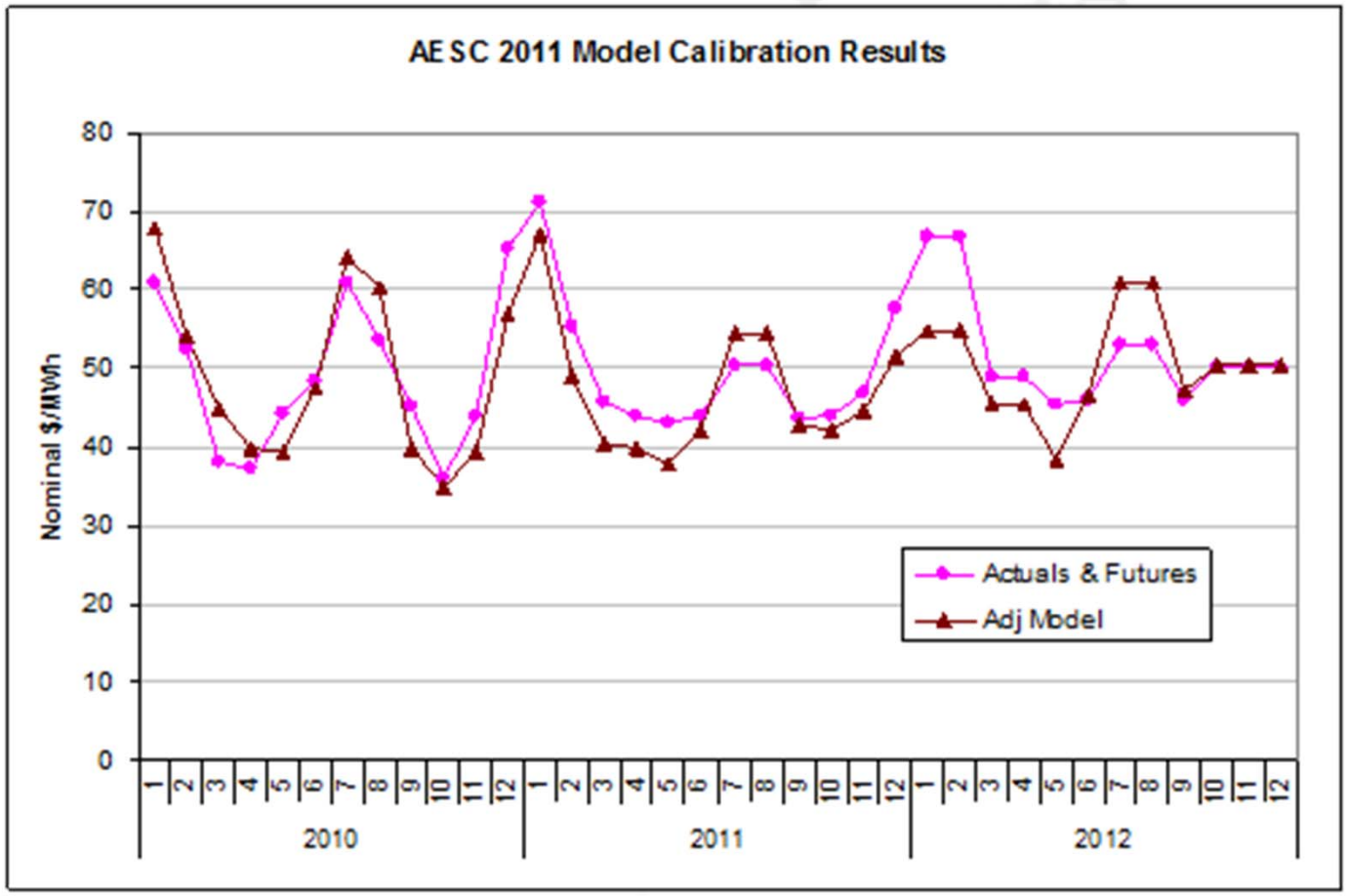
AVOIDED ELECTRICITY COSTS - ENERGY

Energy Exhibit 6-5: Historical and AESC Forecasts – Annual Average Prices



AVOIDED ELECTRICITY COSTS - ENERGY

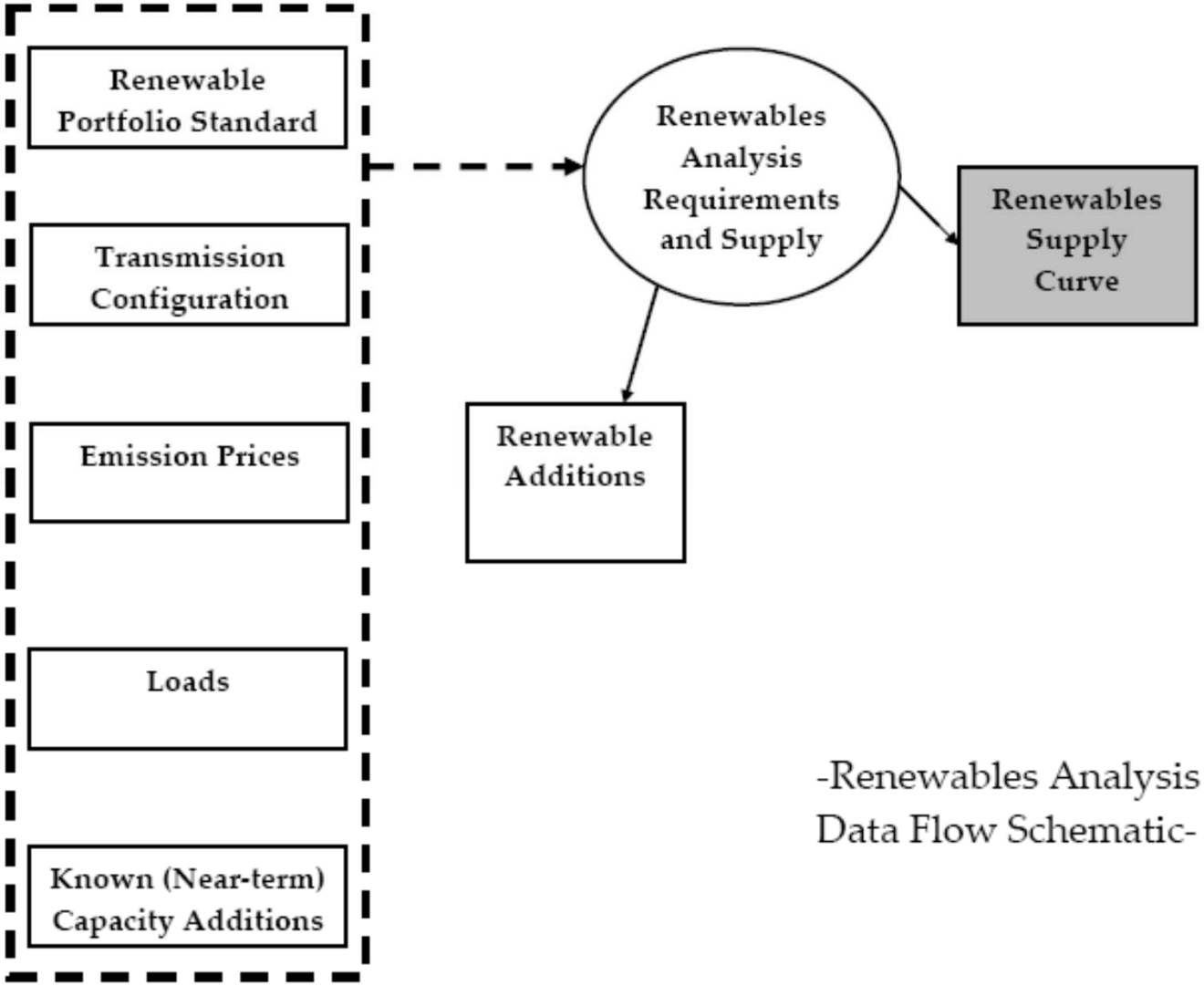
Exhibit 7- 13: AESC Peak Forecast vs. NYMEX New England Futures



Part Three: Avoided Cost of Electricity: Retail

Part Three A: Avoided Cost of Electricity: Retail (RECs and Wholesale Risk Premium)

AVOIDED ELECTRICITY COSTS Retail– Class I Renewable Energy Certificates



-Renewables Analysis Data Flow Schematic-

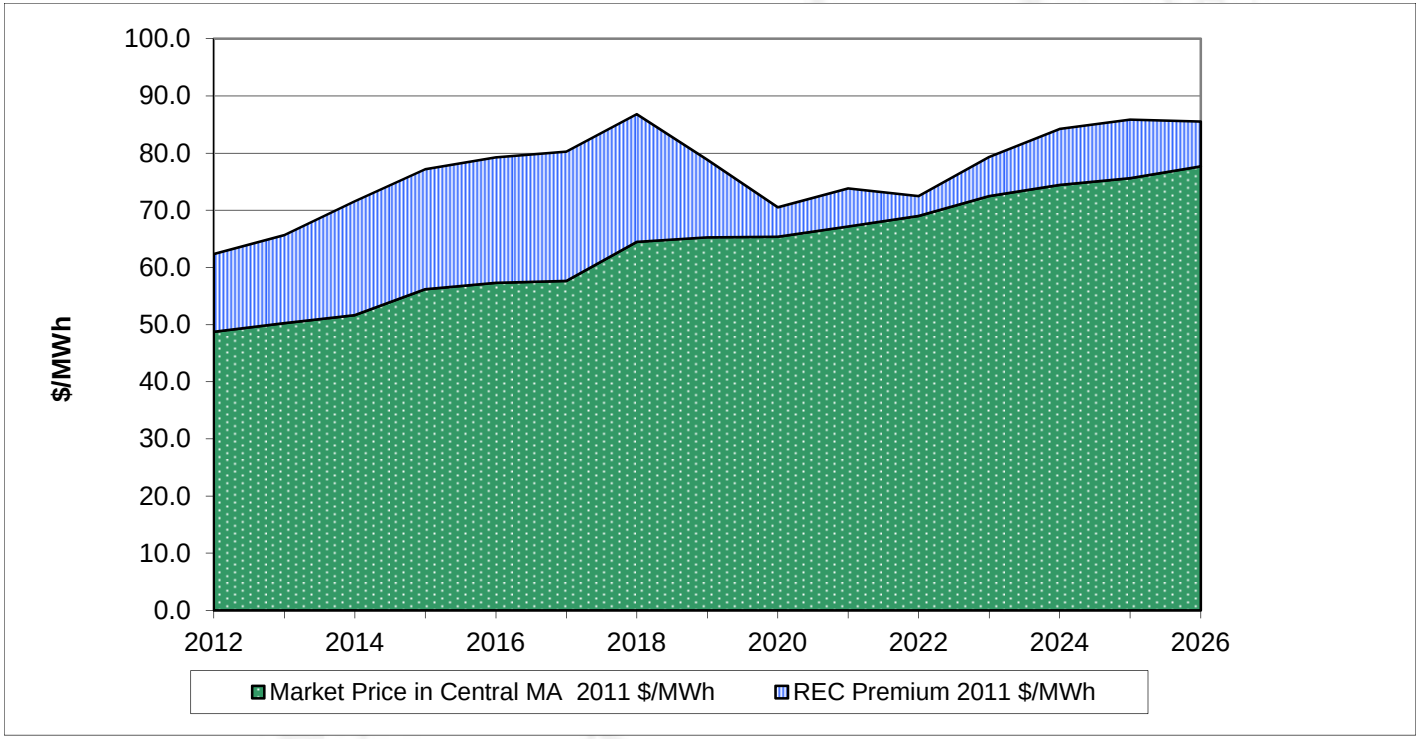
AVOIDED ELECTRICITY COSTS Retail – Class I Renewable Energy Certificates

Exhibit RPS 3

	Class 1 RPS Supply					New RE Demand	
	ISO-NE Supply		Imported Supply		TOTAL		
Year	Operating	Incremental	Current	Expected		New Renewable Requirement GWh	New Renewable Energy Surplus/(Shortage)
	a	b	c	d	e = sum a to d	f	g = e-f
2012	5,803	118	1,814	656	**8,391**	**8,066**	324
2013	5,803	661	1,767	1,067	**9,298**	**9,413**	(115)
2014	5,803	3,476	1,754	1,465	**12,498**	**10,785**	1,713
2015	5,803	5,540	1,741	1,843	**14,927**	**12,374**	2,554
2016	5,803	6,723	1,728	2,220	**16,474**	**13,990**	2,484
2017	5,803	7,500	1,716	2,596	**17,614**	**15,638**	1,976
2018	5,803	7,573	1,703	2,972	**18,051**	**17,126**	925
2019	5,803	8,854	1,691	3,348	**19,695**	**18,635**	1,060
2020	5,803	9,720	1,678	3,724	**20,926**	**20,034**	892
2021	5,803	10,809	1,666	3,720	**21,998**	**20,954**	1,044
2022	5,803	11,469	1,654	3,716	**22,642**	**21,893**	749
2023	5,803	12,572	1,642	3,712	**23,728**	**22,851**	878
2024	5,803	13,179	1,629	3,708	**24,319**	**23,827**	492
2025	5,803	14,323	1,618	3,704	**25,448**	**24,679**	769
2026	5,803	14,846	1,606	3,700	**25,955**	**25,547**	407

AVOIDED ELECTRICITY COSTS Retail – Class I Renewable Energy Certificates

Wholesale Energy Market Price and REC Premium ($/MWh)

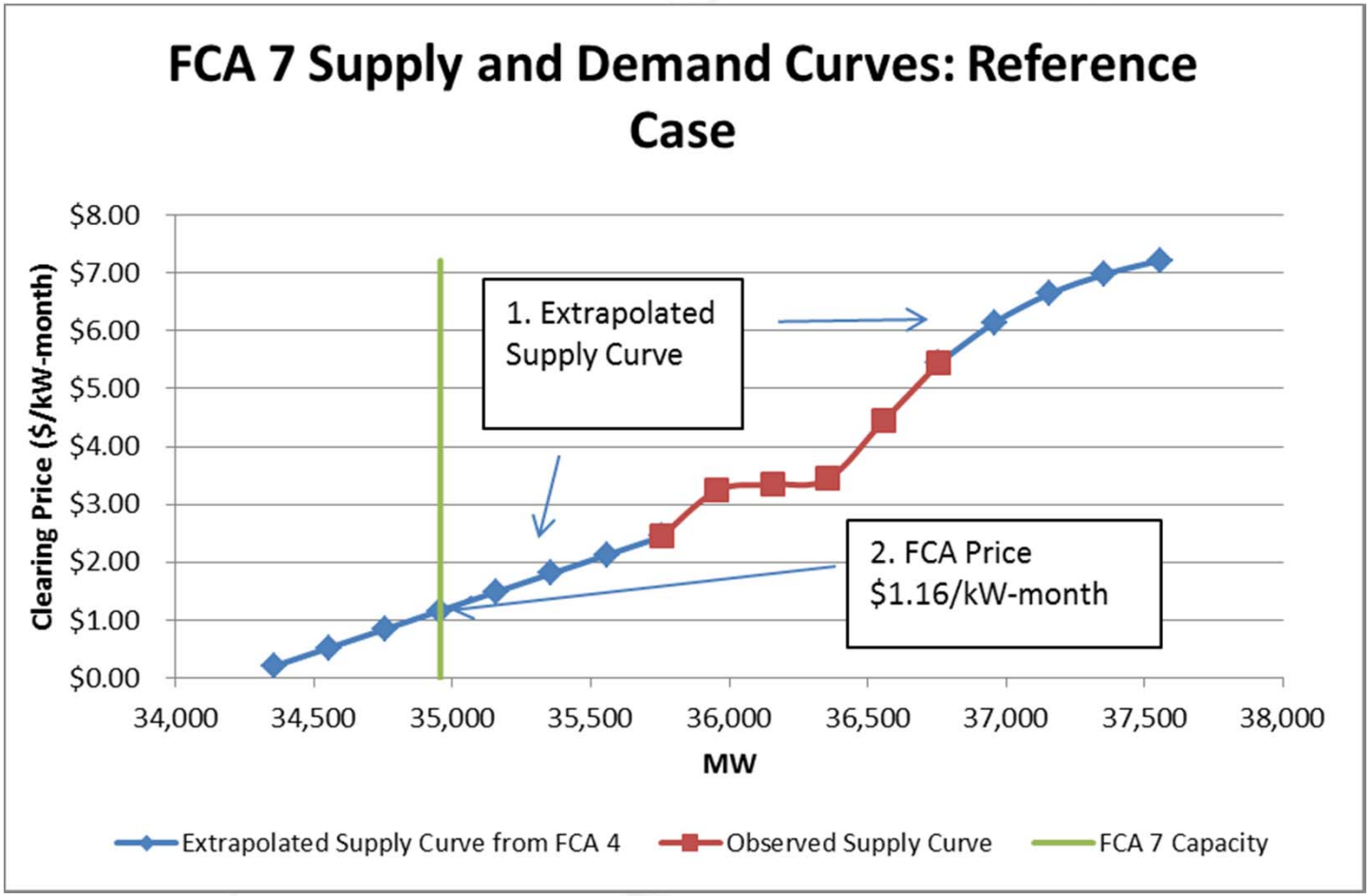


AVOIDED ELECTRICITY COSTS Retail – Wholesale Risk Premium

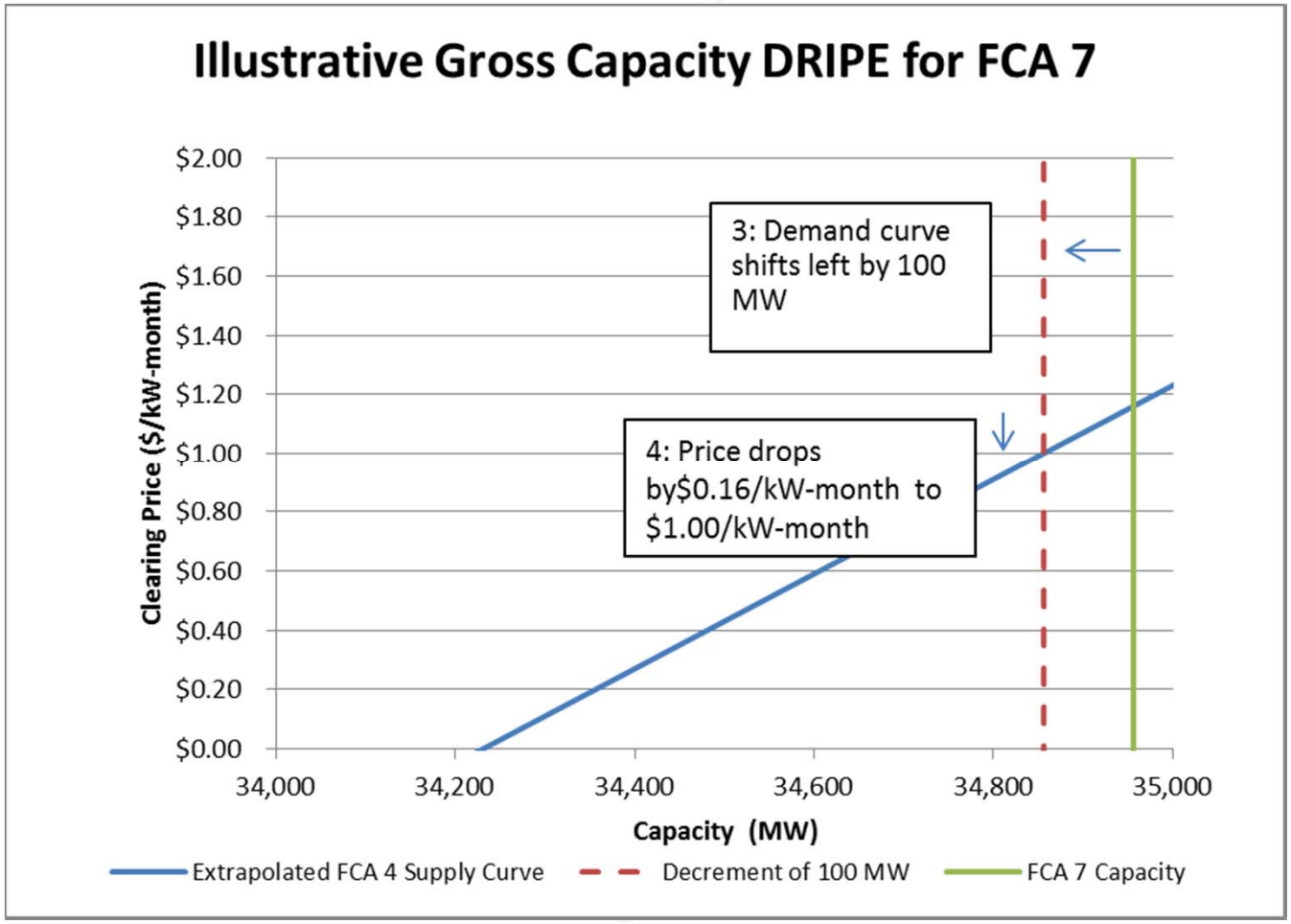
- Reflects the difference between the prices for electricity supply charged to retail customers under full-requirements fixed-price contracts during a given time period and the wholesale market prices for electric energy and capacity during the corresponding time period.
- Primarily attributable to the costs marketers incur to mitigate their exposure to risk. Risks arise from the potential for costs to exceed revenues due to unexpected levels of consumption due to factors such as unexpected variations in weather, economic activity and and/or customer migration
- Vermont uses 11.1%

Part Three B: Avoided Cost of Electricity: Retail (Capacity and Energy DRIPE)

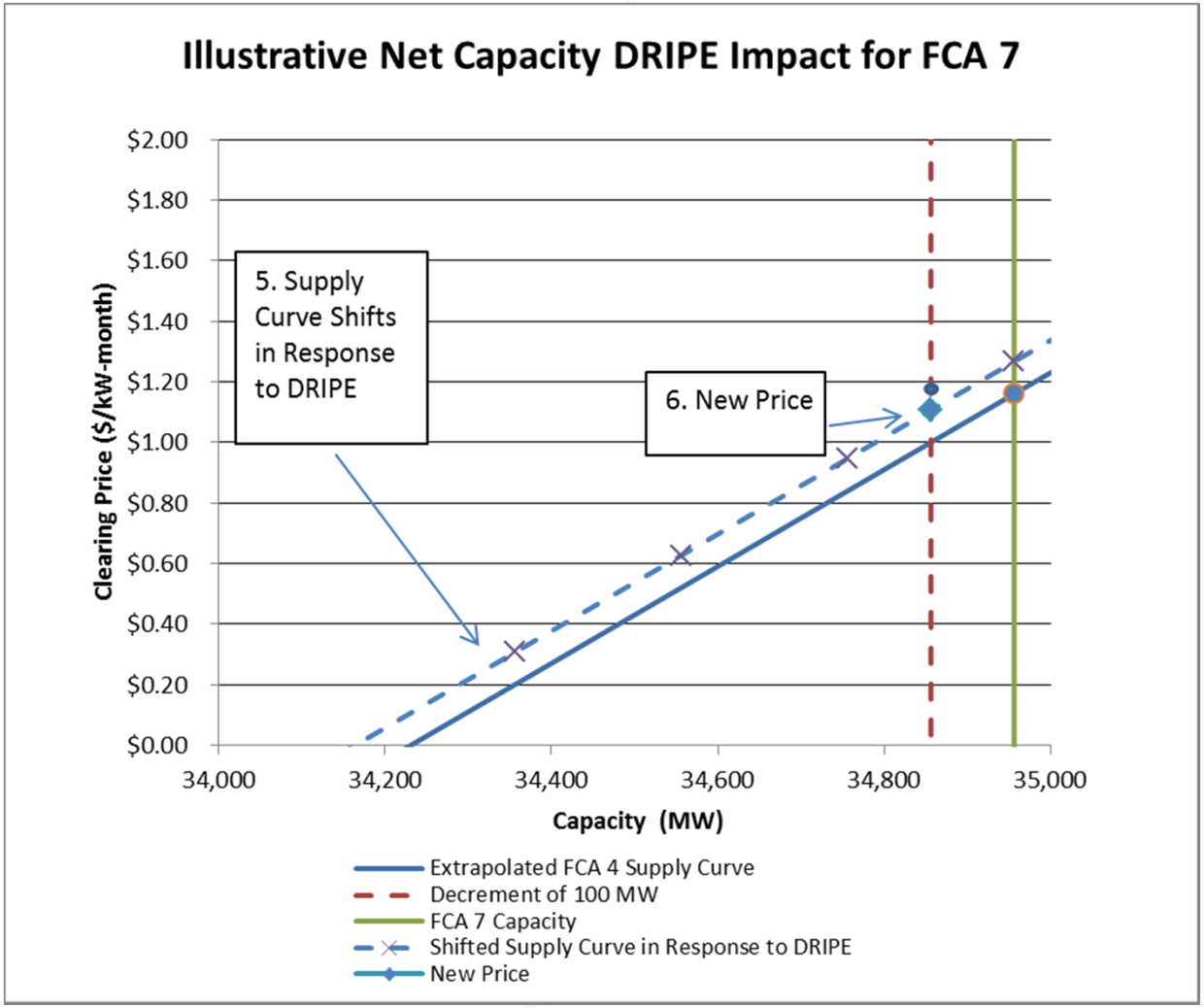
AVOIDED ELECTRICITY COSTS Retail – Capacity DRIPE



AVOIDED ELECTRICITY COSTS Retail – Capacity DRIPE Illustrative Example



AVOIDED ELECTRICITY COSTS Retail – Capacity DRIPE Illustrative Example



AVOIDED ELECTRICITY COSTS Retail – Capacity DRIPE Illustrative Example

Gross Capacity DRIPE Impact on Forecasted Capacity Prices for 100 and 600 MW reduction (2011$)								
		Market Price		100 MW Scenario		600 MW Scenario		
FCA	Year	Reference Case ($/kW-month)	100 MW Redution in Capacity ($kW-month)	100 MW Redution Gross DRIPE ($kW-month)	% of Reference Case	600 MW Reduction Gross DRIPE ($kW-month)	$/kw-month change from Reference Case	% of Reference Case
		a	b	c=a-b	d=c/a	e=c*6	f=e-a	g=e/a
7	2016	$1.16	$1.01	$0.16	13.4%	$0.93	($0.23)	80.2%
8	2017	$1.71	$1.56	$0.16	9.1%	$0.93	($0.78)	54.4%
9	2018	$2.39	$2.24	$0.16	6.5%	$0.93	($1.46)	38.9%
10	2019	$2.68	$2.53	$0.15	5.6%	$0.90	($1.78)	33.6%
11	2020	$3.76	$3.71	$0.05	1.3%	$0.30	($3.46)	8.0%
12	2021	$3.83	$3.78	$0.05	1.3%	$0.30	($3.53)	7.8%
13	2022	$5.75	$5.25	$0.50	8.7%	$3.00	($2.75)	52.2%
14	2023	$6.92	$6.68	$0.24	3.5%	$1.44	($5.48)	20.8%
15	2024	$7.57	$7.45	$0.12	1.6%	$0.72	($6.85)	9.5%
16	2025	$7.86	$7.80	$0.06	0.8%	$0.36	($7.50)	4.6%
17	2026	$8.03	$8.00	$0.03	0.4%	$0.18	($7.85)	2.2%
Notes								
FCA forecast prices from Capacity DRIPE Exhibit 6-1								

AVOIDED ELECTRICITY COSTS Retail – Capacity DRIPE

FCM generally expected to clear at floor prices through FCA6, followed by slowly increasing FCA prices due to capacity shortfall.

Gross impact of DSM on FCM market price is $1.92/kW-year ($0.16 kW-month per 100 MW of load reduction)

We assume no impact until after FCA 6 (June 1, 2015) with dissipation by 2026 (Capacity DRIPE Exhibit 6-6)

	Net Capacity DRIPE 2011$/kW-yr	
Year	AESC 2009	AESC 2011
2011	0	0
2012	0	0
2013	$115	0
2014	$170	0
2015	$112	0
2016	$43	$171
2017	0	$174
2018	0	$175
2019	0	$169
2020	0	$56
2021	0	$57
2022	0	$574
2023	0	$284
2024	0	$136
2025	0	$70
2026	0	$30
levelized (2012-2026)	$32.80	$120.76
NPV @ 10%	$326	$775

AVOIDED ELECTRICITY COSTS Retail – energy DRIPE Illustrative Example for WCMA Zone

MA Gross Statewide Energy Efficiency Energy DRIPE Impact on WCMA Annual						
Year	**WCMA Annual Wholesale Energy Price ($/MWh)**	**Intrastate Energy DRIPE Coefficient per MWh**	**Energy DRIPE Price Impact of 1 MWh ($/MWh)**	**MA 2011 EE Savings Goal (MWh)**	**MA 2011 EE Savings Goal (Average MW)**	**Energy DRIPE Price Impact ($/MWh)**
	a	b	c = a×b	d	e=d÷8760	f = e × c
2011	$46.38	0.0080%	$0.0037	897,232	102	$0.38
Notes						
(d) MA 2011 Energy Efficiency Savings Target of 897,232 MWh from Table 2 DPU Orders						
(a) WCMA wholesale energy price from Energy Exhibit 6-4						

AVOIDED ELECTRICITY COSTS Retail – energy DRIPE

	DRIPE Decay	Energy Hedged by Entitlements	Effective Energy DRIPE
2012	10%	22%	71%
2013	13%	21%	69%
2014	15%	21%	68%
2015	17%	19%	67%
2016	23%	18%	64%
2017	25%	17%	63%
2018	27%	16%	62%
2019	28%	16%	60%
2020	65%	16%	30%
2021	72%	16%	23%
2022	80%	16%	17%
2023	87%	16%	11%
2024	94%	16%	6%

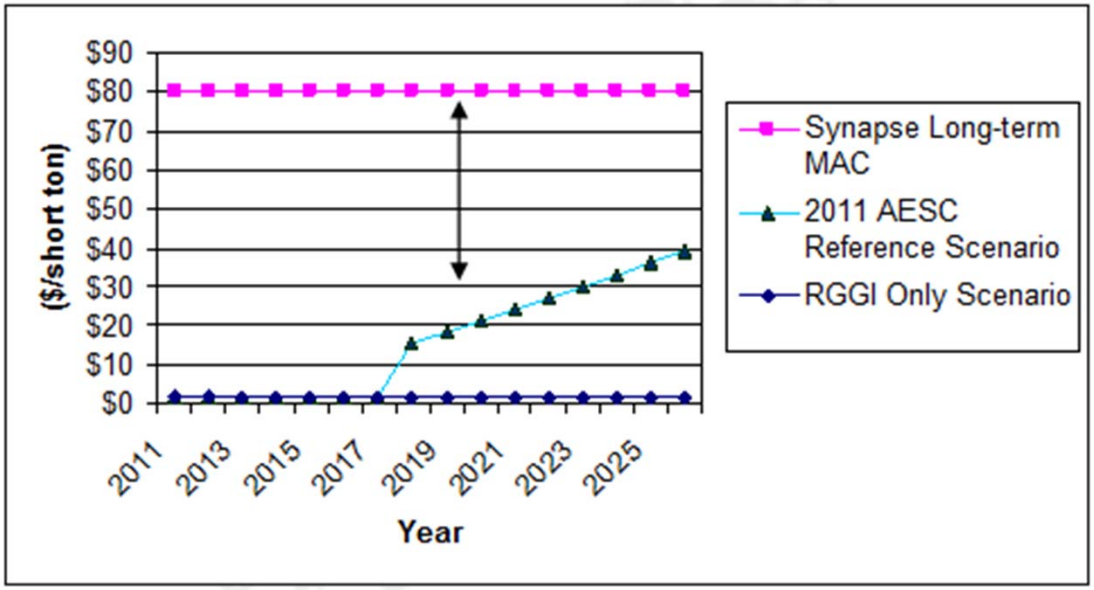
Study	Market	Years to End of DRIPE	% of Initial DRIPE at End of Analysis
Cool, et al, 2008 (Levitan)	Energy	11	
	Capacity	7	
Frayer, 2009 (London Economics)	Energy	12+	24%
	Capacity	12+	
Eggers, 2009 (Credit Suisse)	Energy	7+	27%

Part Three C: Avoided Cost of Electricity: Retail (CO_2 Externalities)

Environmental Effects – CO_2 Externality Value

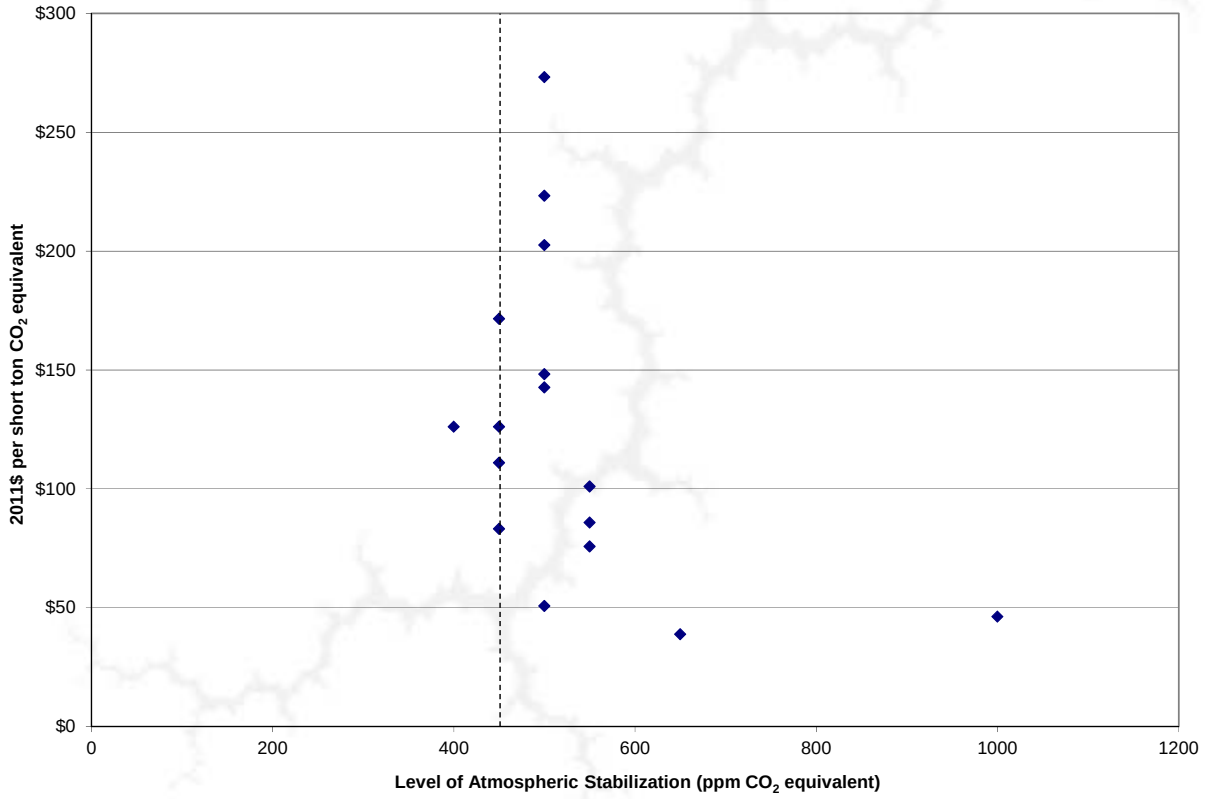
- Externality value = total cost of controlling emissions at a sustainable level – control cost internalized in wholesale energy prices
- CO_2 has the largest externality value of the various emissions associated with electricity usage

Environmental Effects – CO_2 Externality Value

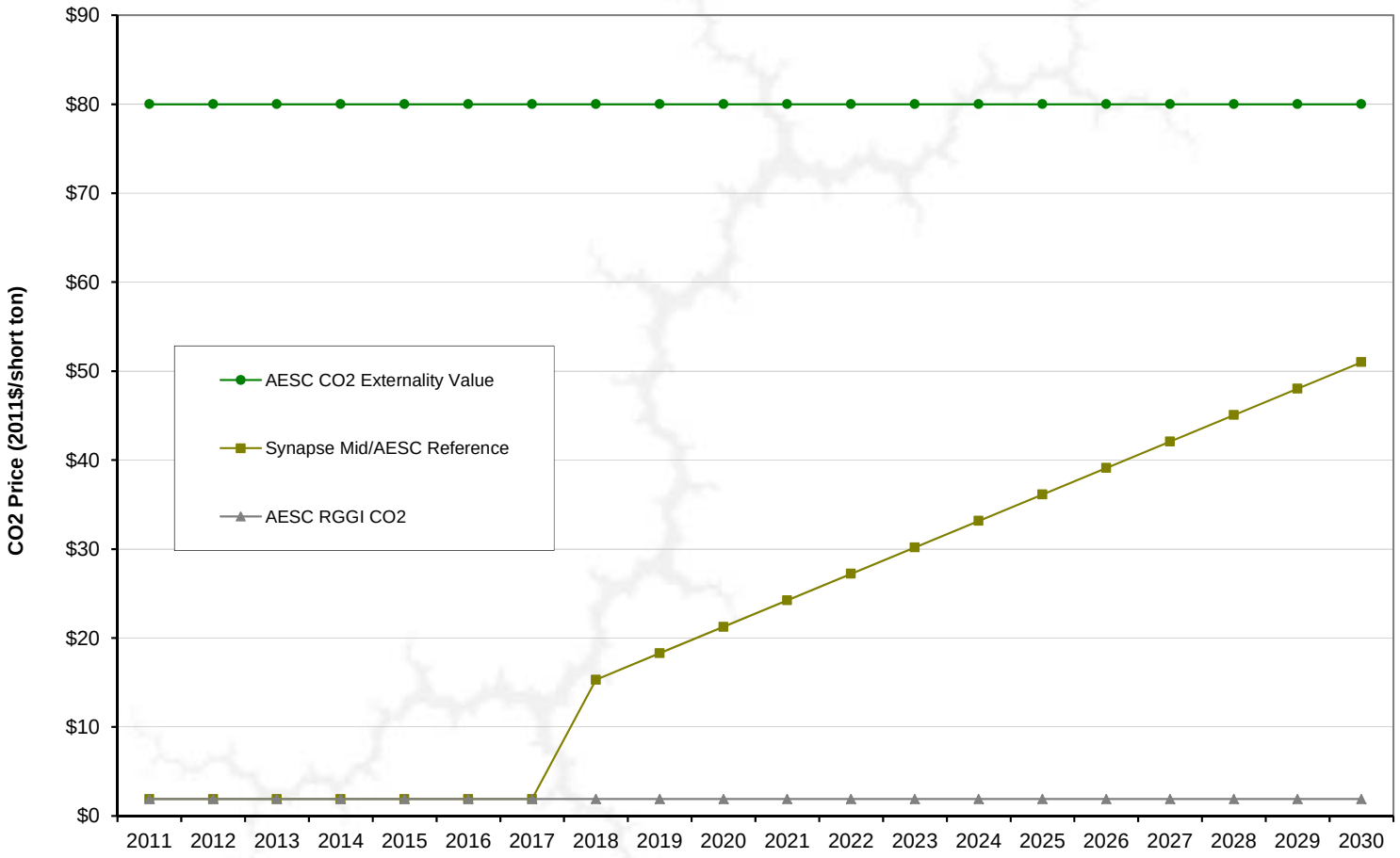


AVOIDED ELECTRICITY COSTS - Energy

- Cost of controlling carbon at a sustainable level



Avoided Electricity Costs- Energy (CO_2)



Note: The AESC Reference and High Forecasts begin with the RGGI allowance price in 2011. The forecasts assume implementation of a federal cap-and-trade program, and use the Synapse Mid and High cases in 2018 and 2015.

Environmental Effects – CO_2 Externality Value

Externalities Exhibit 6-7 CO_2 Externality Calculations

	LT MAC ($/short ton)	2011 AESC Reference Allowance Price ($/short ton)	2011 AESC Reference Externality ($/short ton)	RGGI Only Scenario Allowance Price ($/short ton)	RGGI Only Scenario Externality ($/short ton)
	a	b	c=a-b	d	e=a-d
2011	$80	$1.89	***$78.11***	$1.89	***$78.11***
2012	$80	$1.89	***$78.11***	$1.89	***$78.11***
2013	$80	$1.89	***$78.11***	$1.89	***$78.11***
2014	$80	$1.89	***$78.11***	$1.89	***$78.11***
2015	$80	$1.89	***$78.11***	$1.89	***$78.11***
2016	$80	$1.89	***$78.11***	$1.89	***$78.11***
2017	$80	$1.89	***$78.11***	$1.89	***$78.11***
2018	$80	$15.30	***$64.70***	$1.89	***$78.11***
2019	$80	$18.28	***$61.72***	$1.89	***$78.11***
2020	$80	$21.25	***$58.75***	$1.89	***$78.11***
2021	$80	$24.23	***$55.77***	$1.89	***$78.11***
2022	$80	$27.20	***$52.80***	$1.89	***$78.11***
2023	$80	$30.18	***$49.82***	$1.89	***$78.11***
2024	$80	$33.15	***$46.85***	$1.89	***$78.11***
2025	$80	$36.13	***$43.87***	$1.89	***$78.11***
2026	$80	$39.10	***$40.90***	$1.89	***$78.11***

Notes
Values expressed in 2011 Dollars
Allowance Prices from Exhibit 2-4
Inflation rate of 2%

Background
AESC 2011 Results (cents/kwh) –Vermont zone

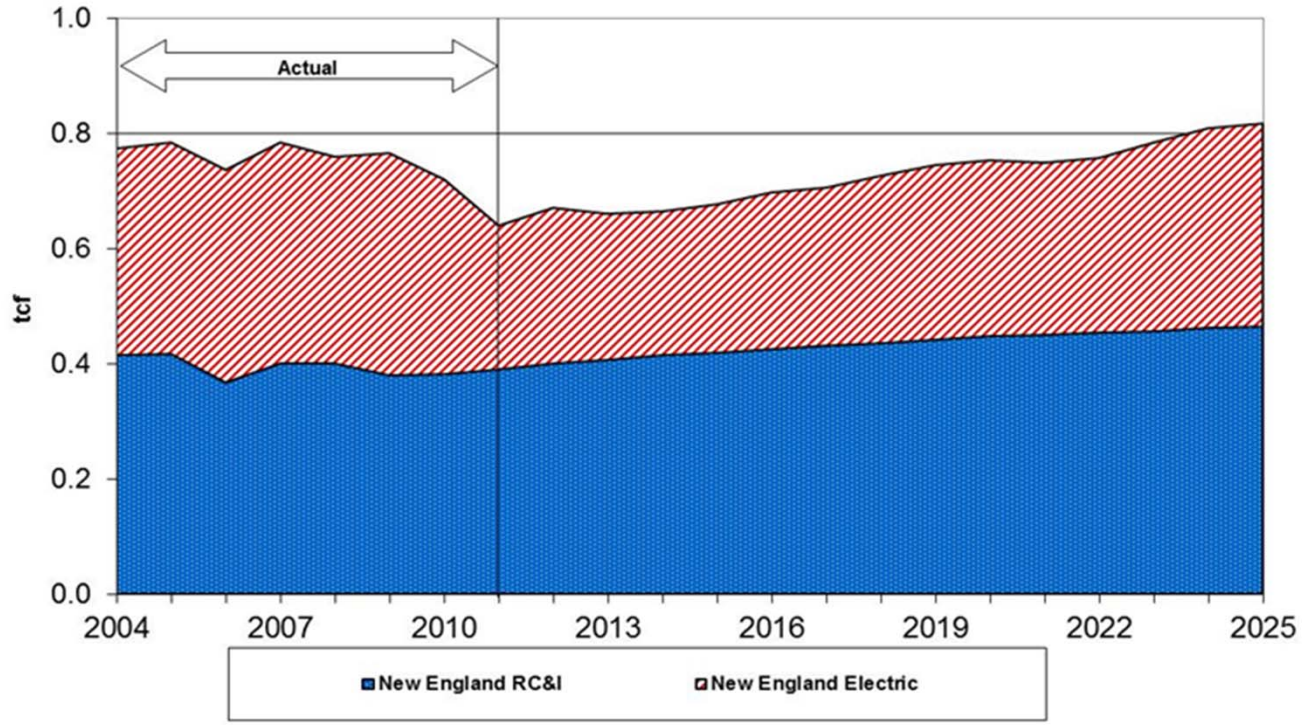
Avoided Electricity Costs for Vermont Zone (Summer On Peak) AESC 2009 vs. AESC 2011- Intrastate Energy DRIPE (Results are 15 year levelized in 2011$)					
Component	**AESC 2009**	**AESC 2011**		**Difference Relative to AESC 2009**	
	cents/kWh	cents/kWh		cents/kWh	% Difference
Avoided Energy Costs	9.52	8.74		-0.79	-8%
Avoided Capacity Costs[1,2]	0.57	1.08		0.51	91%
Energy and Capacity Subtotal	**10.09**	**9.81**		**-0.27**	**-3%**
DRIPE					
Intrastate Energy[3]	0.11	0.19		0.08	74%
Capacity[2]	0.01	0.05		0.03	211%
DRIPE Subtotal	**0.12**	**0.23**		**0.11**	**91%**
Subtotal: Avoided Energy and Capacity + Intrastate DRIPE	**10.21**	**10.05**		**-0.16**	**-2%**
CO_2 Externality[4]	2.95	3.41		0.46	15%
Total	**13.16**	**13.46**		**0.29**	**2%**

Notes
-Values may not sum due to rounding
-Avoided energy costs for Summer On-Peak incorporate avoided REC costs (All Classes for AESC 2011, Class I for AESC 2009)
-AESC 2009 values levelized (2010-2024) escalated to 2011$
1) Avoided capacity costs assumes 100% ***selling*** into Forward Capacity Markets
2) Assuming a 55% load factor
3) Values are for Intrastate *energy* DRIPE
4) 2011 CO_2 prices and physical emission rates

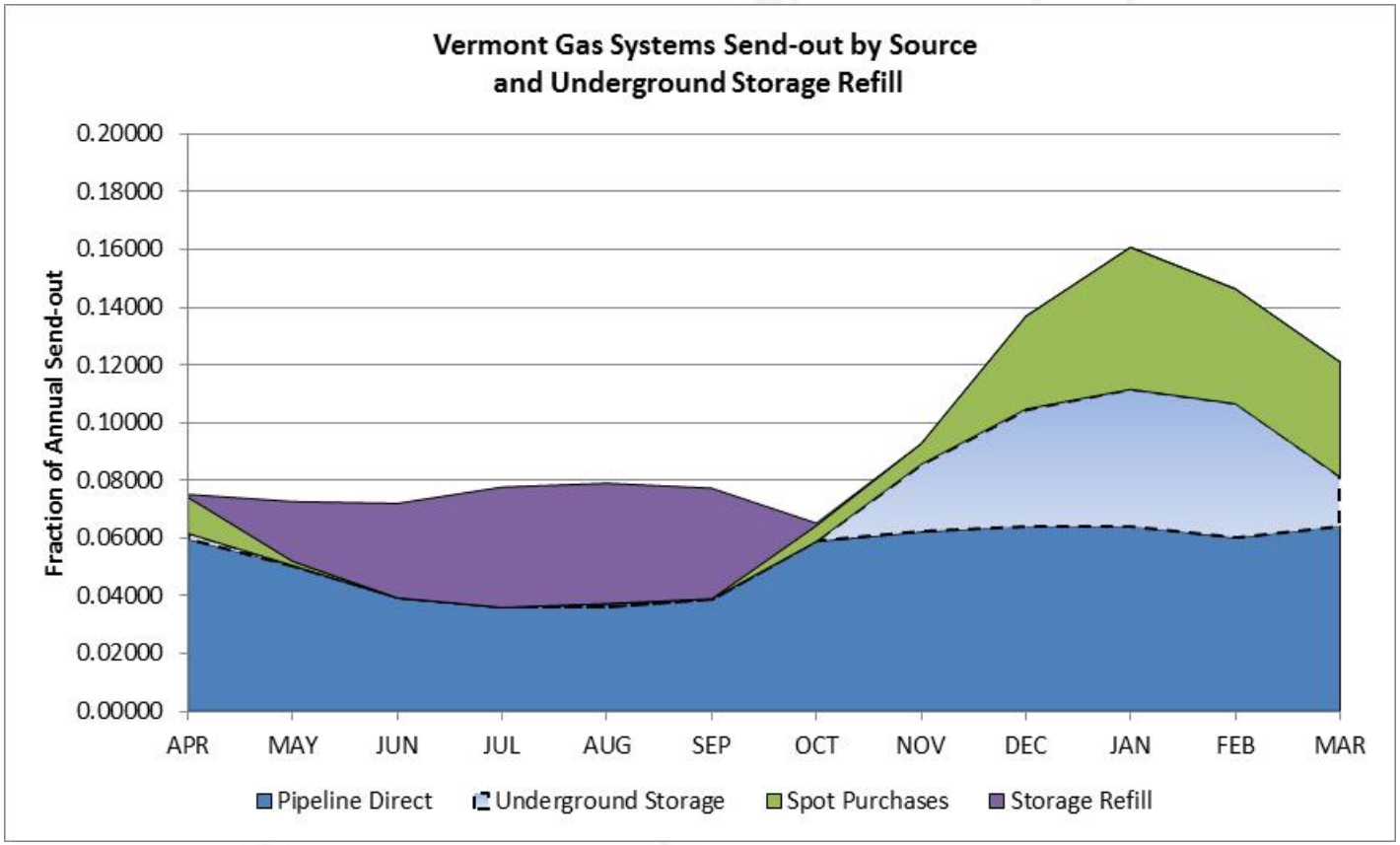
Part Four: Avoided Cost of Natural Gas

Avoided Natural Gas Costs

Exhibit 4 -1 Annual Gas Use (tcf) in New England Actual and AEO 2010 Reference Case projection



Avoided Natural Gas Costs



Avoided Natural Gas Costs

Exhibit 4-1 Summary Table

COMPARISON OF LEVELIZED AVOIDED COSTS OF GAS DELIVERED TO RETAIL CUSTOMERS
BY END USE: AESC 2009 AND AESC 2011
ASSUMING SOME AVOIDABLE RETAIL MARGIN
(2011$/Dekatherm except where indicated as 2009$/DT

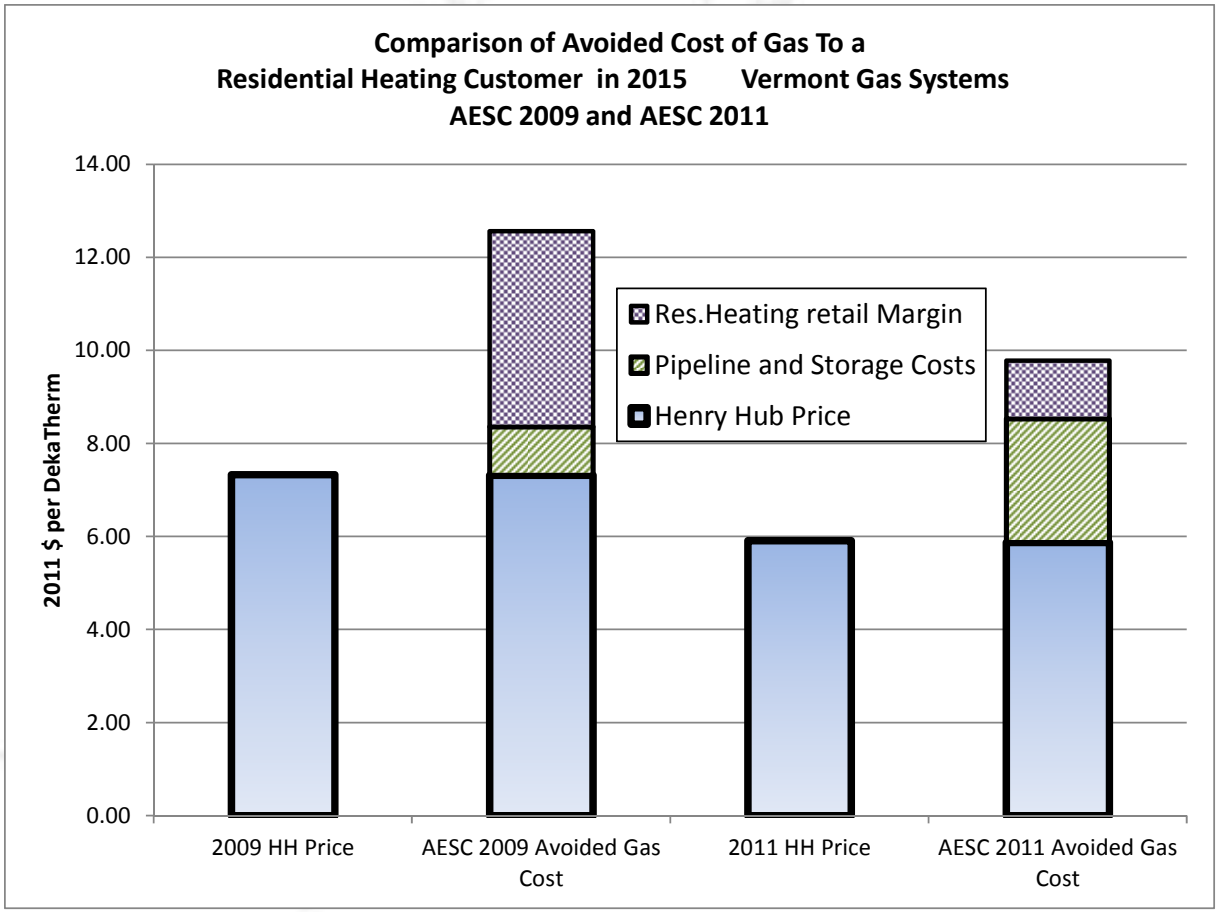
	RESIDENTIAL				COMMERCIAL & INDUSTRIAL			ALL
	Non Heating	Hot Water	Heating	All	Non Heating	Heating	All	RETAIL
Southern New England								
AESC 2009 (2009$/DT)	11.42	11.42	14.52	13.52	9.88	11.83	11.21	12.26
AESC 2009 (a)	11.63	11.63	14.79	13.77	10.07	12.05	11.42	12.49
AESC 2011	7.64	7.64	9.39	9.11	7.58	8.82	8.44	8.75
2009 to 20119 change	-34.33%	-34.33%	-36.54%	-33.82%	-24.71%	-26.84%	-26.08%	-29.92%
Northern & Central New England								
AESC 2009 (2009$/DT)	10.87	10.87	13.54	12.67	10.02	12.05	11.40	12.03
AESC 2009 (a)	11.08	11.08	13.79	12.91	10.21	12.28	11.61	12.25
AESC 2011	7.47	7.47	8.96	8.73	7.59	8.79	8.43	8.58
2009 to 2011 change	-32.57%	-32.57%	-35.03%	-32.38%	-25.64%	-28.37%	-27.41%	-29.99%
Vermont								
AESC 2009 (2009$/DT)	9.72	9.72	12.43	11.56	8.01	9.44	9.00	9.93
AESC 2009 (a)	9.90	9.90	12.66	11.77	8.16	9.62	9.17	10.12
AESC 2011	7.54	7.54	9.88	9.37	7.30	9.08	8.54	8.86
2009 to 2011 change	-23.86%	-23.86%	-21.95%	-20.36%	-10.57%	-5.67%	-6.82%	-12.44%

(a) Factor to convert 2009$ to 2011 $ 1.0186

Note: AESC 2009 levelized costs for 15 years, 2010 - 2024 at a discount rate of 2.22%.
AESC 2011 levelized costs for 15 years 2012 - 2026 at a discoiunt rate of 2.465%.

Avoided Natural Gas Costs

- Vermont specific details for avoided retail gas costs
  - City gate
  - margin



Avoided Natural Gas Costs (Externalities)

Pollutant Emission Values by Sector and by Year in 2011$/MMBtu									
	Residential			Commercial			Industrial		
	NOx	CO2	CO2 at $80/ton	NOx	CO2	CO2 at $80/ton	NOx	CO2	CO2 at $80/ton
2011	$0.011	$0.11	$4.72	$0.011	$0.11	$4.72	$0.016	$0.11	$4.72
2012	$0.007	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
2013	$0.006	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
2014	$0.007	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
2015	$0.007	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
2016	$0.007	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
2017	$0.007	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
2018	$0.007	$0.90	$4.72	$0.007	$0.90	$4.72	$0.010	$0.90	$4.72
2019	$0.007	$1.08	$4.72	$0.008	$1.08	$4.72	$0.011	$1.08	$4.72
2020	$0.007	$1.25	$4.72	$0.008	$1.25	$4.72	$0.011	$1.25	$4.72
2021	$0.007	$1.43	$4.72	$0.008	$1.43	$4.72	$0.011	$1.43	$4.72
2022	$0.008	$1.60	$4.72	$0.008	$1.60	$4.72	$0.011	$1.60	$4.72
2023	$0.008	$1.78	$4.72	$0.008	$1.78	$4.72	$0.012	$1.78	$4.72
2024	$0.008	$1.96	$4.72	$0.008	$1.96	$4.72	$0.012	$1.96	$4.72
2025	$0.008	$2.13	$4.72	$0.009	$2.13	$4.72	$0.012	$2.13	$4.72
2026	$0.008	$2.31	$4.72	$0.009	$2.31	$4.72	$0.012	$2.31	$4.72
Levelized (2011$/MMBtu)									
5 year (2012-16)	$0.007	$0.11	$4.72	$0.007	$0.11	$4.72	$0.010	$0.11	$4.72
10 year (2012-21)	$0.007	$0.50	$4.72	$0.007	$0.50	$4.72	$0.010	$0.50	$4.72
15 year (2012-26)	$0.007	$0.93	$4.72	$0.008	$0.93	$4.72	$0.011	$0.93	$4.72

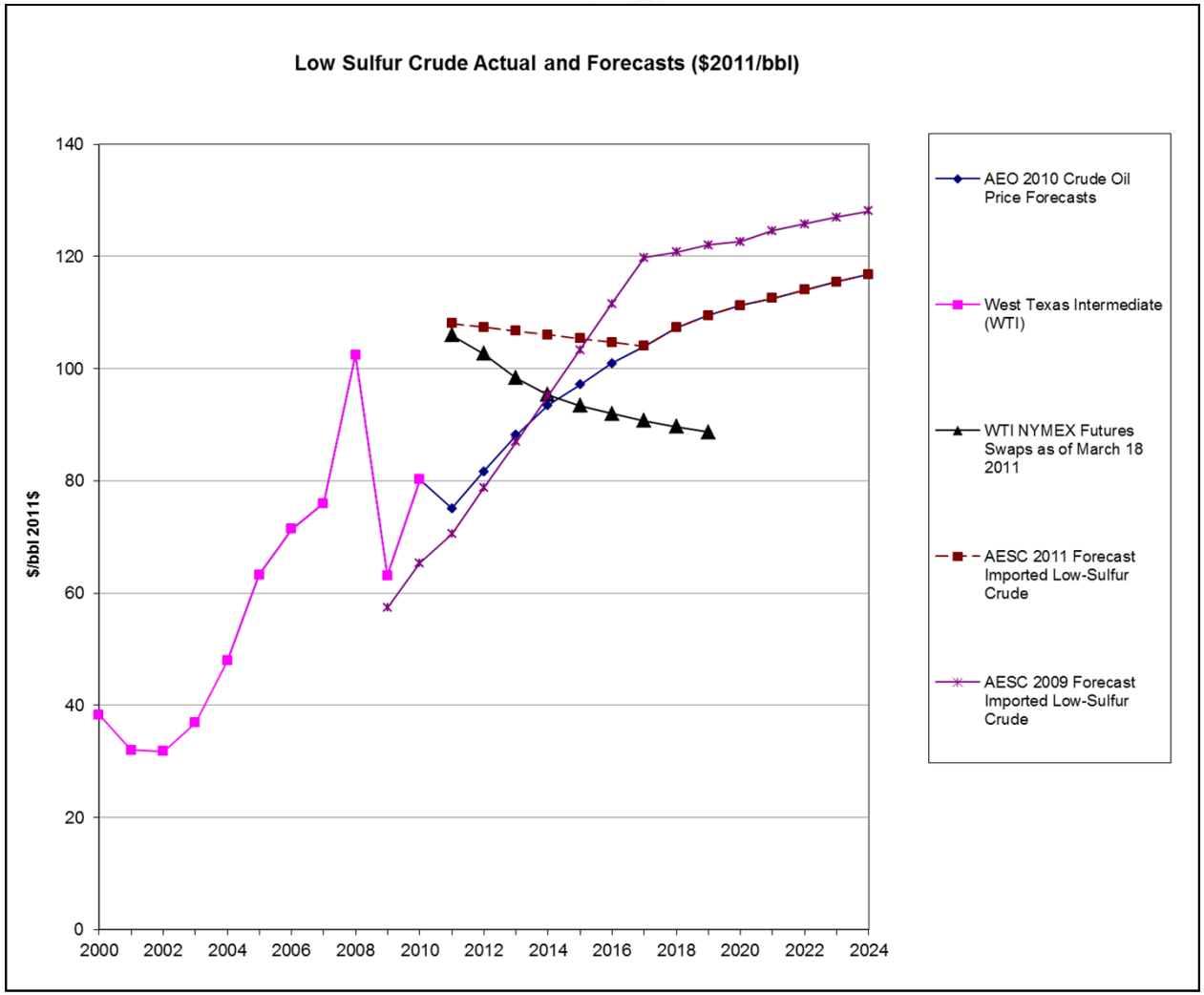
Notes

Based on Exhibit 4-24 pollution emission rates for Natural Gas combustion

Pollutant values based on emission allowance prices detailed in Exhibit 2-4 and $80/short ton long-term marginal abatement cost for CO2

Part Five: Avoided Cost of Other Fuels

Avoided Costs of Other Fuels



Avoided Costs of Other Fuels

Exhibit 5-1 Summary of Other Fuel Prices: AESC 2011 versus AESC 2009

		No. 2 Distillate	No. 2 Distillate	No. 6 Residual (low Sulfur)	Propane	Kerosene	BioFuel	BioFuel	Wood
	Sector	Res	Com	Com	Res	Res & Com	B5 Blend	B20 Blend	Res
AESC 2011 Levelized Values (2011$/MMBtu)									
	2012-2026	25.38	23.55	17.27	35.99	25.51	25.38	25.38	9.47
AESC 2019 Levelized Values (2011$/MMBtu)									
	2010-2024	23.25	22.09	17.85	34.66	22.59	23.25	23.25	8.38
Percent Difference from AESC 2009									
		9.1%	6.6%	-3.2%	3.8%	12.9%	9.1%	9.1%	13.1%
Notes									
Res	Residential Sector								
Com	Commercial Sector								

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