

Energy Efficiency Modeling Discussion

October 14th, 2016



Major Energy Efficiency Modeling Assumptions

- Vectren's IRP process will inform the level of Energy Efficiency (EE) to achieve in future program plans
- EE blocks will include both residential and Commercial/Industrial savings, which allows flexibility in future years to determine the proper mix
- No minimum level of EE has been embedded into our sales and demand forecast (IRP will determine the amount of EE)
- Naturally occurring EE included in sales and demand forecast
- EE savings amounts in 2016-2017 will be based on EE plan approved in Cause No. 44645. Included as an existing resource in our dispatch portfolio model
- Levelized EE costs over the measure life

EE = Energy Efficiency
IRP = Integrated Resource Plan

Major EE Modeling Assumptions Cont.

- The model may select up to 8 blocks at 0.25% of eligible sales for a maximum of 2% of eligible sales¹ annually
- 80% net to gross ratio, which is consistent with our most recent evaluation
- Current plan costs used as the base cost for block pricing
 - Escalated in real dollars based on penetration model. The prices increase from block 1 up to block 8 and increase each year

¹ 2% is aligned with Vectren's most recent market potential study for the 2015-2019 study period for technical potential including opt-out eligible customer sales

EE = Energy Efficiency

EE Blocks – Base Case

EE Resource Options Net of Free Riders										
Year	Eligible GWh Conservation Savings	Percent of Eligible Sales Potential	MWh Block 1	MWh Block 2	MWh Block 3	MWh Block 4	MWh Block 5	MWh Block 6	MWh Block 7	MWh Block 8
2016										
2017	3,493									
2018	3,525	2.00%	6,986	6,986	6,986	6,986	6,986	6,986	6,986	6,986
2019	3,545	2.00%	7,050	7,050	7,050	7,050	7,050	7,050	7,050	7,050
2020	3,571	2.00%	7,089	7,089	7,089	7,089	7,089	7,089	7,089	7,089
2021	3,577	2.00%	7,141	7,141	7,141	7,141	7,141	7,141	7,141	7,141
2022	3,594	2.00%	7,154	7,154	7,154	7,154	7,154	7,154	7,154	7,154
2023	3,613	2.00%	7,188	7,188	7,188	7,188	7,188	7,188	7,188	7,188
2024	3,640	2.00%	7,227	7,227	7,227	7,227	7,227	7,227	7,227	7,227
2025	3,654	2.00%	7,281	7,281	7,281	7,281	7,281	7,281	7,281	7,281
2026	3,672	2.00%	7,309	7,309	7,309	7,309	7,309	7,309	7,309	7,309
2027	3,692	2.00%	7,344	7,344	7,344	7,344	7,344	7,344	7,344	7,344
2028	3,721	2.00%	7,384	7,384	7,384	7,384	7,384	7,384	7,384	7,384
2029	3,739	2.00%	7,442	7,442	7,442	7,442	7,442	7,442	7,442	7,442
2030	3,755	2.00%	7,477	7,477	7,477	7,477	7,477	7,477	7,477	7,477
2031	3,772	2.00%	7,511	7,511	7,511	7,511	7,511	7,511	7,511	7,511
2032	3,796	2.00%	7,543	7,543	7,543	7,543	7,543	7,543	7,543	7,543
2033	3,810	2.00%	7,592	7,592	7,592	7,592	7,592	7,592	7,592	7,592
2034	3,831	2.00%	7,620	7,620	7,620	7,620	7,620	7,620	7,620	7,620
2035	3,850	2.00%	7,663	7,663	7,663	7,663	7,663	7,663	7,663	7,663
2036	3,876	2.00%	7,701	7,701	7,701	7,701	7,701	7,701	7,701	7,701

*EE savings amount for 2016-2017 will be based upon EE plan approved in 44645

EE = Energy Efficiency
GWh = Gigawatt Hour
MWh = Megawatt Hour



Major EE Modeling Assumptions Cont.

- The 8 blocks of 0.25% per year (2% of retail sales per year) for the 20 year planning horizon represents almost 40% of retail sales are EE options available for selection in the IRP process
- This level of optionality exceeds typical estimates of achievable potential or even technical potential
- As a result, Vectren needs to incorporate estimates of the cost to achieve these levels of impacts

EE = Energy Efficiency

EE Resource Cost

- Vectren's current 2016 operating plan used as a starting point for block pricing
- Vectren utilized the cost of EE programs approved in its most recent filing (Cause No. 44645) as a starting point for 2017
- Energy Information Administration (EIA) data was used to determine the relationship between the cost to implement EE programs and market penetration
 - Statistical analysis provided insights on how costs change with changes in the size of EE load impact initiatives as well as increases in the overall cumulative penetration of the market.

EE = Energy Efficiency

EE Resource Cost

- Growth rates in cost were developed from two separate econometric models of EIA data
- The results from the two models were averaged to produce a growth rate in cost of 4.12% per 1% of retail sales achievement or 1.04% per 0.25% EE block.
- Developed 2 tiers of EE pricing
 - 1% of retail sales over the 20 year horizon exceeds an expected high achievable level
 - It is assumed that the second 1% of retail sales occurs at a higher marketing cost than the first

EE = Energy Efficiency
EIA = Energy Information Administration

EE Resource Cost

The starting cost for the second 1% of blocks is assumed to be the ending cost (in real dollars) for the first 1%.

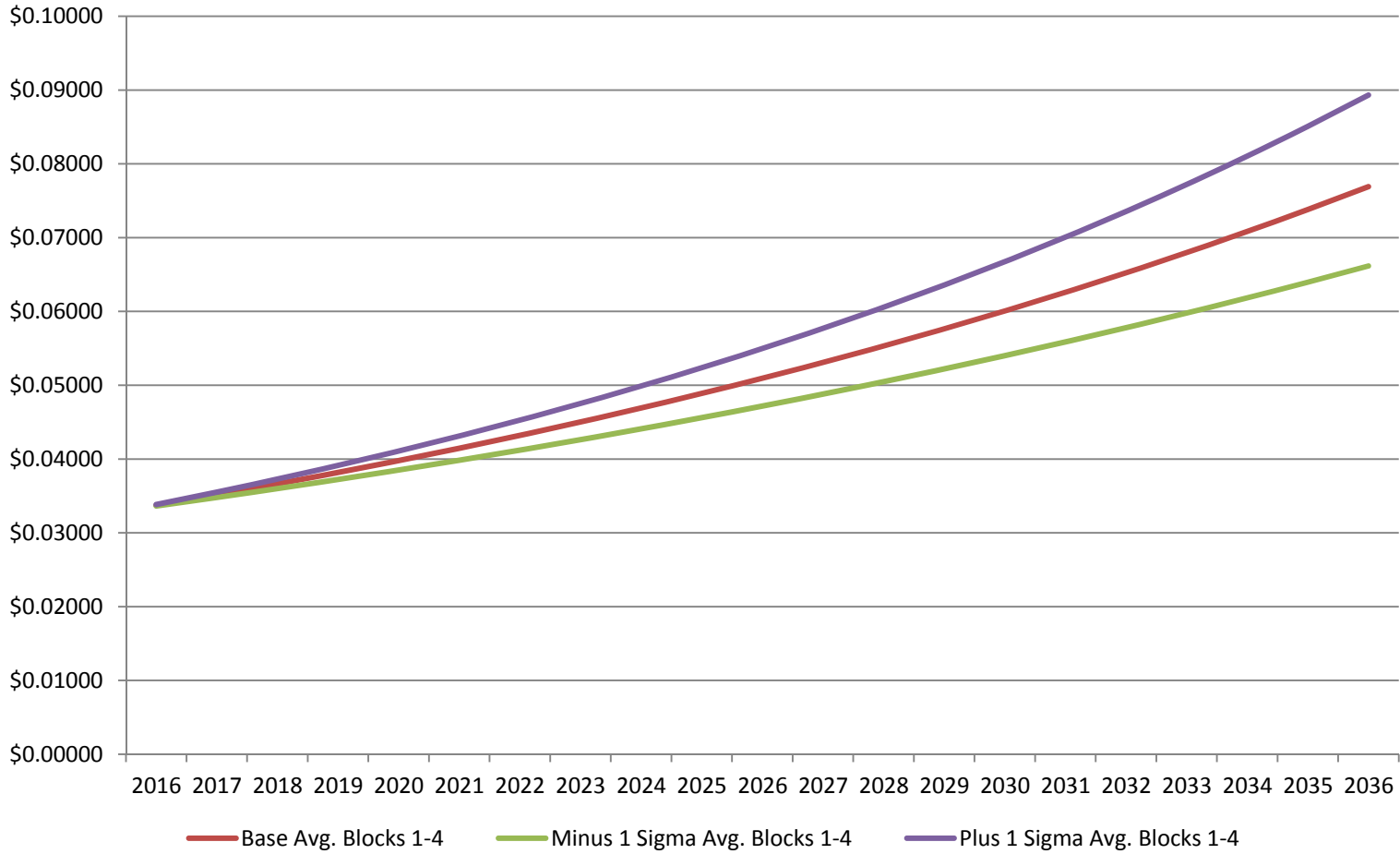
- The process of computing the applicable growth rate for the second 1% was similar to that of the first 1%. This resulted in a growth rate of 1.72% per additional 1% of retail sales impacts or 0.43% per 0.25% block. This growth rate is applied to the remaining set of four 0.25% blocks or the next 1% of retail sales available for selection.

EE Resource Cost cont.

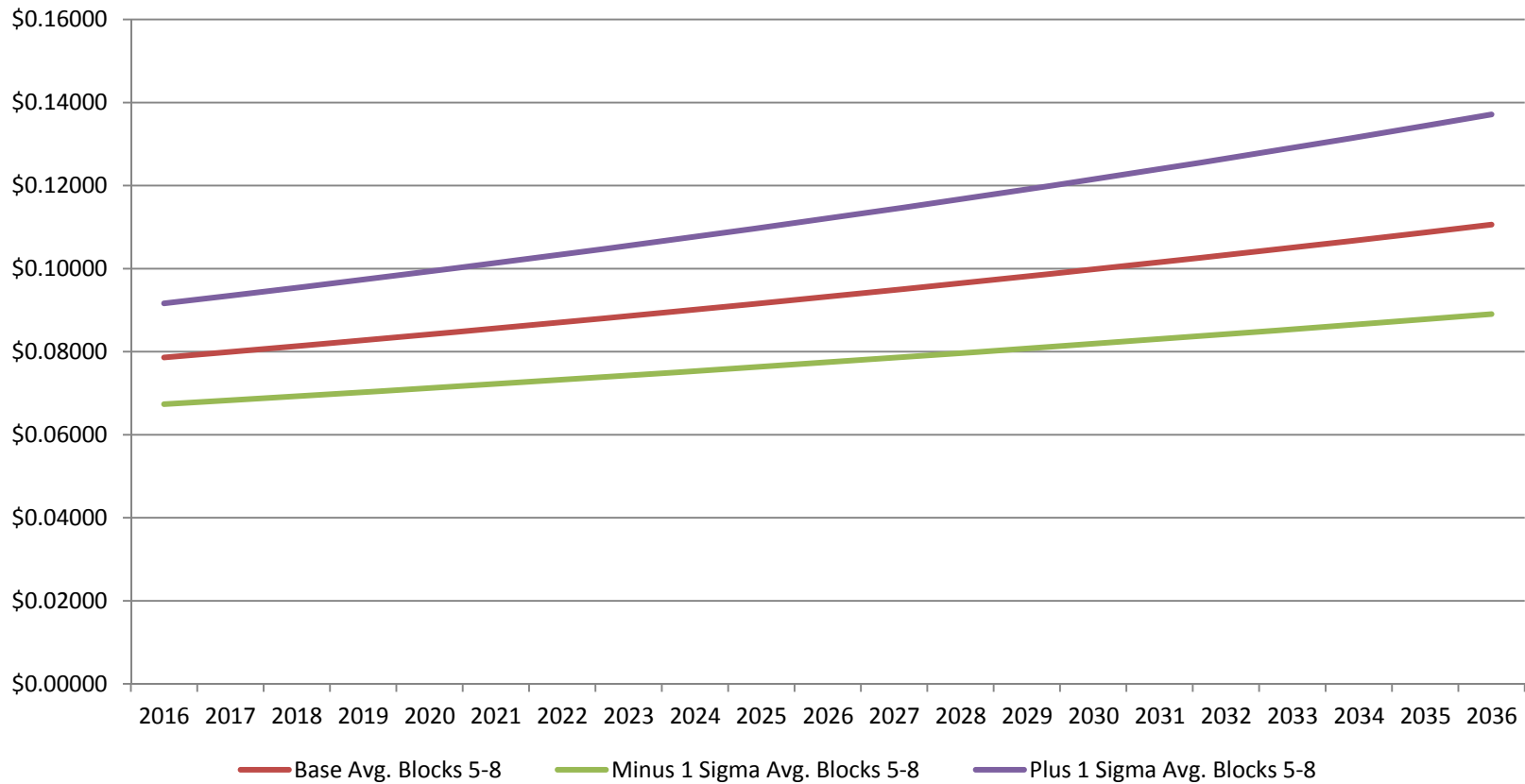
- Vectren recognizes that 20 year cost projections for EE achievement are subject to uncertainty
- As a result, Vectren also incorporated into the IRP analysis alternate levels of cost projection reflecting plus and minus one standard deviation in the projected growth rates in cost
- This helps assess whether alternate views on EE cost achievement would impact the selection of a resource plan

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Base Case Average Levelized Costs – Blocks 1-4



Base Case Average Levelized Costs – Blocks 5-8



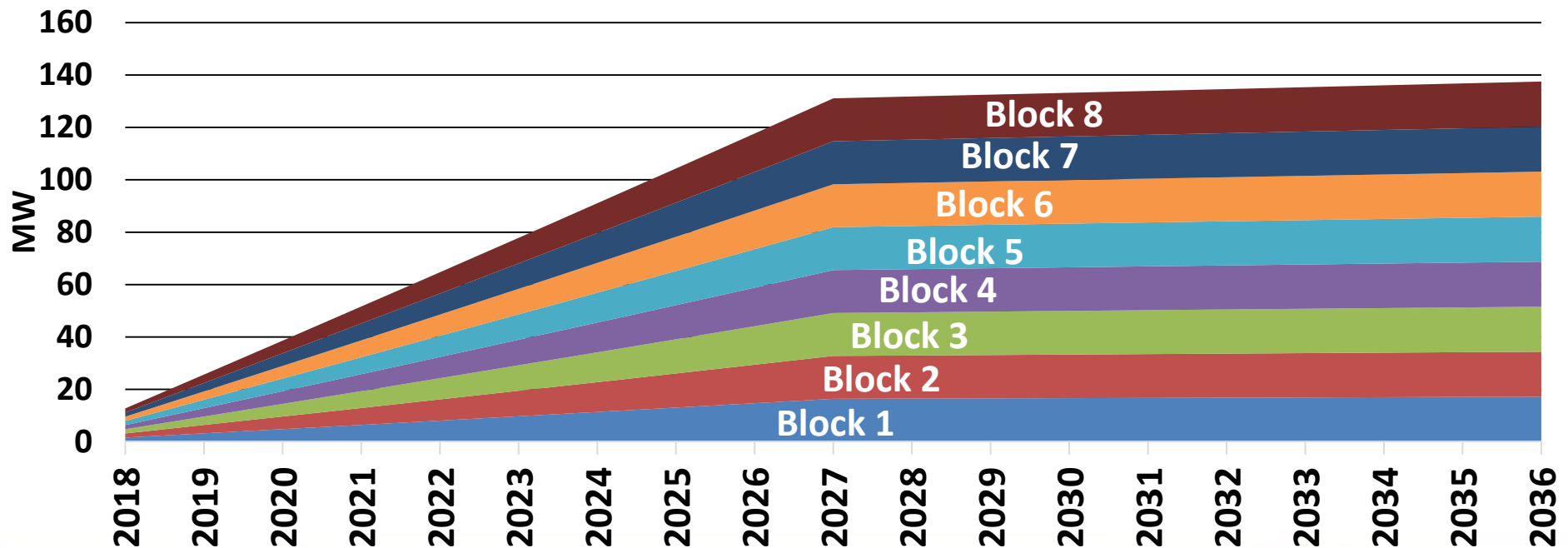
EE Resource Summary

- The EE Resource process provides EE savings and cost values for over 150 blocks of EE resources representing almost 40% of available retail sales for potential selection by the IRP analytical model
 - This level of EE resource options exceeds estimates of Technical Potential
 - Provides flexibility to the IRP model to identify and select an EE plan consistent with the IURC and legislative objectives
- Given that there is a potential for a modeled portfolio to exceed an estimate of Technical Potential, the results of the IRP analytical process should be evaluated to ensure that the resulting level of EE selected is viable

EE = Energy Efficiency
IRP = Integrated Resource Plan
IURC = Indiana Utility Regulatory Commission

Energy Efficiency Program Modeling: What Does EE Alternative Look Like?

- Modeled as 8 individual “blocks”
- Each block represents 0.25% of eligible sales
- Program life = 10 years



EE = Energy Efficiency
MW = Megawatt

Energy Efficiency Program Modeling: Decision Constraints

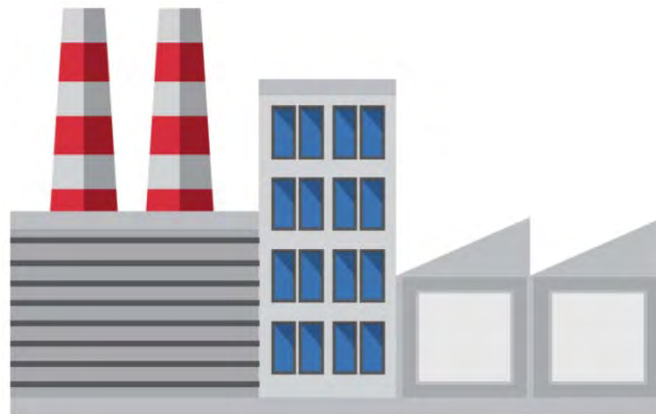
- For optimization runs, if block selected, must continue throughout study period
 - Too many choices if year-to-year selection allowed
- Also built portfolios with varied levels of EE over time
- No more than 8 blocks can be selected (2% of eligible sales max)
- Decision to select any amount of EE is made in 2018
 - Level of EE selected in 2018 is carried throughout the study period



EE = Energy Efficiency

Energy Efficiency Program Modeling: How Does Strategist Evaluate Alternatives?

- The screening model's primary objective: minimize customer costs
- Selected portfolio must meet future customer requirements for:
 - Resource adequacy (or capacity)
 - Energy
- Supply and demand side options evaluated on a comparable basis



Energy Efficiency Program Evaluation: How Does Strategist Select?

- Factors contributing to preference for energy efficiency programs:
 - Existing generation avoided energy cost
 - Long term cost of carbon
 - Ability to contribute to resource adequacy requirements

Questions?