



2013–14 Demand Resource Plan Proceeding

Brian Cotterill
Vermont Department of Public Service
May 14, 2014

Overview

PART 1:

- Electric EE Scenarios & Modeling
- Electric EE Potential Study
- Electric EE Rate & Bill Impact Analysis

PART 2:

- Budgets & Savings Recommendations

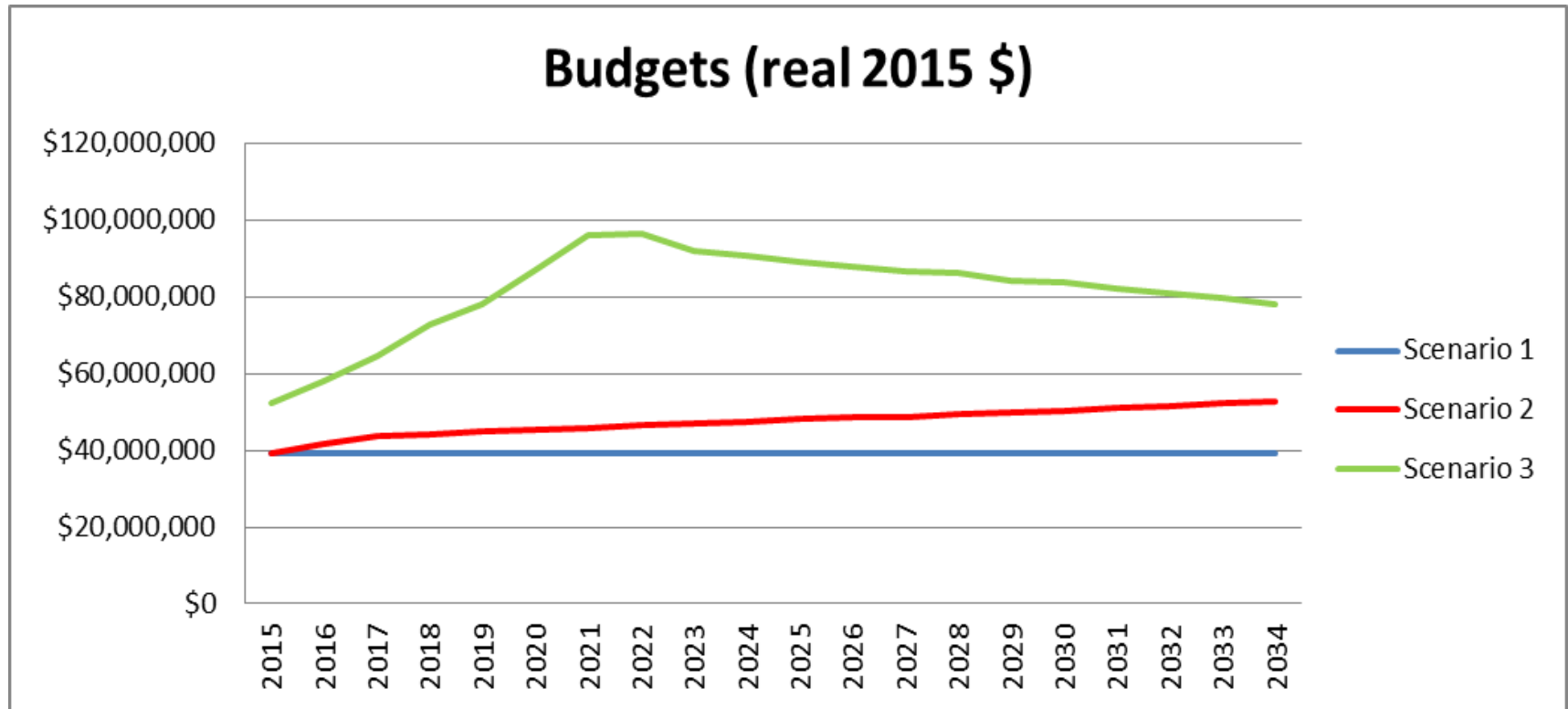
Part 1: DRP Components

1. Electric resource acquisition budgets and savings
2. TEPF resource acquisition budgets and savings
3. Non-resource acquisition budgets and descriptions
4. EEU compensation (QPI award and operations fees)
5. DPS evaluation plan and budget
6. EEU Fiscal Agent and EEU Fund audit budgets and
7. Impact of budget recommendations on electric consumers' rates and bills

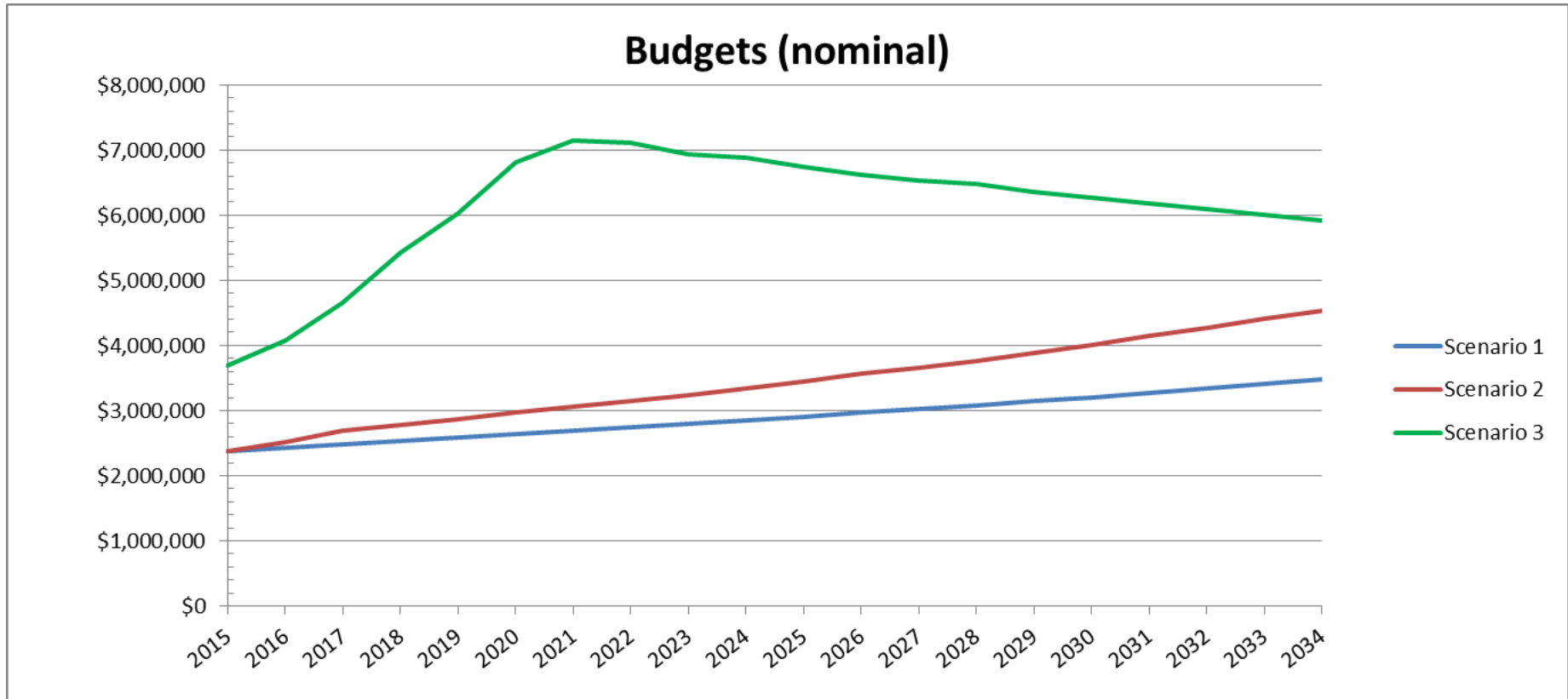
Scenarios & Modeling

1. all economically achievable potential through level budgets (adjusted for inflation) over twenty years
2. all economically achievable potential through the extension of the current 2012–2031 DRP through 2034
3. ramp up to and maintenance of acquisition of 3% savings relative to annual electric energy usage by year 2019

VEIC Modeling – Electric



BED Modeling – Electric



VEIC & BED Modeling – Thermal

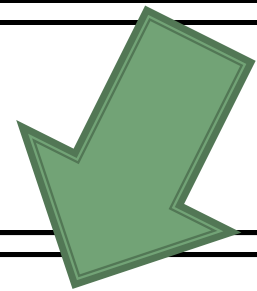
2015-2024

	Estimated Budget	Estimated MMbtu
VEIC	\$ 71,189,401	883,860
BED	\$ 1,055,444	4,365

B. Potential Study

Potential Study – Overview

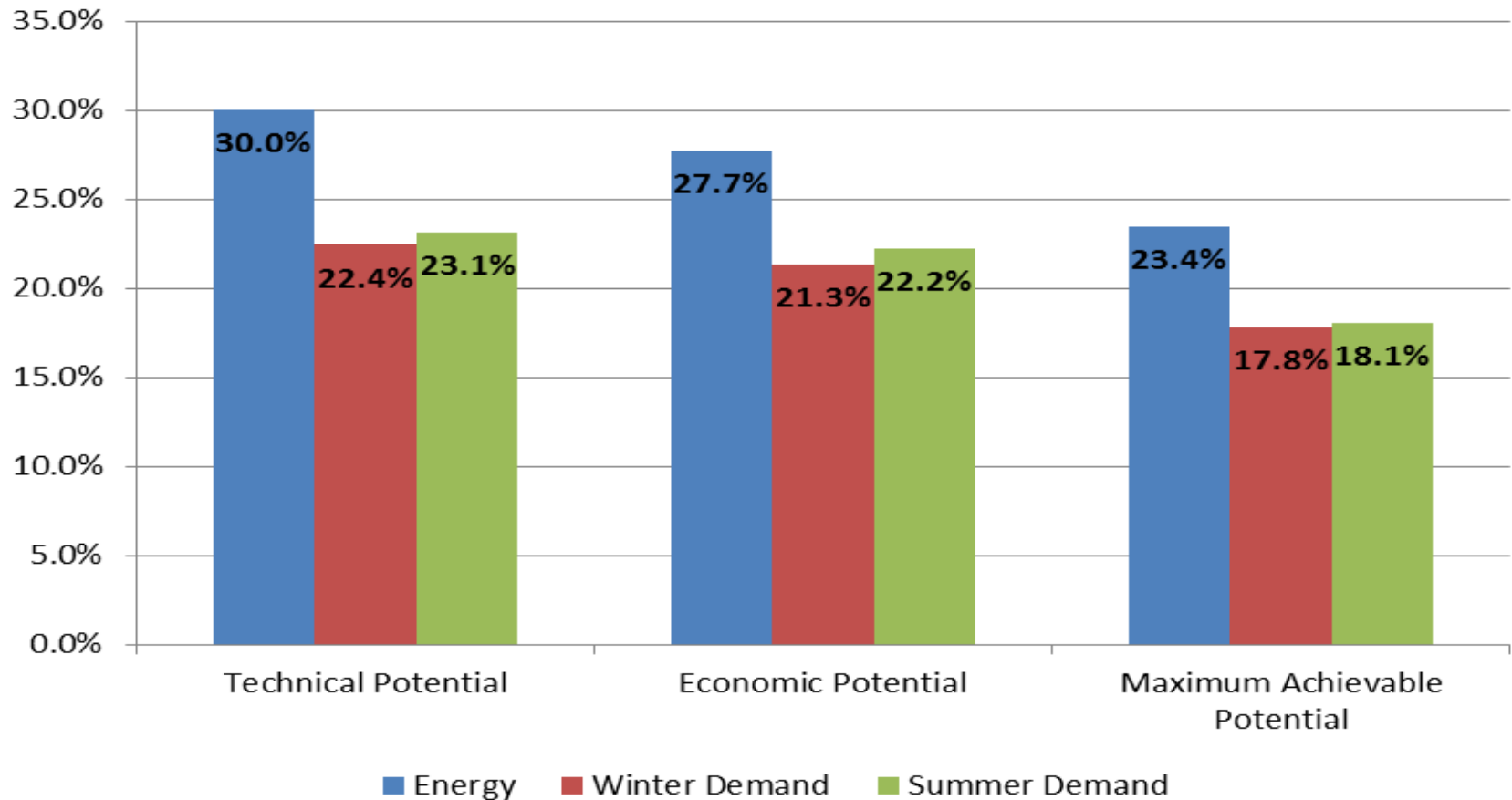
Not Technically Feasible	Technical Potential			
Not Technically Feasible	Not Cost Effective	Economic Potential		
Not Technically Feasible	Not Cost Effective	Market & Adoption Barriers	Achievable Potential	
Not Technically Feasible	Not Cost Effective	Market & Adoption Barriers	Program Design, Budget, Staffing, & Time Constraints	Program Potential



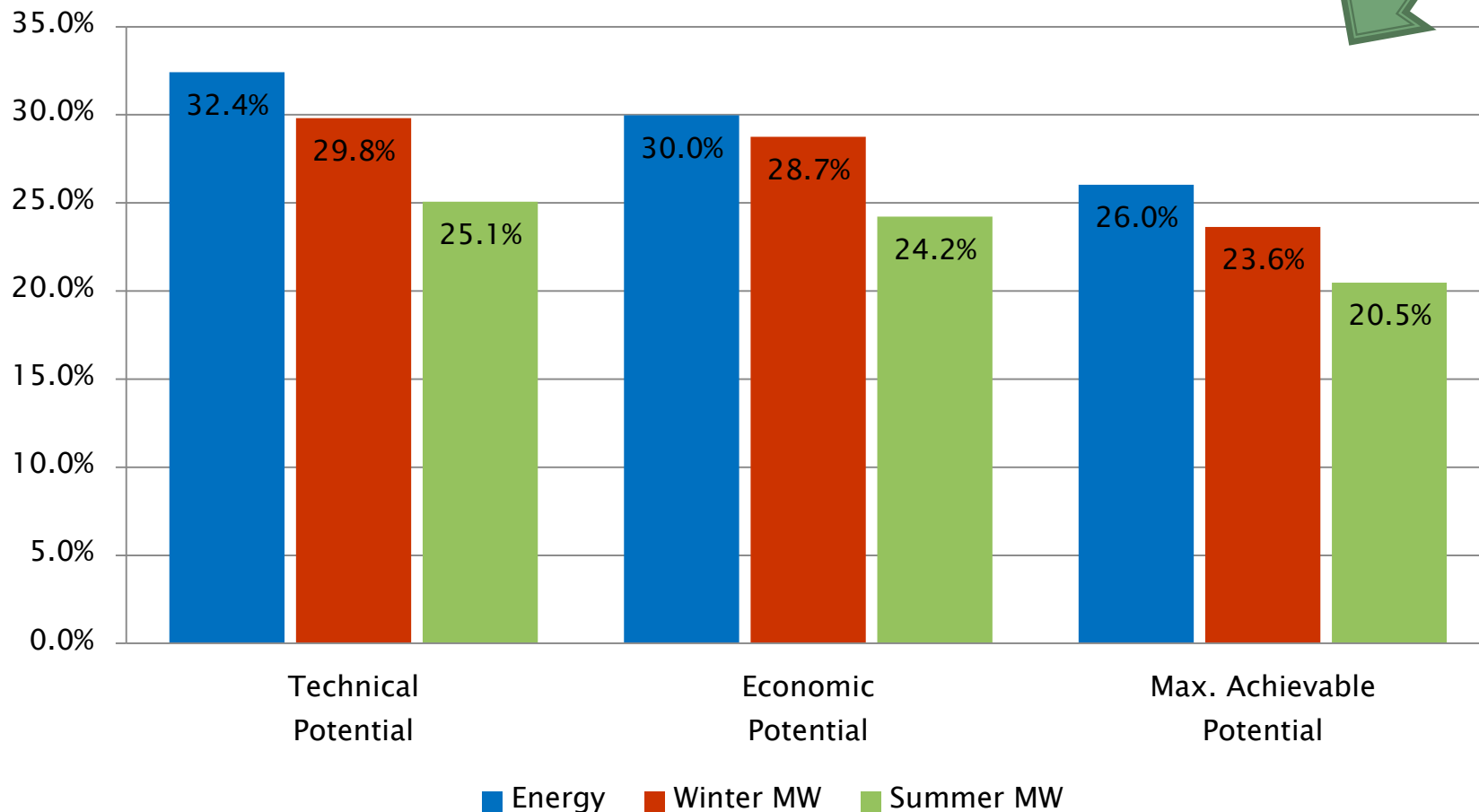
Potential Study Methodology

- ▶ Residential:
 - “Bottom-up” approach to calculate potential
- ▶ C&I:
 - “Top-down” approach that disaggregates the load forecast into building types, end-uses, and measure-level savings.
- ▶ Updates include:
 - Avoided Costs Values, Load Forecasts, Measure Lists/Characterizations, Baselines
 - Behavior Measures – uplift (1%)

Potential Study Statewide Results – 2033

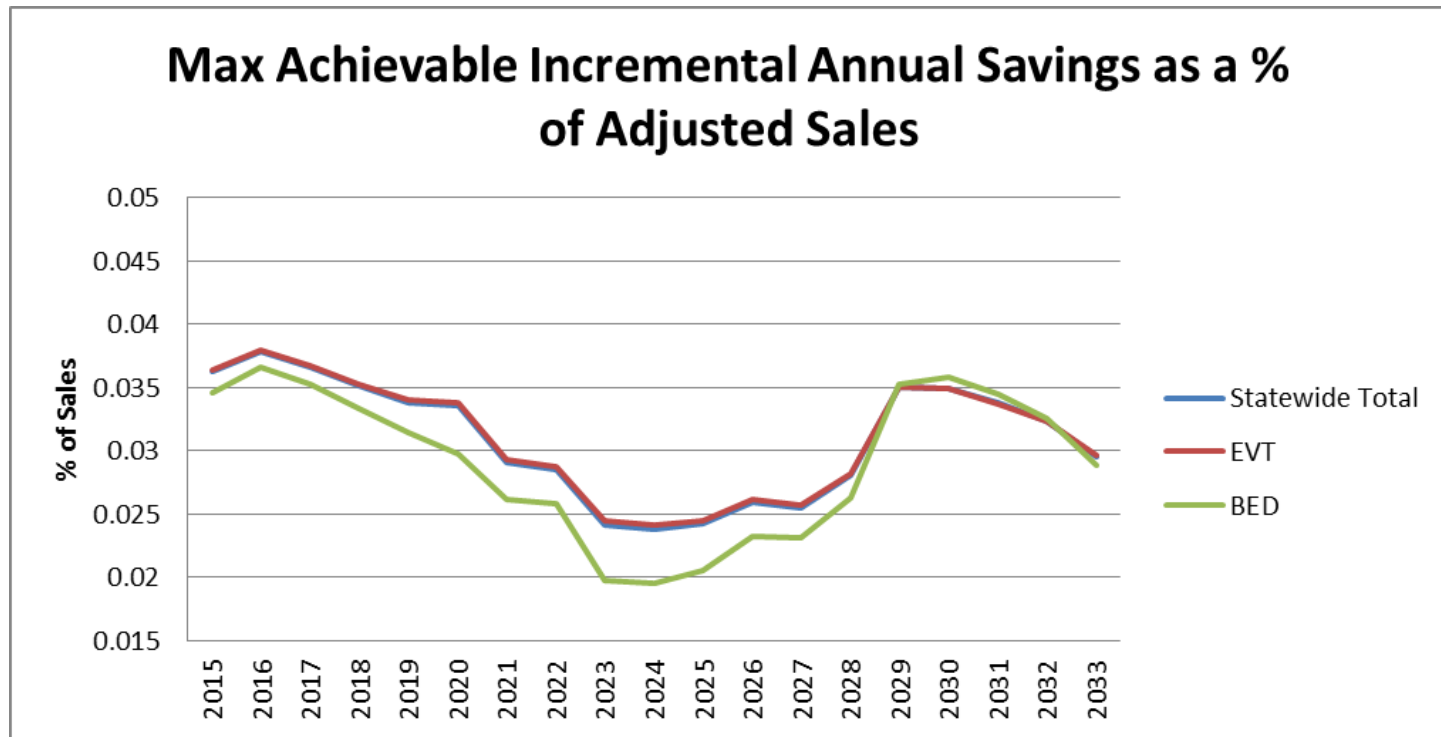


2011 Study – More potential available – 2031



Summary – Potential Study

- ▶ Significant Cost-Effective Potential Remains in all sectors.

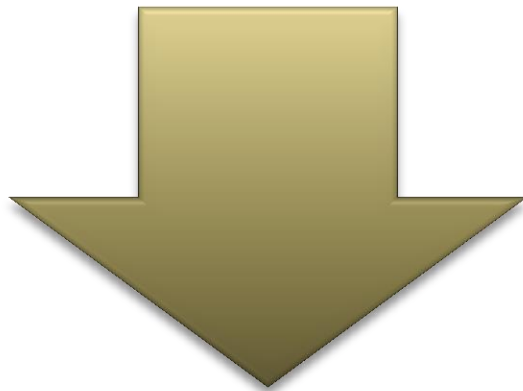


C. Rate and Bill Impacts of Modeled Electric EE Budgets

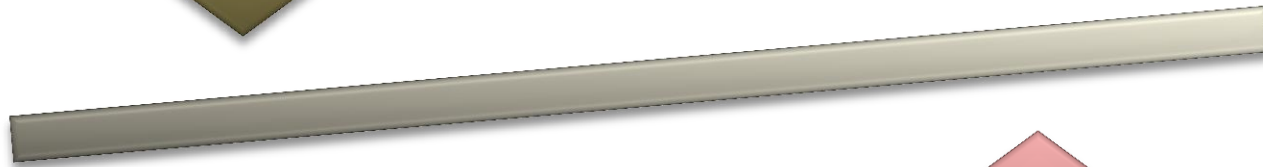
Overview – Rate and Bill Impact

- Synapse Energy Economics, Inc.
- Rate Impact: Bottom Up approach based on changes in revenue requirements associated with 4 general rate components; change in MWh sales
- Bill Impact: Reflects both impacts of changes in rates and bills across all customers within a sector on average.
- Study Compares EEU modeled Scenario 2 (Inaugural DRP extended) to “No EE”; Scenario’s 1 and 3 are analyzed relative to Scenario 2.
- Modeled Costs and Savings – 38 years
 - NRA, Compensation, Evaluation, Other Costs as estimated in 2011 DRP
- Residential, Commercial non-demand, Commercial Demand

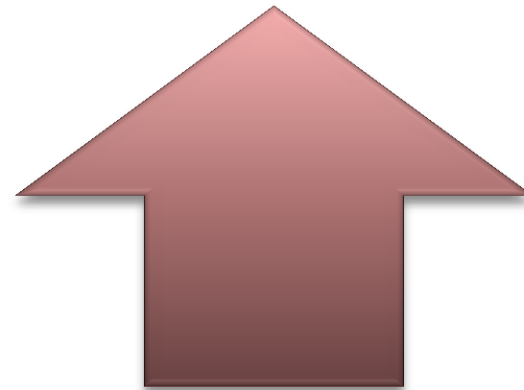
Rate Pressures



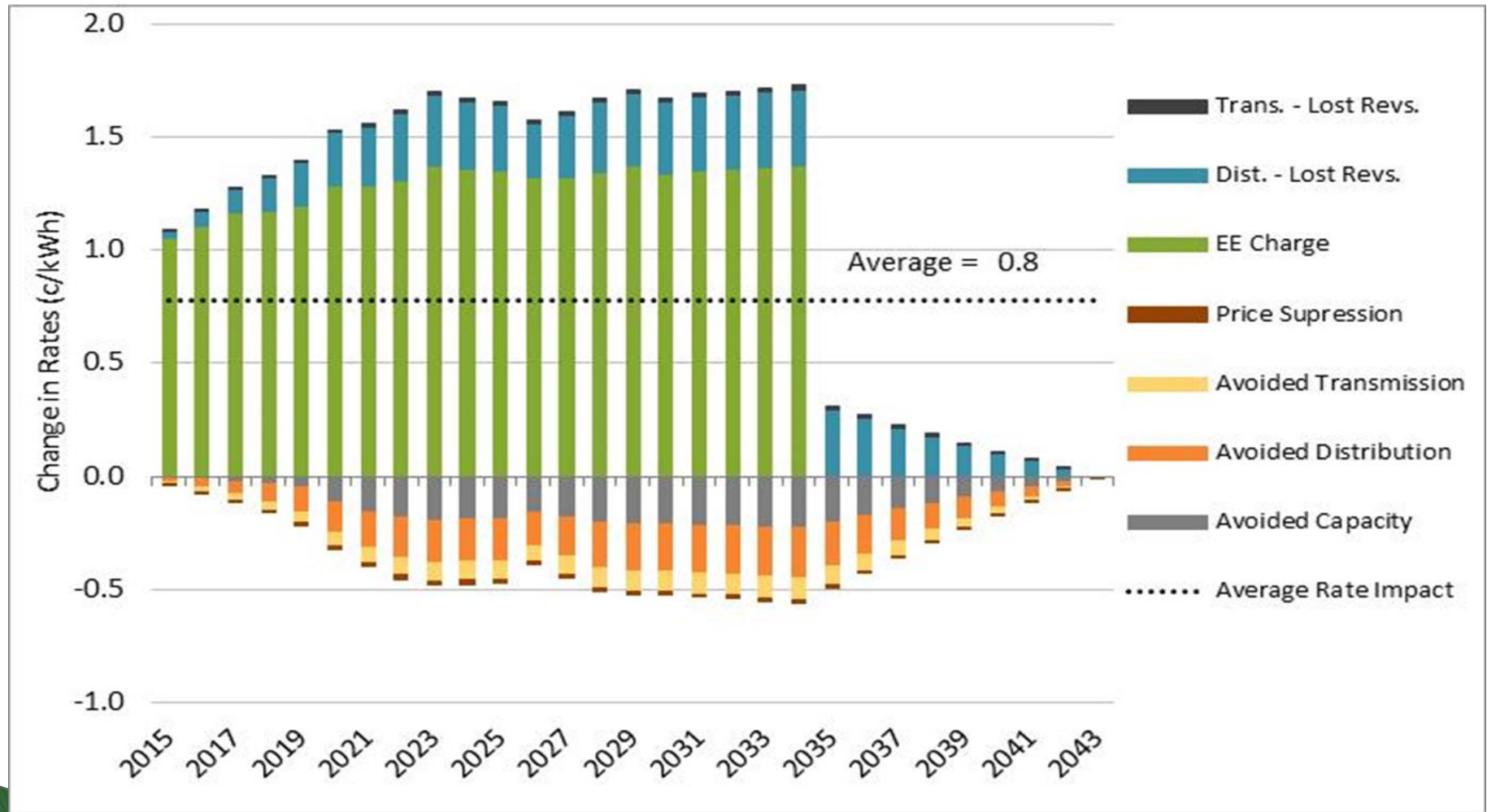
Avoided Costs:
Capacity, T&D,
DRIPE



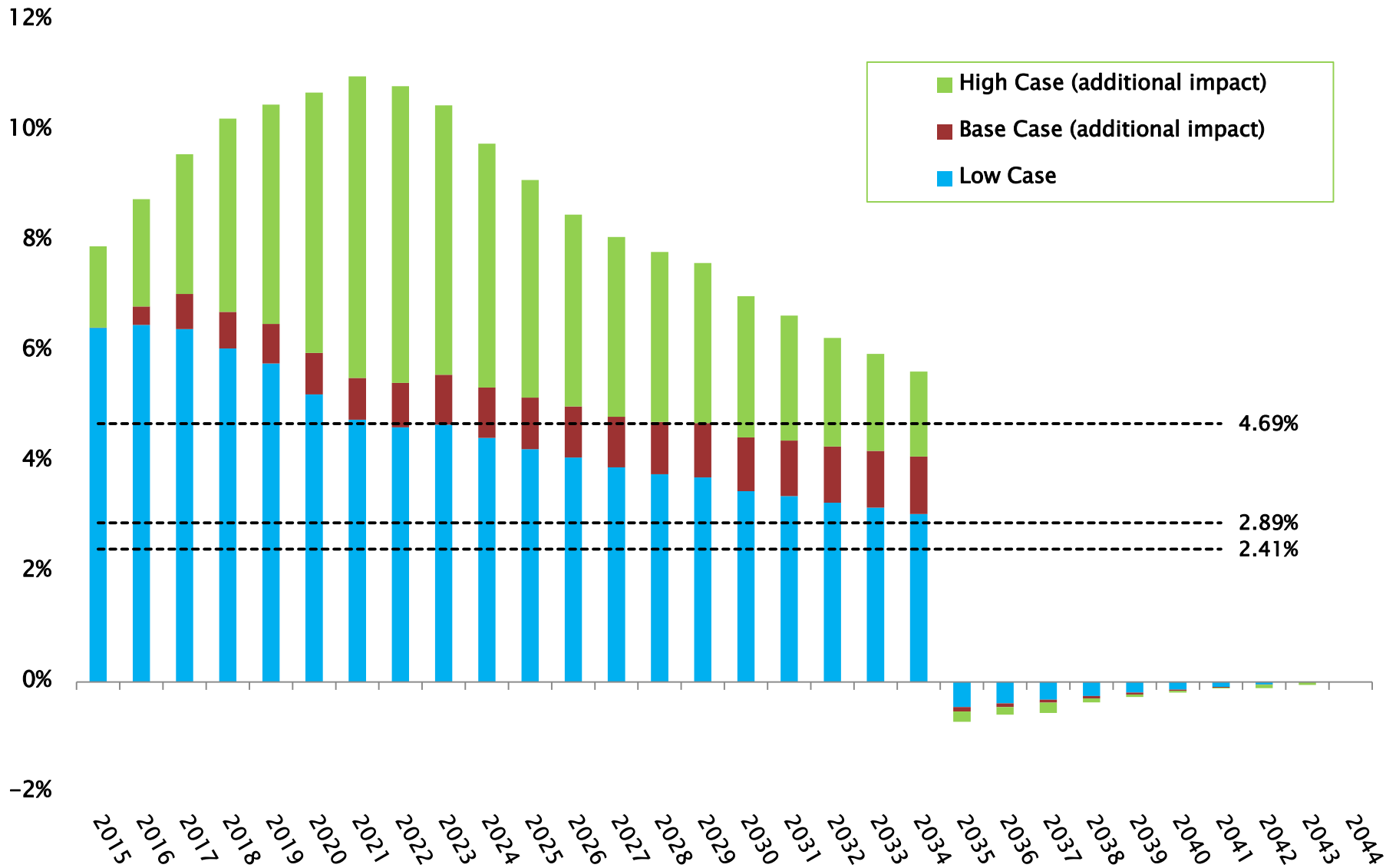
EEC, Fixed Cost
Recovery over
Lower Sales



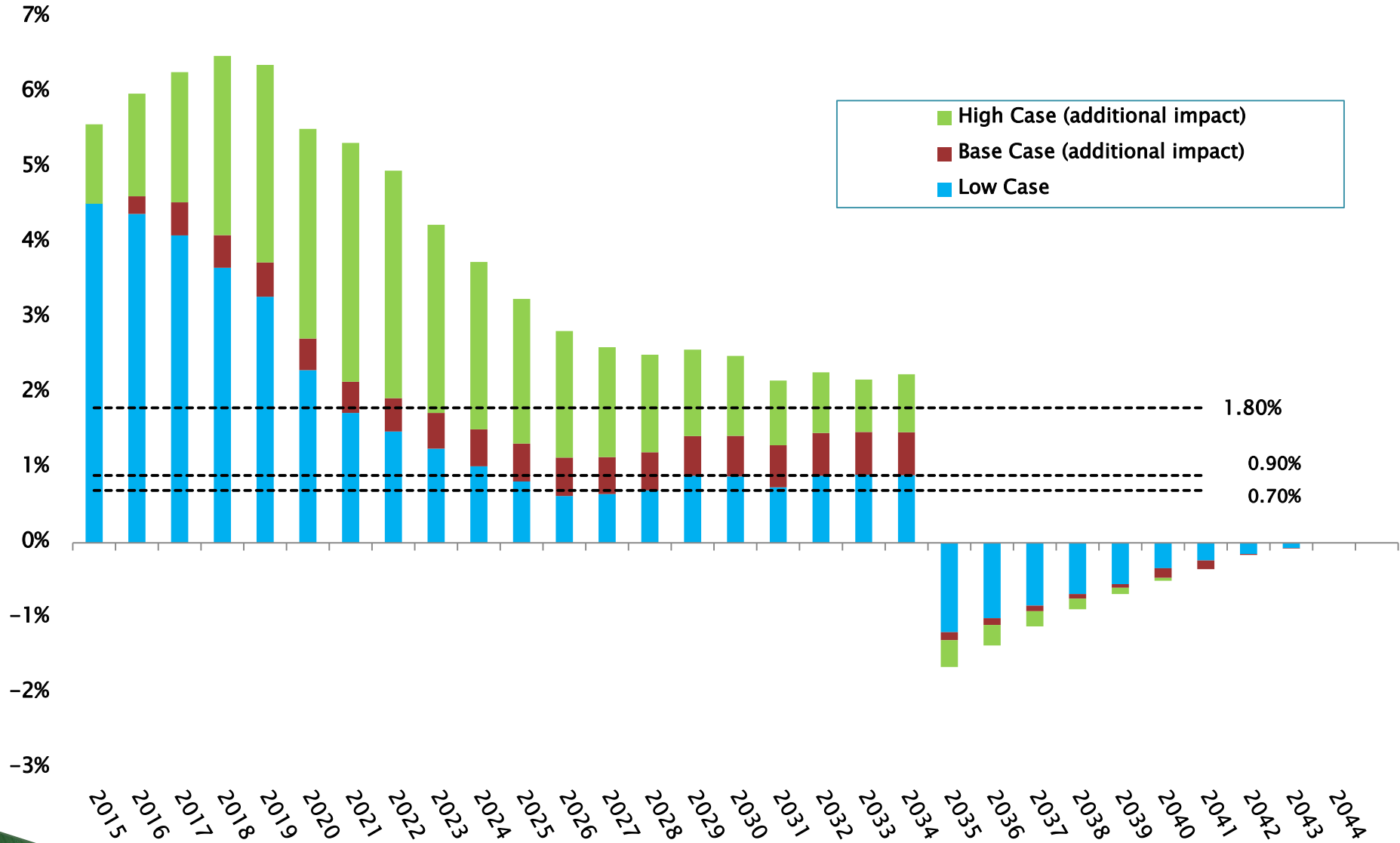
Rate Impact – Component Breakdown Example (EVT Res)



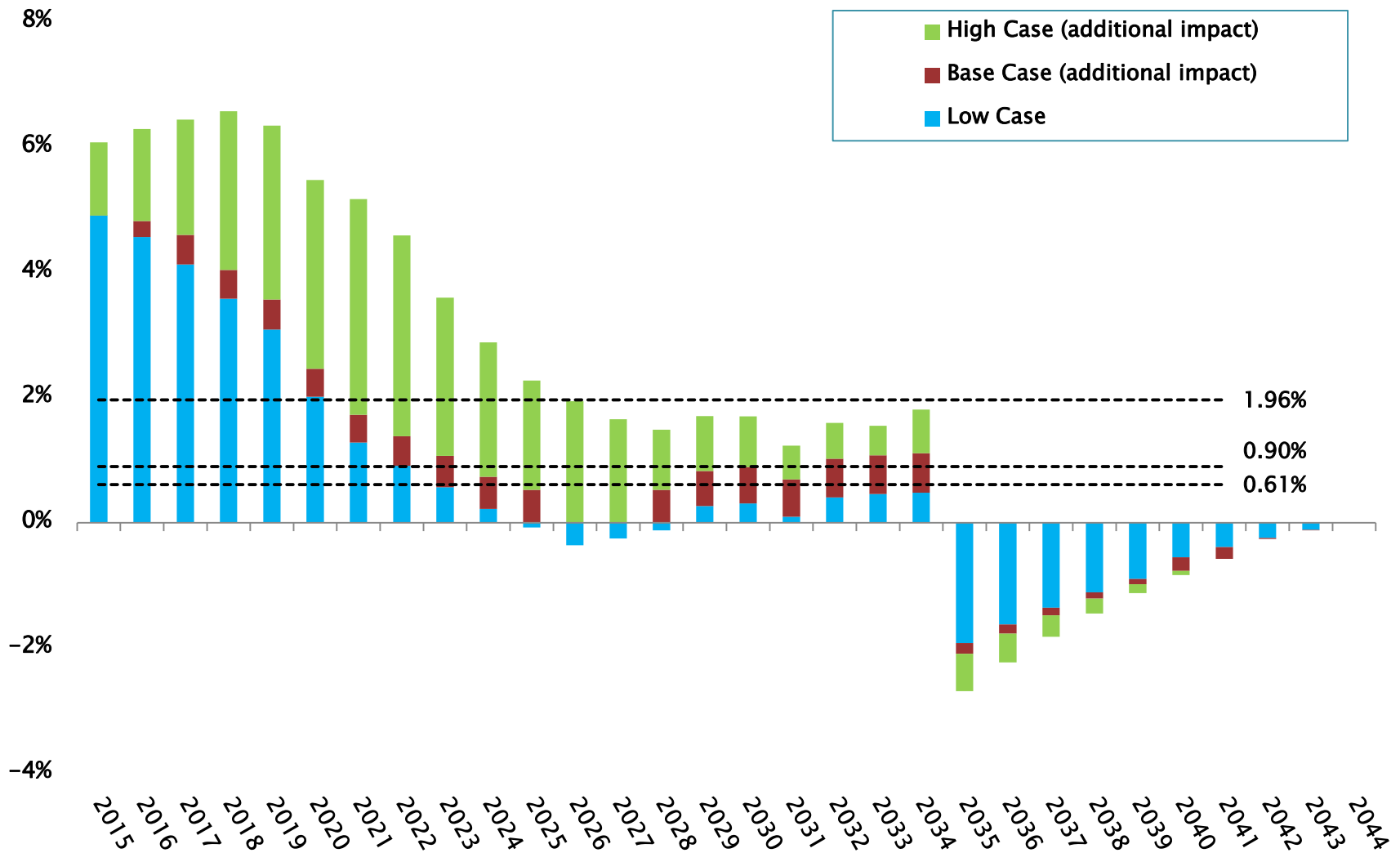
EVT Residential: Change in Rates Relative to No EE



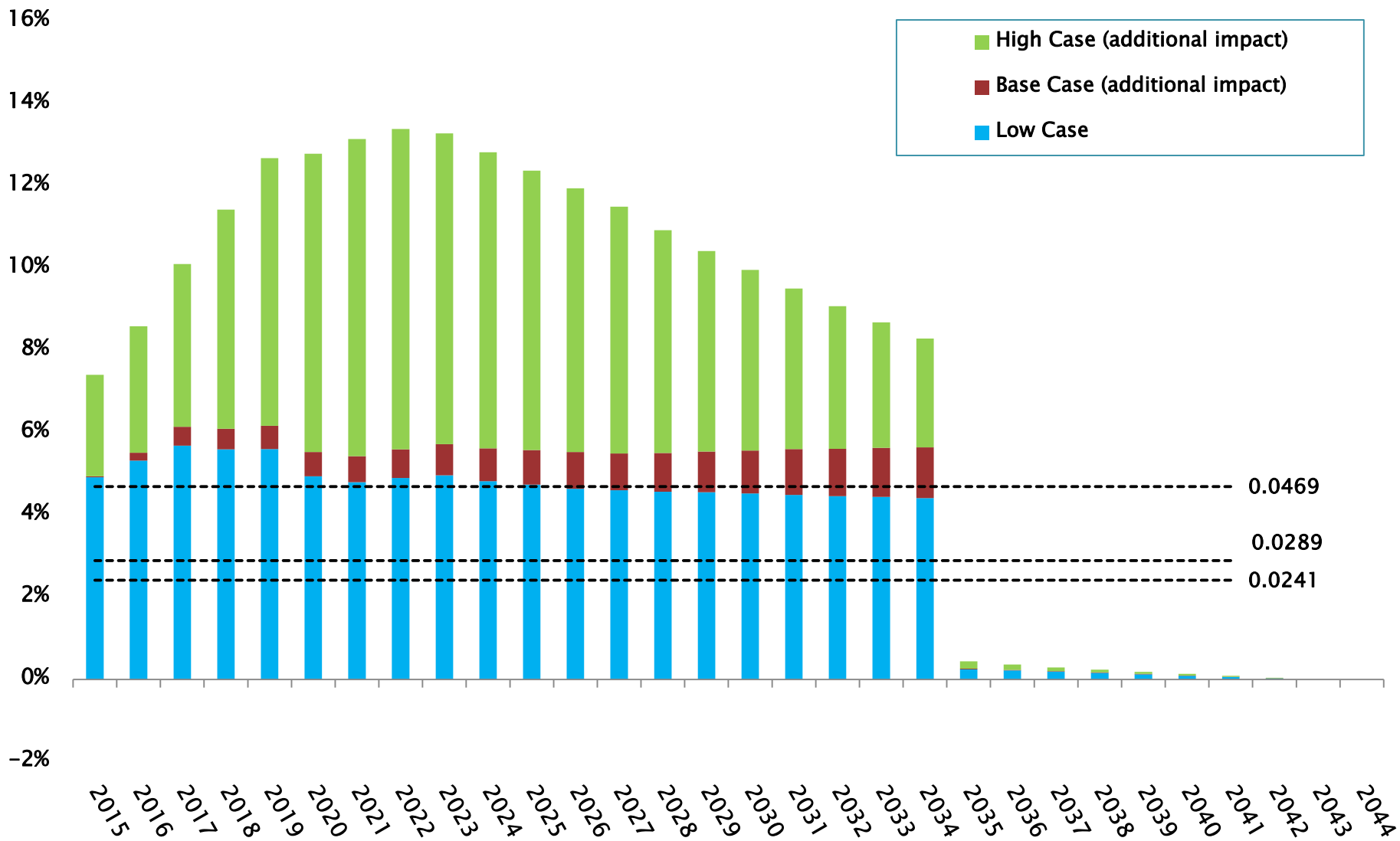
EVT Business Non-Demand: Change in Rates Relative to No EE



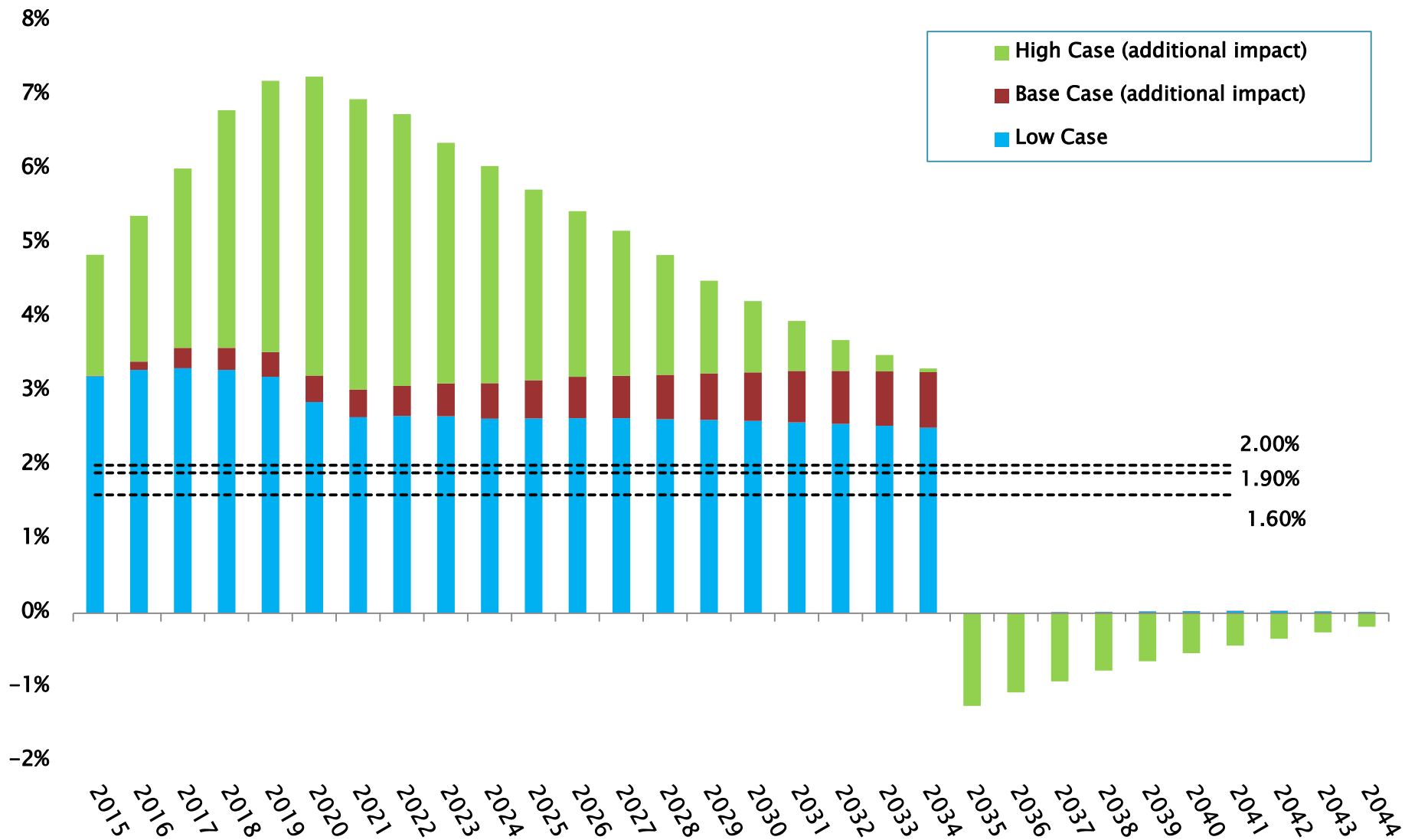
EVT Business Demand: Change in Rates Relative to No EE



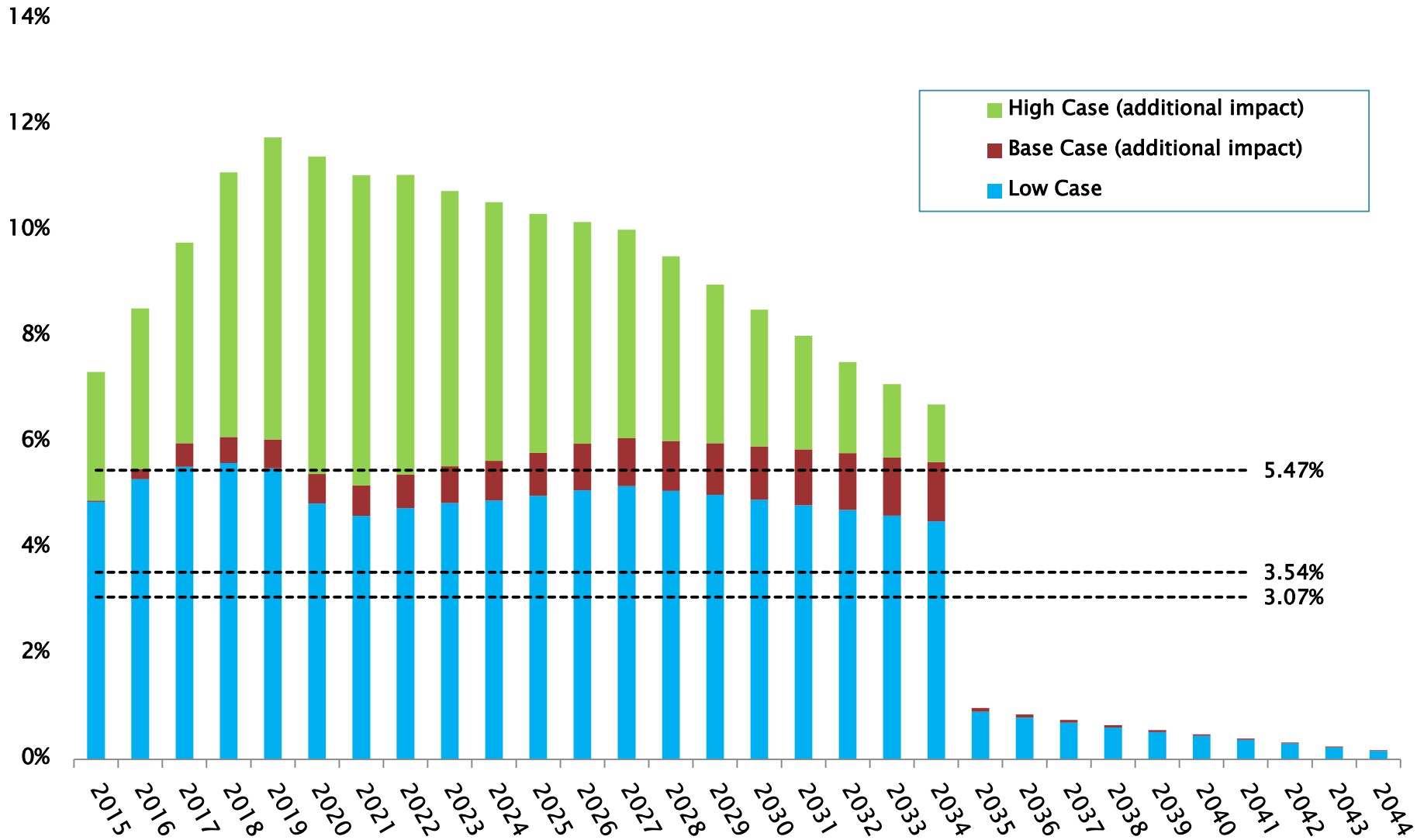
BED Residential: Change in Rates Relative to No EE



BED Business Demand: Change in Rates Relative to No EE



BED Business Non-Demand: Change in Rates Relative to No EE



Bill Impact: Baseline Usage

- ▶ Pre-EE Customer Average Monthly Usage
 - Residential
 - Including Low-Income/Multifamily sectors
 - Commercial & Industrial
 - Highly variable Usage Patterns
 - Lumped into one Business Sector
 - Demand and Non-Demand Customers
 - Example Customers instead of Average Customers

Bill Impact: Post-EE Usage

▶ Non-Participants

- Usage unchanged i.e. Savings = 0 Kwh
- Bills change proportionally to rates
 - Post EE rate x Usage

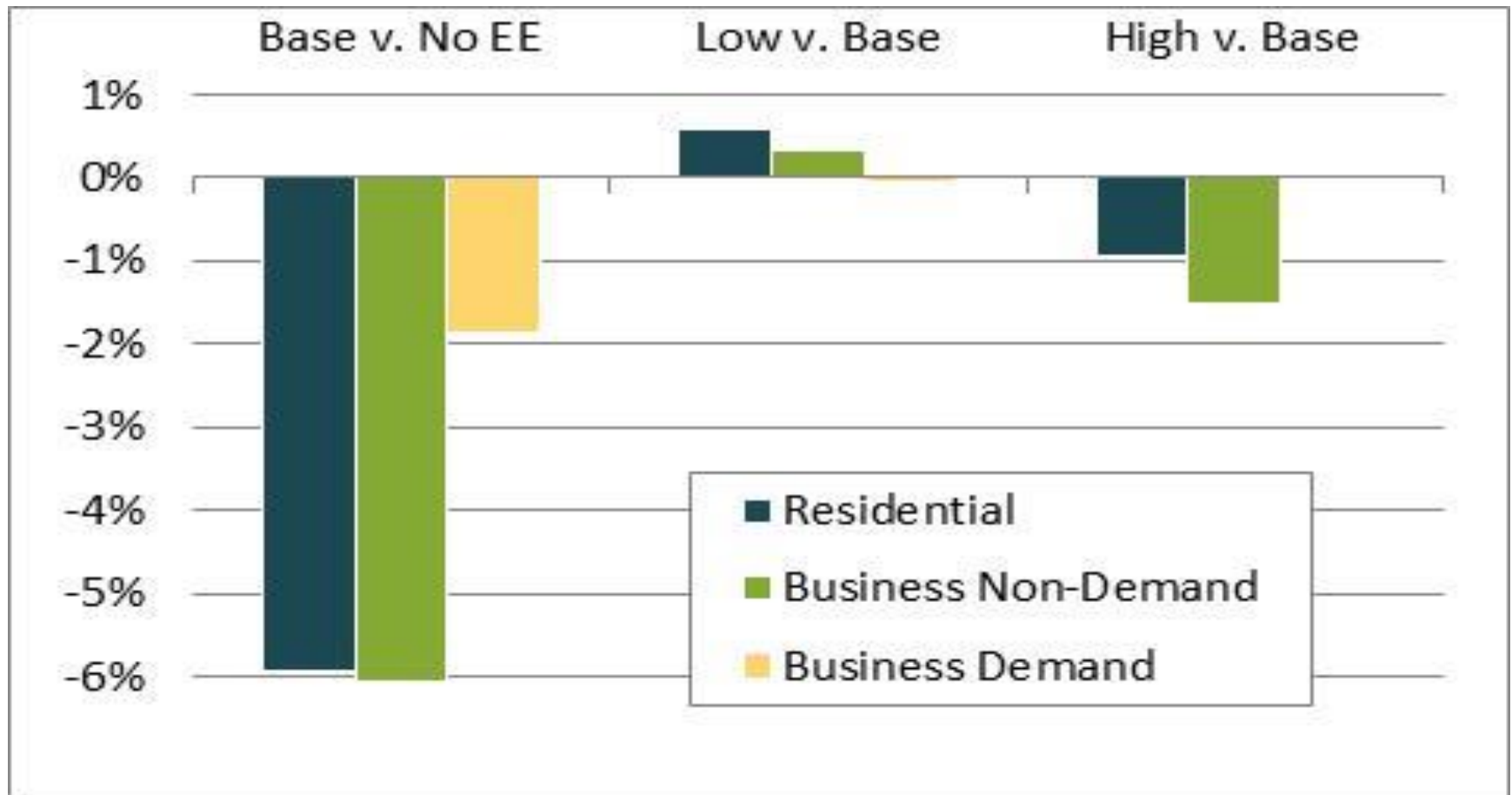
▶ Participants

- Monthly Savings subtracted from Pre EE usage
 - Participation & Savings Levels Vary Across Scenarios
- Bill Impacted by change in usage & change in rate
 - Non-Participant Bill minus Participant Bill

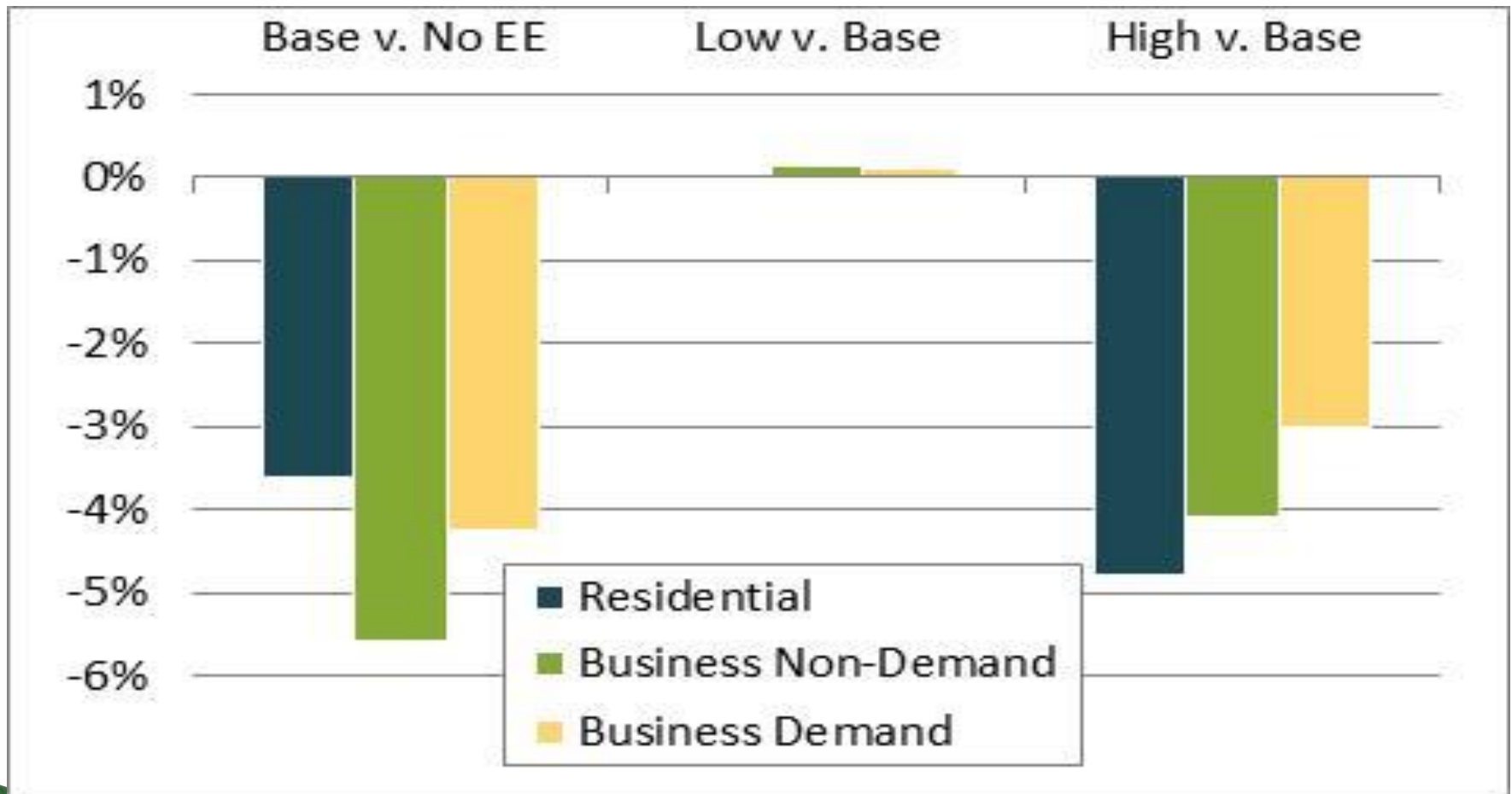
▶ Average Customer

- Participants & Non-Participants combined
- Bill Impact for customer class as whole

EVT Long-Term Average Bill Impacts by Sector



BED Long-Term Average Bill Impacts by Sector



Rate and Bill Impact PSD Summary

- ▶ Results are indicative; not definitive
- ▶ Scenario 2 showed steady then declining rate impact; significant reductions in average bills;
- ▶ Capacity Savings create significant benefits and could reduce rate impacts

PART 2:

- DPS EEU Budget & Savings Recommendations
 - A. Efficiency Vermont (EVT)
 - B. Burlington Electric Department (BED)

A. Efficiency Vermont

- ▶ **DPS Recommended**
 - Resource Acquisition
 - Electric Resource Acquisition
 - Research & Development
 - TEPF Resource Acquisition
 - Non-Resource Acquisition
 - Compensation

Electric Resource Acquisition Budget (EVT)

VEIC EEC Budget 2015-2017

	2015	2016	2017	3-yr Total
Funded via EEC				
Electric Resource Acquisition	\$39,351,359	\$42,460,068	\$45,555,423	\$127,366,850
RA R&D	\$1,377,298	\$1,804,553	\$1,822,217	\$5,004,067
RA Total	\$40,728,656	\$44,264,621	\$47,377,640	\$132,370,917

Electric Resource Acquisition Research & Development

- ▶ DPS recommends a portion of the RA budget be for R&D activities that are expected to deliver savings
- ▶ Not used in the calculation of QPIs, to avoid biased interpretation of results
- ▶ DPS, EEU's, and potentially DUs to file annual research plan
- ▶ Visit measure results in late 2015 to determine appropriateness of incorporating in RA for 2016 and for 2017–2019 and beyond
- ▶ Expected to include behavior, uplift, smart grid– and other data-enabled measures

Electric Resource Acquisition Modeled Savings (EVT)

Annual VEIC Budgets (nominal) and Modeled Savings				
	RA Budget	MWh	Summer MW	Winter MW
2015	\$40,728,656	90,528	14.2	14.6
2016	\$44,264,621	91,974	14.0	14.6
2017	\$47,377,640	92,298	13.4	14.3
2018	\$48,034,051	89,284	13.2	15.2
2019	\$49,645,840	92,232	13.5	15.5
2020	\$51,279,154	81,129	11.7	11.7
2021	\$52,828,643	76,141	11.1	11.1
2022	\$54,549,928	74,219	10.7	10.3
2023	\$56,254,913	72,126	10.0	9.6
2024	\$58,069,805	73,637	10.0	9.5
2025	\$59,920,919	73,449	9.7	9.1
2026	\$61,707,337	73,485	9.4	8.9
2027	\$63,157,477	72,286	9.1	8.6
2028	\$65,086,641	70,396	8.6	8.3
2029	\$66,982,240	71,062	8.6	8.2
2030	\$69,058,751	70,667	8.3	8.0
2031	\$71,418,979	70,319	8.1	7.8
2032	\$72,426,971	69,780	8.0	7.7
2033	\$74,198,237	68,050	7.7	7.5
2034	\$75,969,503	68,307	7.6	7.5

Thermal Resource Acquisition Budget (EVT)

VEIC TEPF Budget 2015-2017

	2015	2016	2017	3-yr Total
Funded via FCM and RGGI				
TEPF Resource Acquisition	\$5,349,342	\$5,856,090	\$6,256,375	\$17,461,807

Thermal Resource Acquisition Modeled Savings (EVT)

VEIC TEPF Budget and Modeled Savings		
	RA Budget	MMBtu
2015	\$5,349,342	63,908
2016	\$5,856,090	76,986
2017	\$6,256,375	81,459
2018	\$6,625,318	84,773
2019	\$7,192,044	90,426
2020	\$7,500,683	92,817
2021	\$7,707,212	94,531
2022	\$8,049,298	97,906
2023	\$8,037,072	97,259
2024	\$8,615,968	103,794

Efficiency Vermont

VEIC EEU Budget 2015-2017

	2015	2016	2017	3-yr Total
Funded via EEC				
Electric Resource Acquisition	\$39,351,359	\$42,460,068	\$45,555,423	\$127,366,850
RA R&D	\$1,377,298	\$1,804,553	\$1,822,217	\$5,004,067
Non-Resource Acquisition	\$4,217,048	\$4,177,272	\$4,260,432	\$12,654,752
Operations Fee and QPI Award (4.1%)	\$1,842,774	\$1,986,118	\$2,117,161	\$5,946,052
EEC-Funded Subtotal	\$46,788,478	\$50,428,011	\$53,755,233	\$150,971,722
Funded via FCM and RGGI				
Heating-and-Process-Fuel Resource Acquisition	\$5,349,342	\$5,856,090	\$6,256,375	\$17,461,807
Non-Resource Acquisition	\$575,052	\$569,628	\$580,968	\$1,725,648
Operations and QPI Fees (4.1%)	\$242,900	\$263,454	\$280,331	\$786,686
FCM and RGGI-Funded Subtotal	\$6,167,294	\$6,689,173	\$7,117,674	\$19,974,140

VEIC 2015-2017 EEC & TEPF Total \$170,945,862

B. Burlington Electric Department

▶ **DPS Recommended**

- Resource Acquisition
 - Electric Resource Acquisition
 - Electric Resource Acquisition (Research & Development)
 - TEPF Resource Acquisition
- Non-Resource Acquisition

Electric Resource Acquisition Budget (BED)

BED EEC Budget 2015-2017

	2015	2016	2017	3-yr Total
Funded via EEC				
Electric Resource Acquisition	\$2,337,666	\$2,513,980	\$2,696,148	\$7,547,794
RA R&D	\$81,818	\$106,844	\$107,846	\$296,508
RA Total	\$2,419,484	\$2,620,824	\$2,803,994	\$7,844,302

Electric Resource Acquisition Modeled Savings (BED)

Annual BED Budgets (nominal) and Modeled Savings				
	RA Budget	MWh	Summer KW	Winter KW
2015	\$2,419,484	6,769	972	1002
2016	\$2,620,824	6,777	972	1004
2017	\$2,803,994	6,784	969	1005
2018	\$2,780,382	6,513	923	964
2019	\$2,868,773	5,841	826	865
2020	\$2,966,063	6,227	837	922
2021	\$3,056,968	6,178	826	915
2022	\$3,149,249	5,488	660	813
2023	\$3,243,315	5,686	753	842
2024	\$3,349,072	5,340	738	791
2025	\$3,453,508	5,076	649	752
2026	\$3,568,530	5,039	643	746
2027	\$3,648,111	4,801	628	711
2028	\$3,764,671	5,035	625	746
2029	\$3,881,651	4,981	622	738
2030	\$4,004,169	4,655	482	689
2031	\$4,149,095	4,566	478	676
2032	\$4,273,568	4,548	475	673
2033	\$4,401,775	4,337	461	642
2034	\$4,533,828	4,383	459	641

Thermal Resource Acquisition Budget (BED)

BED TEPF Budget 2015-2017

	2015	2016	2017	3-yr Total
Funded via FCM and RGGI				
TEPF Resource Acquisition	\$96,390	\$98,318	\$100,284	\$294,992

Thermal Resource Acquisition Modeled Savings (BED)

BED TEPF Budget and Modeled Savings		
	RA Budget	MMBtu
2015	\$96,390	542
2016	\$98,318	486
2017	\$100,284	442
2018	\$102,290	411
2019	\$104,336	417
2020	\$106,422	411
2021	\$108,551	417
2022	\$110,722	411
2023	\$112,936	417
2024	\$115,195	411

Burlington Electric Department

BED EEU Budget 2015-2017

	2015	2016	2017	3-yr Total
Funded via EEC				
Electric Resource Acquisition	\$2,337,666	\$2,513,980	\$2,696,148	\$7,547,794
RA R&D	\$81,818	\$106,844	\$107,846	\$296,508
Non-Resource Acquisition	\$230,076	\$234,700	\$239,300	\$704,076
EEC-Funded Subtotal	\$2,649,560	\$2,855,524	\$3,043,294	\$8,548,378
Funded via FCM and RGGI				
Heating-and-Process-Fuel Resource Acquisition	\$96,390	\$98,318	\$100,284	\$294,992
Non-Resource Acquisition	\$10,700	\$11,000	\$11,200	\$32,900
FCM and RGGI-Funded Subtotal	\$107,090	\$109,318	\$111,484	\$327,892

BED 2015-2017 EEC & TEPF Total \$8,876,270

Other Elements

- ▶ Compensation
- ▶ Non-Resource Acquisition
- ▶ DPS Evaluation
- ▶ Other

2015-17 EEU EEC Recommendation

	2015	2016	2017	3-yr Total
Funded via EEC				
Electric Resource Acquisition				
Efficiency Vermont	\$39,351,359	\$42,460,068	\$45,555,423	\$127,366,850
RA R&D	\$1,377,298	\$1,804,553	\$1,822,217	\$5,004,067
BED	\$2,337,666	\$2,513,980	\$2,696,148	\$7,547,794
RA R&D	\$81,818	\$106,844	\$107,846	\$296,508
Customer Credit Program Participant	\$989,400	\$1,009,188	\$1,029,372	\$3,027,960
Non-Resource Acquisition				
Efficiency Vermont	\$4,217,048	\$4,177,272	\$4,260,432	\$12,654,752
BED	\$230,076	\$234,700	\$239,300	\$704,076
Operations Fee and QPI Award	\$1,842,774	\$1,986,118	\$2,117,161	\$5,946,052
DPS Evaluation	\$1,319,400	\$1,319,400	\$1,319,400	\$3,958,200
Fiscal Agent	\$33,244	\$33,244	\$33,244	\$99,731
Fiscal Agent Audit	\$19,946	\$19,946	\$19,946	\$59,839
EEC-Funded Subtotal	\$51,800,029	\$55,665,313	\$59,200,489	\$166,665,830

2015-17 EEU TEPF Recommendation

	2015	2016	2017	3-yr Total
Funded via FCM and RGGI				
Heating-and-Process-Fuel Resource Acquisition				
Efficiency Vermont	\$5,349,342	\$5,856,090	\$6,256,375	\$17,461,807
BED	\$96,390	\$98,318	\$100,284	\$294,992
Non-Resource Acquisition				
Efficiency Vermont	\$575,052	\$569,628	\$580,968	\$1,725,648
BED	\$10,700	\$11,000	\$11,200	\$32,900
Operations Fee and QPI Award	\$242,900	\$263,454	\$280,331	\$786,686
DPS Evaluation	\$773,600	\$773,600	\$773,600	\$2,320,800
FCM and RGGI-Funded Subtotal	\$7,047,984	\$7,572,091	\$8,002,758	\$22,622,832

Considerations

- ▶ Statutory requirement
 - *...realize all reasonably available, cost-effective energy efficiency savings...*
- ▶ Comprehensive Energy Plan
- ▶ Pace of program expansion
- ▶ Rate and Bill impacts

Brian Cotterill
Vermont Department of Public Service
brian.cotterill@state.vt.us
802-828-3212

APPENDICES

- Appendix A – Potential Study
- Appendix B – Rate and Bill Impacts
- Appendix C – DPS EEU Budget & Savings Recommendations

Appendix – Potential Study

- ▶ Residential Methodology
- ▶ Statewide Residential Potential Results
- ▶ Statewide Residential End Use Breakdowns
- ▶ Commercial Methodology
- ▶ Statewide Commercial and Industrial Potential Results
- ▶ Commercial End Use Potential Breakdowns (VT)
- ▶ BED Potential Results
- ▶ EVT Potential Results

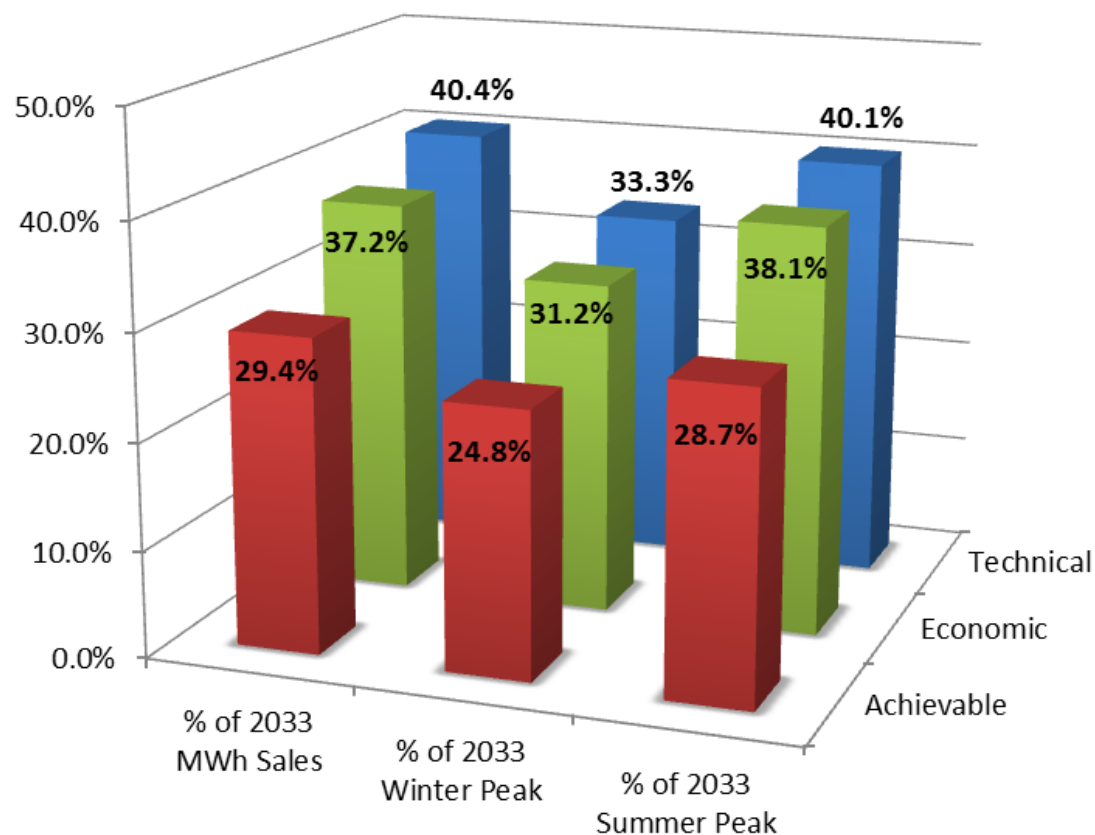
Residential Sector Methodology



"BOTTOM-UP APPROACH"
Residential Energy Savings

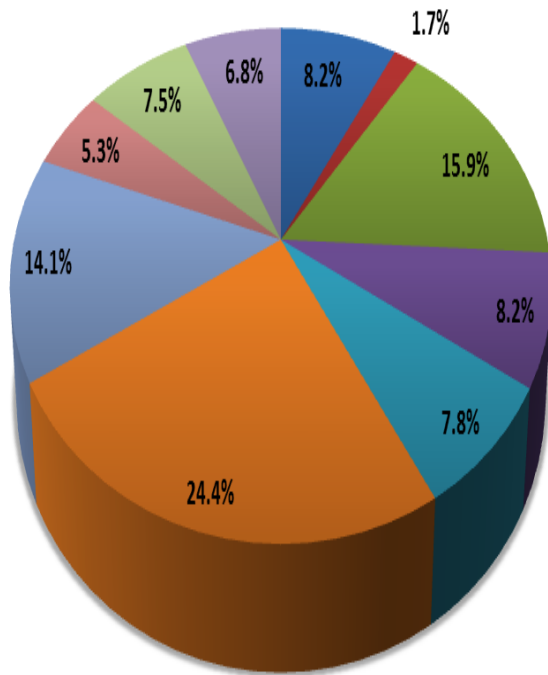


RESIDENTIAL ENERGY EFFICIENCY POTENTIAL ESTIMATES



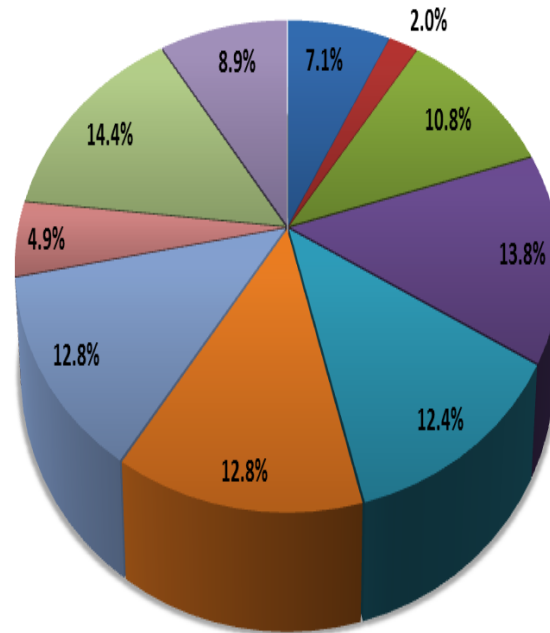
Summary of Residential Energy Efficiency Potential as a % of 2033 Forecast – VT Statewide

Residential End Use Potential Savings 2020 and 2033



2020

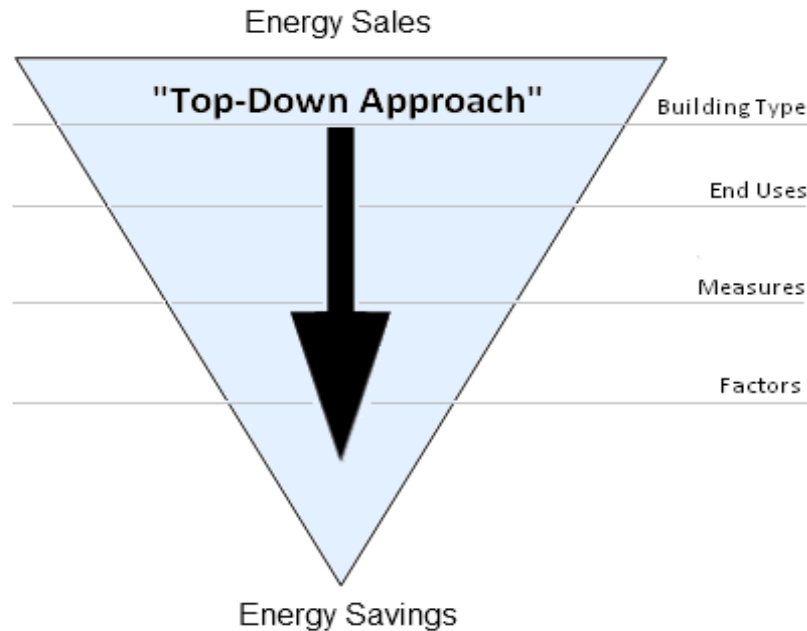
- Appliances
- Appliances/Water Heating
- Consumer Electronics
- HVAC (Envelope)
- HVAC (Equipment)
- Lighting
- Water Heating
- Other
- Fuel-Switching
- Early Retirement



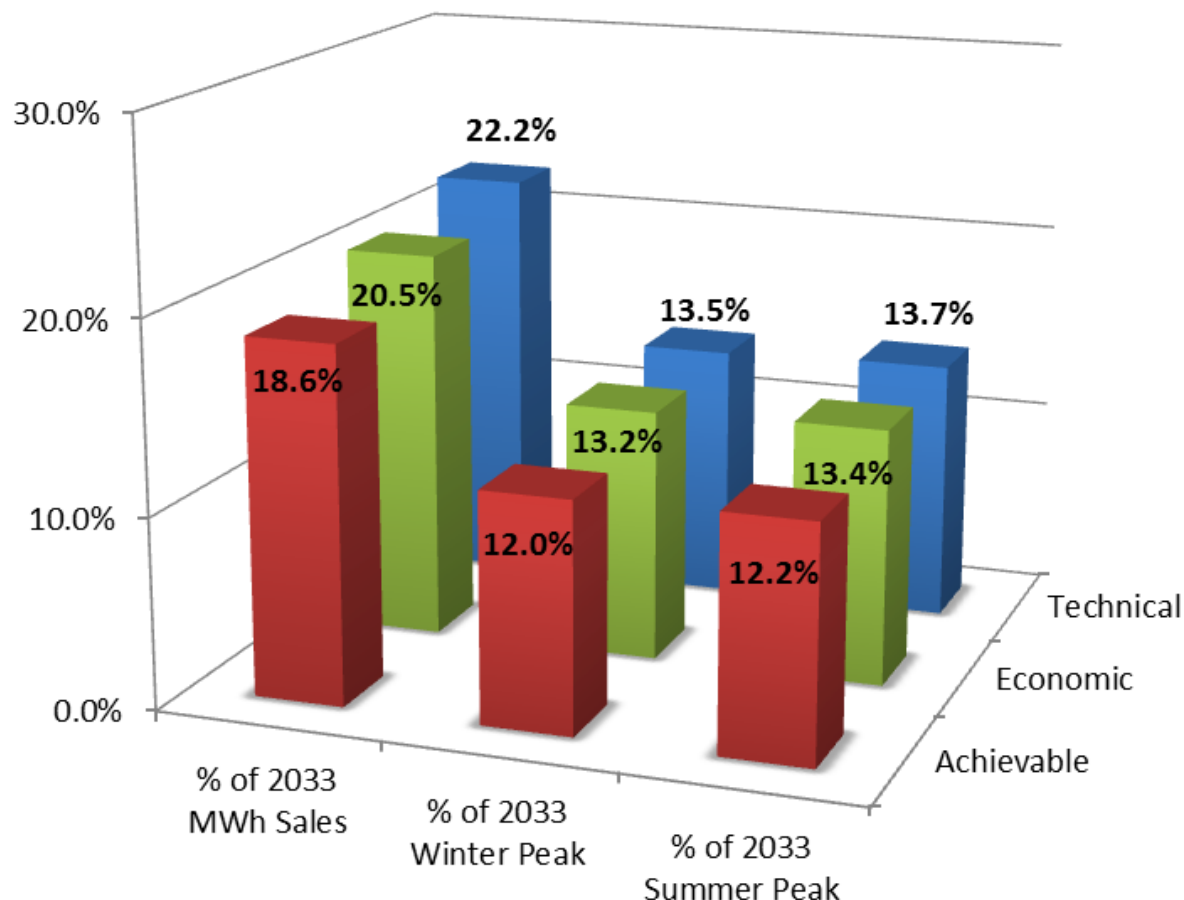
2033

- Appliances
- Appliances/Water Heating
- Consumer Electronics
- HVAC (Envelope)
- HVAC (Equipment)
- Lighting
- Water Heating

Commercial Sector Methodology

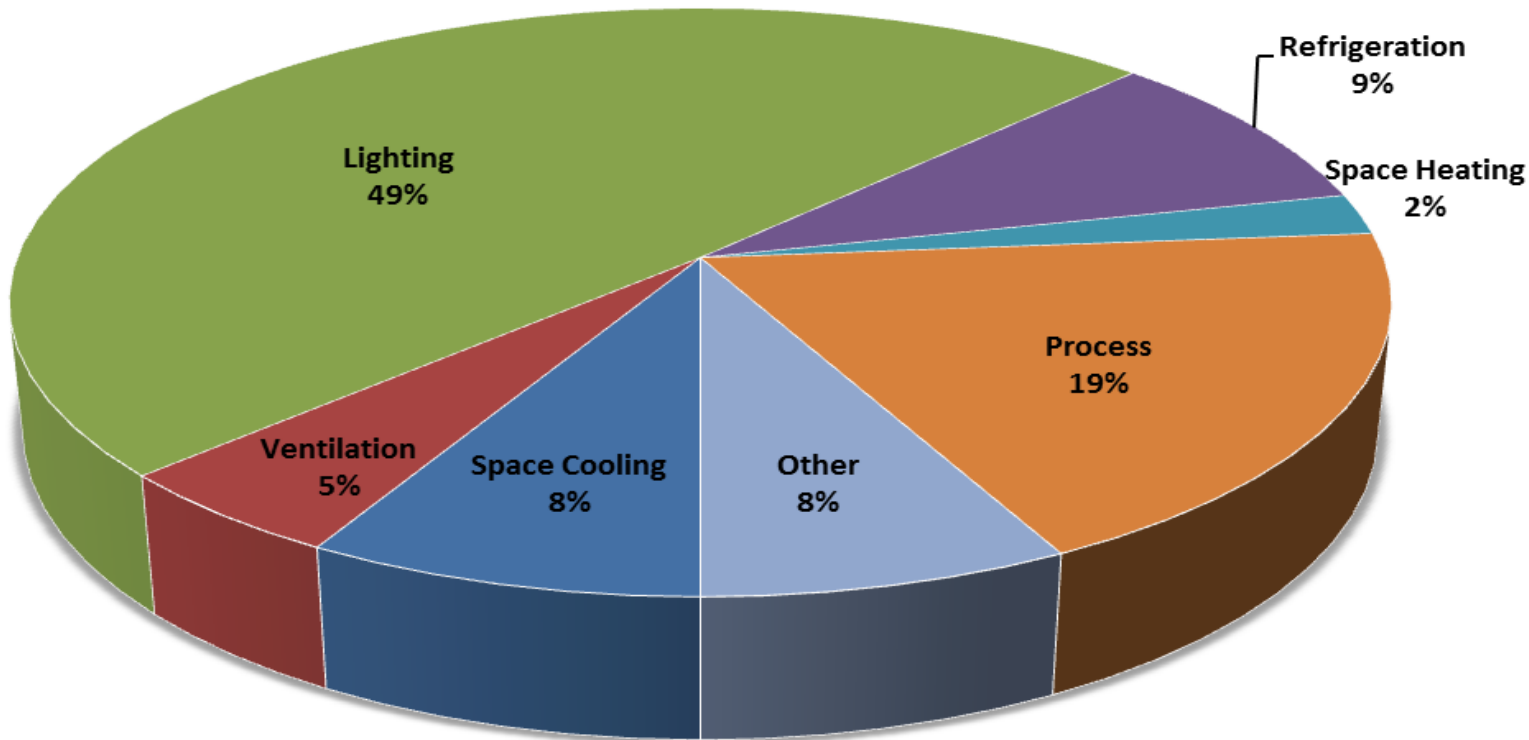


COMMERCIAL AND INDUSTRIAL ENERGY EFFICIENCY POTENTIAL ESTIMATES

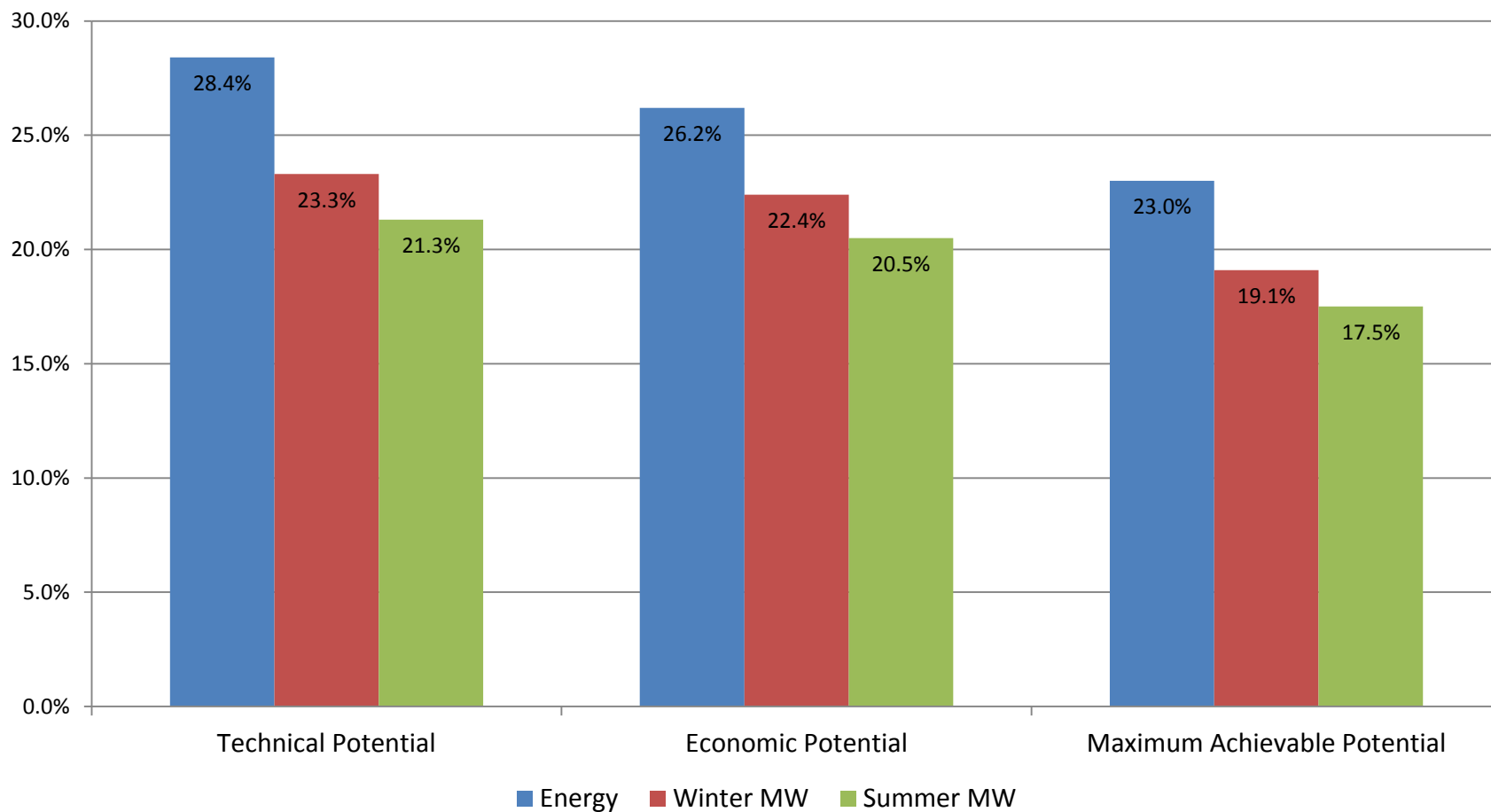


2033 Summaries of Commercial & Industrial Energy Efficiency Potential

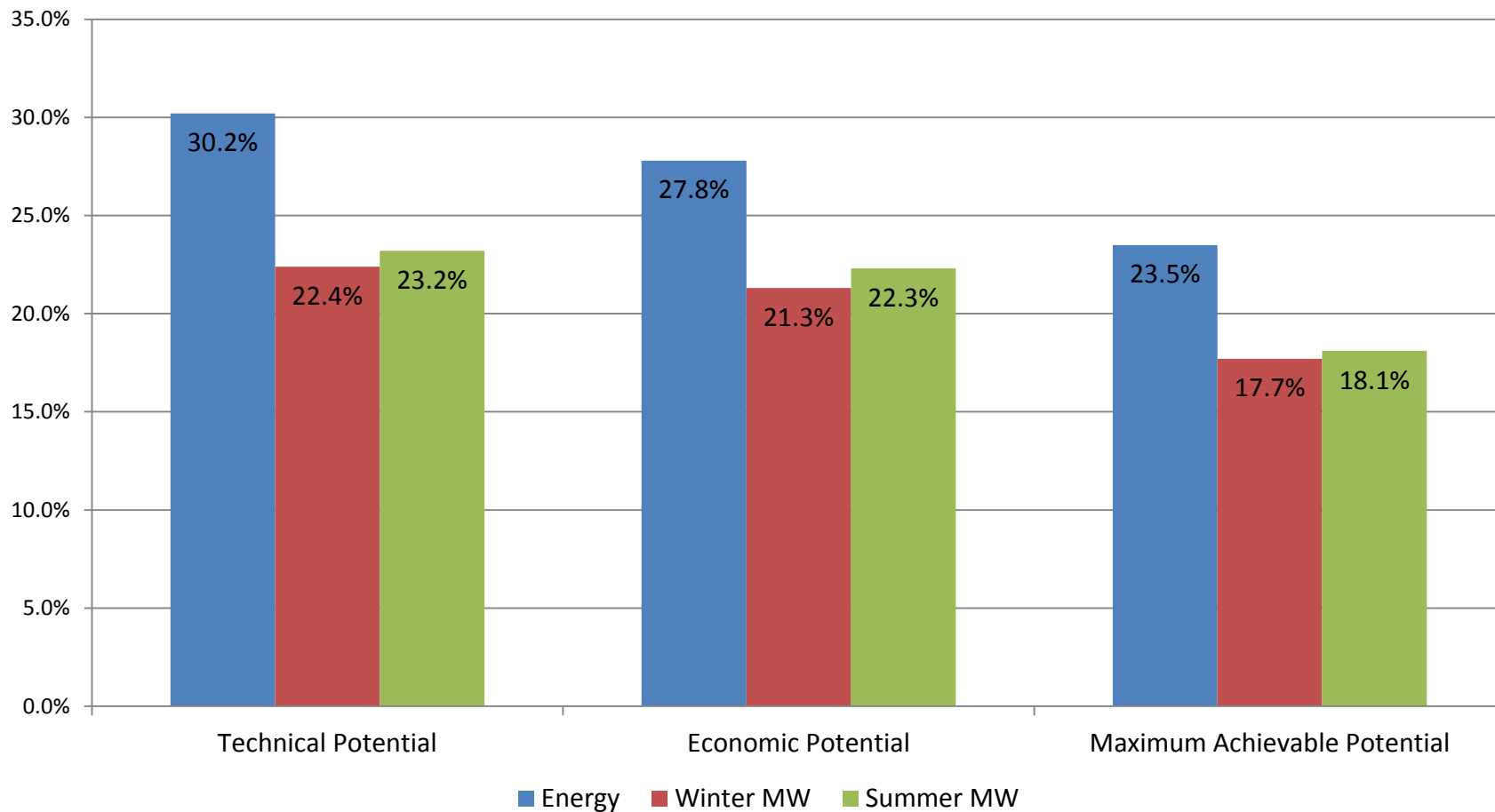
C&I End Use Potential Savings 2033



BED Potential Results



EVT Potential Results



Appendix B – Rate and Bill Impacts

Detailed Methodology – Rate Impacts

1. Determine Current Rates

- *EVT* – State Average Billing Revenue & Data
- *BED* – BED's Billing Revenue & Data
- Revenues converted to 2013 dollars using 2012–2013 inflation rate (1.5%)

2. Unbundle Energy Charge

- Gen (Energy & Capacity)/Tran/Dis (& Demand)/ Other (Customer Charge, Taxes, Fees)
 - *EVT* – G: 58.1%/ T: 6.7%/ D: 16.7%/ O: 8.5%
 - *BED* – G: 47.7%/ T: 12.7%/ D: 25.8%/ O: 13.8%

3. Apply Escalation Rates

- G: % Annual Change in Avoided Wholesale Energy & Capacity Costs**
- T: 3% in 2016, 7% in 2017, and 1% annually 2018–2054***
- D: Held Constant
- O: Held Constant****

4. Adjusting Rates for EE

- *Avoided Costs*: Price Suppression Benefits, Capacity, Transmission, Distribution
- *Bottom-Up* – Impact of EE per component, including avoided costs (downward pressure) and lost revenue components (fixed cost recovery/upward pressure)

5. Calculating Rate Adjustments

- Post-efficiency rates are determined for the energy efficiency charge, generation charge, transmission charge, distribution charge, other charge, and the customer charge. All of these charges are summed together to produce a total adjusted rate.



Appendix C – DPS EEU Budget and Savings Recommendations

Reference to Inaugural DRP

Appendix A: 8/01/2011 EEU-2010-06

EEU Program Electric Budgets

Board Determination

	2012	2013	2014	3-yr Total	2015	2016	2017
Funded via EEC							
Electric Resource Acquisition							
Efficiency Vermont	\$32,482,600	\$34,706,540	\$37,385,900	\$104,575,040	<u>\$40,340,759</u>	\$43,469,256	\$46,584,795
BED	\$1,880,000	\$2,014,000	\$2,170,000	\$6,064,000	<u>\$2,337,666</u>	\$2,513,980	\$2,696,148
Non-Resource Acquisition							
Efficiency Vermont	\$3,032,000	\$3,264,000	\$3,405,000	\$9,701,000	\$3,058,530	\$3,333,810	\$3,504,830
BED	\$197,000	\$201,000	\$203,000	\$601,000	\$145,300	\$154,600	\$158,400
Operations and QPI Fees					\$1,855,444	\$2,000,965	\$2,141,475
Operations Fees	\$607,340	\$649,340	\$697,560	\$1,954,240			
QPI Awards	\$911,020	\$974,010	\$1,046,340	\$2,931,370			
DPS Evaluation					\$959,971	\$959,971	\$959,971
Rest of State	\$885,180	\$885,300	\$885,430	\$2,655,910			
BED	\$63,820	\$63,700	\$63,570	\$191,090			
Fiscal Agent					\$27,703	\$28,423	\$29,162
Rest of State	\$24,290	\$24,930	\$25,570	\$74,790			
BED	\$1,360	\$1,390	\$1,430	\$4,180			
EEU Fund Audit					\$16,622	\$17,054	\$17,497
Rest of State	\$14,570	\$14,950	\$15,350	\$44,870			
BED	\$820	\$840	\$850	\$2,510			
EEC-Funded Subtotal	\$40,100,000	\$42,800,000	\$45,900,000	\$128,800,000	\$48,741,995	\$52,478,059	\$56,092,279



DEPARTMENT OF PUBLIC SERVICE