PENNSYLVANIA ENERGY EFFICIENCY AND PEAK DEMAND REDUCTION MARKET POTENTIAL STUDY REPORT

Prepared for Pennsylvania Public Utility Commission

January 29, 2025

NV5

brightline GROUP

PRESENTATION OUTLINE

- Study Overview
- Traditional Energy Efficiency Methods and Results (i.e., no DG)
- Combined Heat and Power Methods and Results
- Solar PV Methods and Results
- Act 129 EE Potential Results
- Sensitivity Analysis of Possible Impacts of External Funding
- Phase V Planning Timeline

ENERGY EFFICIENCY AND PEAK DEMAND REDUCTION POTENTIAL STUDY OVERVIEW

ENERGY EFFICIENCY AND PEAK DEMAND REDUCTION MARKET POTENTIAL STUDY (EEPDR MPS) OVERVIEW

PURPOSE OF THE STUDY

- Determine the cost-effective, achievable electric energy efficiency (EE) and associated coincident peak demand reduction potential for the four electric distribution companies (EDCs) subject to Act 129.
- Inform the Commission's plans for a potential Phase V of Act 129 programs.

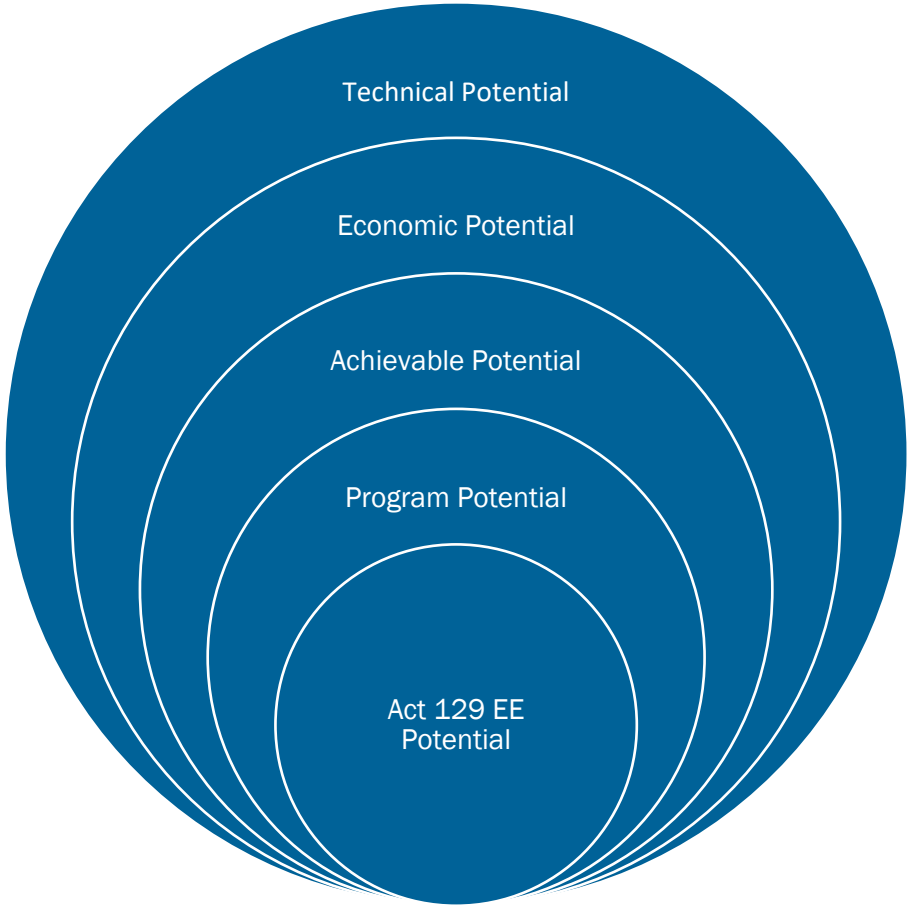
GOALS

- Determine if Phase V of Act 129 is cost-effective by utilizing the results of the EEPDR MPS.
- Inform possible performance targets for the EDCs and direct additional cost-effective programming.

SCOPE

- Include estimates of potential from traditional electric energy efficiency measures, combined heat and power (CHP), and solar photovoltaic (PV).
- Consider opportunities in the residential, commercial, and industrial sectors.
- Model a comprehensive mix of measures rather than a mix that represents past programs.

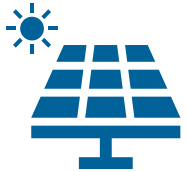
MODELED POTENTIAL SCENARIOS



- This study defined **Technical Potential**, **Economic Potential** and **Achievable Potential** according to industry standard definitions.
- **Program Potential** assumes incentive levels cover 50 percent of incremental costs (100 for low-income participants).
- ***Act 129 EE Potential*** assumes acquisition costs from the Program Potential and *constrains total budgets* such that the exact nominal dollar budget amounts established by Act 129 are met. Assumes budget allocations for traditional EE, CHP, and PV.

PROGRAM POTENTIAL VERSUS ACT 129 EE POTENTIAL

- The **Act 129 EE Potential** is the primary output of the EEPDR MPS.
- **Traditional EE measures, CHP, and PV** potential were blended to develop Act 129 EE Potential assuming budget allocations of 94%, 1%, and 5%, respectively.
- Modeled acquisition costs from the **Program Potential** scenario were combined with Act 129 budget caps to estimate **Act 129 EE Potential.**
  - Modeling Act 129 EE Potential assumes 13.3% of Act 129 budgets are spent on the low-income sector, consistent with Phase IV spending through PY15.

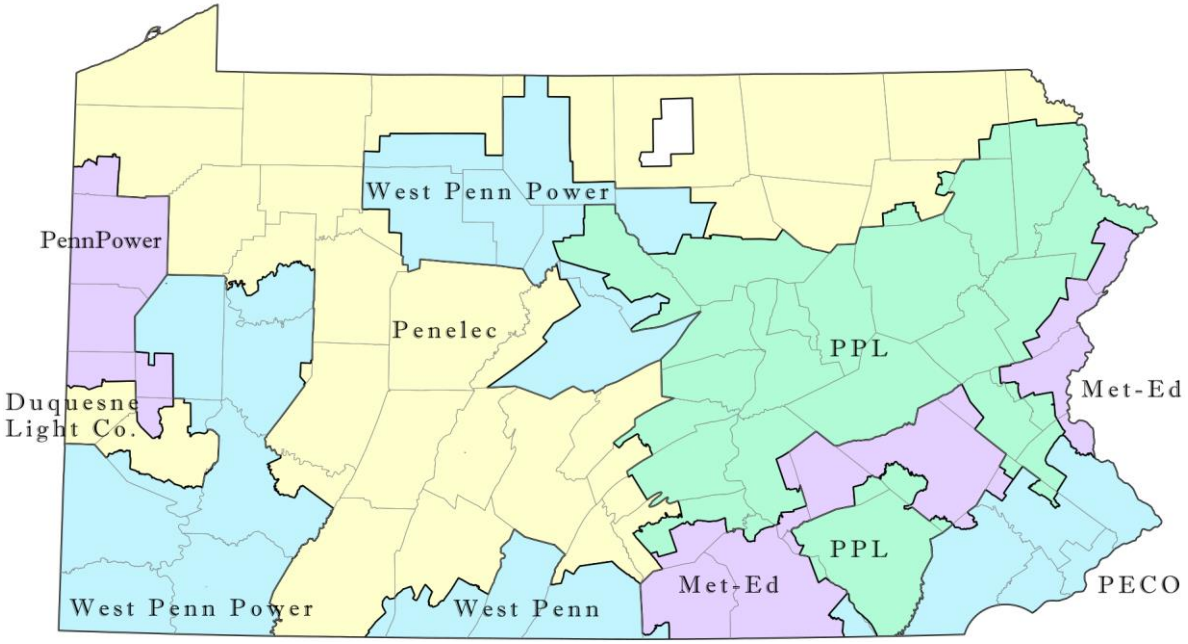
94% Budget  Trad. EE + 1% Budget  CHP + 5% Budget  PV = Act 129 EE Potential = 3,626.6 GWh of energy savings

TRADITIONAL ENERGY EFFICIENCY METHODS

ANALYSIS REGIONS

FOUR ACT 129 EDCS

- EDC specific analysis for each territory, e.g.:
  - Climate
  - Avoided Costs
  - Sales Disaggregation
  - Sales Forecast
- Study *results* reflect the consolidation of the four legacy FirstEnergy EDCs (Met-Ed, Penelec, Penn Power, and West Penn Power) into a single "FirstEnergy" EDC.
- Due to the timing of the consolidation/Commission approval, the EEPDR MPS analysis was conducted separately for the four legacy FirstEnergy EDCs using separate inputs reflecting the underlying technical and economic research.



COMBINED TOP-DOWN/BOTTOM-UP APPROACH

- **Top-down approach** used in all market sectors. Summary of major steps is as follows:
  - Develop energy sales forecast for each EDC
  - Disaggregate by new and existing construction, then into separate loads for each building type or market segment, and finally into each major end-use within each building type
  - Estimate the percentage of the disaggregated end-use energy applicable to the installation of a given efficiency measure
  - Apply actual measure level savings
- This approach **merged the top-down estimates of applicable energy use to individual bottom-up measure-level estimates** of incremental costs, savings, lifetimes, and other measure-level parameters.

BASELINE SALES FORECAST AND DISAGGREGATION SOURCES

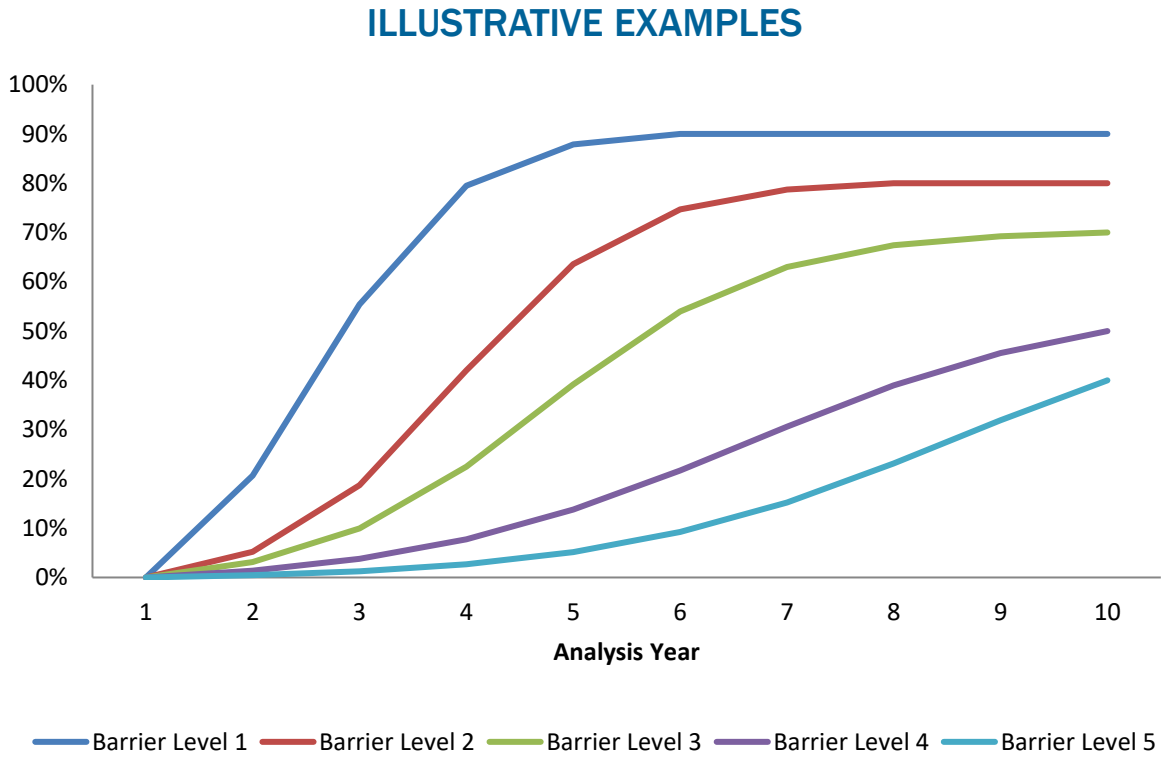
Dimension	Description	Primary Data Source(s) and Notes
Sales Forecast	Forecasted energy sales by EDC, sector, and year	• EDCs' response to SWE data request. • Extrapolated future years from annual growth rate for the initial forecast period. • Adjusted for embedded existing efficiency program savings.
Building Vintage	New Construction or Existing Buildings	• US Census, EIA Annual Energy Outlook 2023
Building Segment	Primary building use and/or subsegment (e.g., residential low-income)	• 2023 Pennsylvania Statewide Act 129 Residential Baseline Study • 2023 Pennsylvania Act 129 Non-Residential Baseline Study • American Community Survey (US Census)
End-Use	Primary energy end-use for a given building segment (e.g., lighting, space heating)	• 2023 Pennsylvania Statewide Act 129 Residential Baseline Study • 2023 Pennsylvania Act 129 Non-Residential Baseline Study • EIA's 2020 Residential Energy Consumption Survey, 2018 Commercial Building Energy Consumption Survey, and 2018 Manufacturing Energy Consumption Survey • NREL ResStock

MEASURE CHARACTERIZATION SOURCES

Measure Parameter	Units	Primary Data Source(s) and Notes
Measure Lifetime	Years	• Adopted measures from 2026 TRM or • Other available resources and recent studies in nearby jurisdictions • Capped at 15 years
Measure Savings (Savings Fraction)	Percentage	• Estimated energy use of baseline and high-efficiency measures consistent with 2026 TRM, where applicable, or • Estimated via recent studies from nearby jurisdictions, nearby TRMs, and other data sources
Measure Costs	$/First Year kWh Saved	• 2026 Incremental Measure Cost Database, where applicable, or • Estimated with secondary research and alternative sources (e.g., regional potential studies and TRMs; R.S. Means Cost Data; incremental cost studies)

ADOPTION CURVES (PENETRATIONS)

- **Economic Potential** generally assumes 100% measure adoption in all years for cost-effectives measures.
- **Achievable Potential** assumes typical measure adoption "S-curves" (from market adoption literature and EE program experience).
  - These curves illustrate the maximum adoption assumptions at 100% cost coverage and full customer awareness, resulting from unconstrained and aggressive marketing campaigns (informed by PA willingness-to-pay research).
  - Curve shape dependent on the level of barriers assumed for each measure.
  - Early-on penetration is typically low because one mostly captures the early adopters—people who are particularly open and aware of new products and ideas. It then reaches rapid growth, where overall awareness and interest increases, and more mass-market adoption can be captured.
- **Program Potential** adoption assumes a fraction of the Achievable Potential adoption is achieved based on participant economics with incentives covering less than 100% of measure incremental costs for non-low-income markets.



EQUATION FOR DERIVING MEASURE SAVINGS

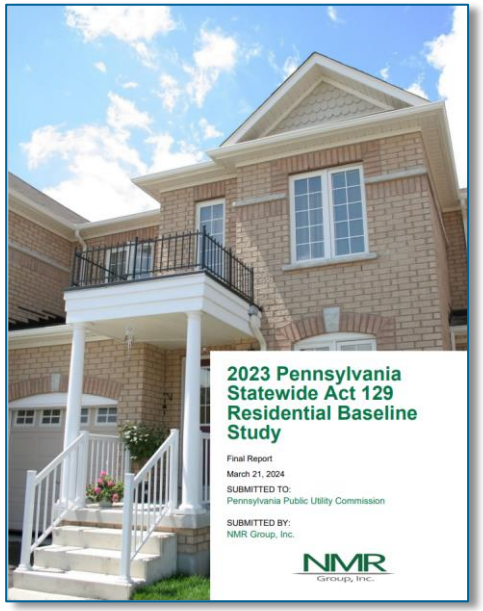
Measure savings	=	Segment / end-use / year kWh sales	x	Applicability factor	x	Feasibility factor	x	Turnover factor (replace-ment only)	x	Not-complete factor (retrofit only)	x	Savings fraction	x	Penetration rate

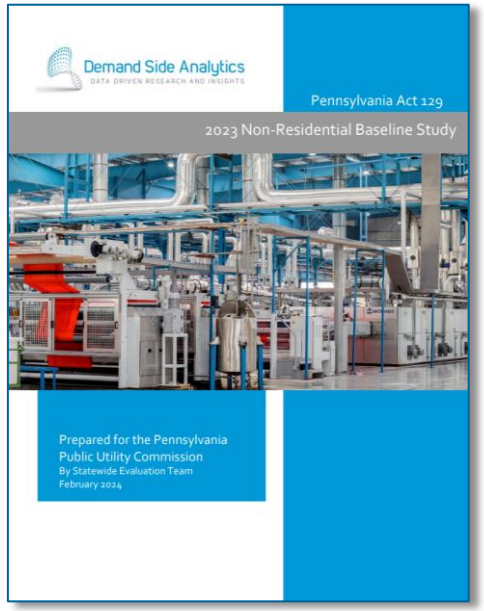
Applicability is the fraction of the end-use electric load for each building segment and year attributable to a particular end-use load to which an efficiency measure can be applied.

Feasibility is the fraction of applicable end-use sales for which it is technically feasible to apply an efficiency measure.

Turnover is the percentage of existing equipment that will be naturally replaced each year, due to failure, remodeling, or renovation.

Not-complete is the percentage of existing equipment that does not already represent the high-efficiency option.





NON-INCENTIVE PROGRAM COSTS AND COST-EFFECTIVENESS SCREENING

NON-INCENTIVE PROGRAM COSTS

- The **Achievable Potential, Program Potential, and Act 129 EE Potential** include estimates of non-measure program costs to estimate program budgets.
- Non-incentive program costs as percentages of measure costs (incentives) were primarily informed by the actual Phase IV program spending by the EDCs.

COST-EFFECTIVENESS SCREENING

- Cost-effectiveness uses Total Resource Cost (TRC) Test consistent with 2026 TRC Test Final Order.
- Electric, gas, and other relevant avoided costs were specific to each EDC and were developed using the 2026 TRC Test Final Order's Avoided Cost Calculator.
- **Measures not meeting a 1.0 TRC Benefit-Cost-Ratio (BCR) were excluded** from the potential in the Economic Potential and subsequent scenarios.

SPECIAL CONSIDERATIONS FOR NON-RESIDENTIAL LIGHTING

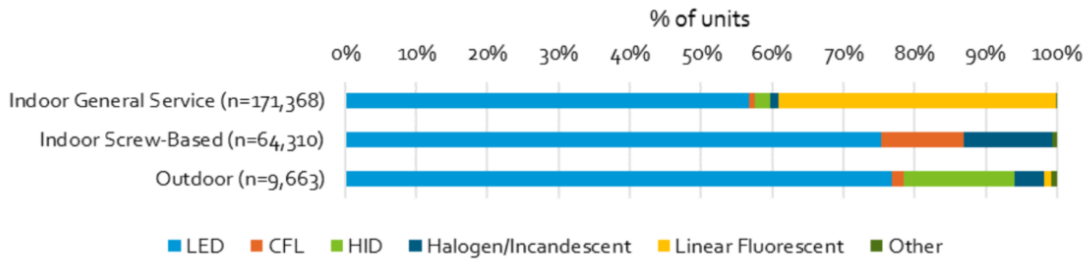
SUMMARY OF THE ISSUE

- Historically, C&I lighting has been a high contributor of savings in most EE portfolios. EDC reported data show that in PY14 and PY15, C&I lighting savings accounted for nearly **50 percent** of total portfolio savings (**68 percent of C&I savings**).
- The 2023 Pennsylvania Act 129 Non-Residential Baseline Study found that LED lighting saturations are already high and increasing quickly. By count, LED technologies represent **60 percent of commercial lighting statewide and 40 percent of total installed wattage**.
- For mid-stream lighting programs, there is increasing risk that LEDs will begin replacing LEDs, particularly as early LED linear replacement lamps (or TLEDs) begin to fail.

TREATMENT IN THE EEPDR MPS

- Assumed that **opportunities** for both market-driven (such as mid-stream) and retrofit measures **are limited to the projected stock of baseline lighting equipment and once converted to LEDs will no longer represent a future opportunity.**
- To estimate the LED lighting saturation in 2026, data from the 2018 and 2023 Non-Residential Baseline studies was used to establish a linear trend.

Figure 43: Lighting Technology by Application (Counts)



TRADITIONAL ENERGY EFFICIENCY RESULTS

TRADITIONAL ENERGY EFFICIENCY RESULTS SUMMARY

Traditional EE Potential Benefits and Costs by EDC and Scenario, 2026-2030 Total (Real 2026 Dollars)

EDC	Economic Potential			Achievable Potential			Program Potential		
	Costs ($MM)	Benefits ($MM)	TRC benefit-cost ratio (X:1)	Costs ($MM)	Benefits ($MM)	TRC benefit-cost ratio (X:1)	Costs ($MM)	Benefits ($MM)	TRC benefit-cost ratio (X:1)
PECO	$1,914.3	$4,465.9	2.33	$1,200.7	$1,907.0	1.59	$793.5	$1,355.6	1.71
PPL	$2,392.5	$6,014.4	2.51	$1,397.1	$2,476.1	1.77	$902.9	$1,694.1	1.88
Duquesne Light	$564.8	$1,531.3	2.71	$335.4	$625.3	1.86	$229.6	$452.6	1.97
FirstEnergy	$2,697.4	$6,483.6	2.40	$1,532.7	$2,626.9	1.71	$954.4	$1,762.9	1.85
Statewide	**$7,569.0**	**$18,495.1**	**2.44**	**$4,465.9**	**$7,635.3**	**1.71**	**$2,880.4**	**$5,265.2**	**1.83**

Note: Totals may not equal sum of column or row due to rounding

- Table presents key economic findings for the Economic, Achievable, and Program Potential of Traditional EE scenarios presenting the present value costs, benefits, and benefit-cost ratios (BCR).
- Note that these results reflect the economics based on a Total Resource Cost (TRC) test, and do not reflect program budgets nor the cost-effectiveness on the electric utility system alone.
- If the identified **Achievable Potential** were pursued, from a Total Resource Cost perspective, **each dollar invested in energy efficiency would yield $1.71 in benefits.**

TRADITIONAL ENERGY EFFICIENCY RESULTS SUMMARY

Act 129 Traditional EE Potential Summary, 2026-2030 Total (Real 2026 Dollars)

EDC	Acquisition Cost ($/MWh)	Budget ($MM)	TRC Costs ($MM)	TRC Benefits ($MM)	Net TRC Benefits ($MM)	TRC BCR (X:1)	Energy Savings (GWh)	Peak Reduction (MW)
PECO	$419.9	$427.4	$578.3	$987.9	$409.6	1.71	1,017.8	133
PPL	$404.8	$307.5	$456.0	$855.7	$399.7	1.88	759.6	101
Duquesne Light	$404.1	$97.7	$132.2	$260.6	$128.4	1.97	241.8	33
FirstEnergy	$382.5	$390.3	$536.3	$992.1	$455.8	1.85	1,020.4	132
Statewide	**$402.3**	**$1,222.9**	**$1,702.8**	**$3,096.3**	**$1,393.5**	**1.82**	**3,039.6**	**399**

Note(s): Budgets and acquisition costs are in nominal dollars. Benefits, costs, and net benefits are in real (2026) dollars. GWh and peak MW are the sum of first-year incremental annual savings from 2026 through 2030. Peak demand impacts are reported as the average of summer and winter peak MW reductions intentionally for ease of comparison to the Demand Response (DR) Market Potential Study (MPS).

- Values reflect assumption of a 100% Act 129 budget allocation for **Traditional EE**. CHP and Solar PV potential is only included in the blended Act 129 EE Potential.
- The estimated statewide acquisition costs for **Traditional EE** are $402/MWh ($3,064/kW-year).
- Full capture of the Traditional EE Potential would result in **3,039.6 GWh** of total incremental annual energy savings and **399 MW** of peak demand reduction for 2026-2030.
- If the identified **Traditional EE Potential** were pursued, from a Total Resource Cost perspective, **each dollar invested in energy efficiency would yield $1.82 in benefits.**

TRADITIONAL ENERGY EFFICIENCY RESULTS SUMMARY

Act 129 Traditional EE Potential GWh Savings by EDC and Year

EDC	2026 (GWh)	2027 (GWh)	2028 (GWh)	2029 (GWh)	2030 (GWh)	Total (GWh)
PECO	203.6	203.6	203.6	203.6	203.6	**1,017.8**
PPL	151.9	151.9	151.9	151.9	151.9	**759.6**
Duquesne Light	48.4	48.4	48.4	48.4	48.4	**241.8**
FirstEnergy	204.1	204.1	204.1	204.1	204.1	**1,020.4**
Statewide	**607.9**	**607.9**	**607.9**	**607.9**	**607.9**	**3,039.6**
% of 2009/2010 load forecast	**0.41%**	**0.41%**	**0.41%**	**0.41%**	**0.41%**	**2.07%**

Note: Totals may not equal sum of column or row due to rounding

- This table presents the potential for **Traditional EE** energy savings as a percent of 2009/2010 load, assuming that savings are captured evenly across Phase V.
- This results in **annual savings of 0.41%** relative to the 2009/2010 load forecast.
- Again, values reflect assumption of a 100% Act 129 budget allocation for Traditional EE. CHP and Solar PV potential is only included in the blended Act 129 EE Potential

TRADITIONAL ENERGY EFFICIENCY RESULTS SUMMARY

Act 129 Traditional EE Potential MW Peak Demand Reduction by EDC and Year

EDC	2026 (MW)	2027 (MW)	2028 (MW)	2029 (MW)	2030 (MW)	Total (MW)
PECO	27	27	27	27	27	133
PPL	20	20	20	20	20	101
Duquesne Light	7	7	7	7	7	33
FirstEnergy	26	26	26	26	26	132
Statewide	**80**	**80**	**80**	**80**	**80**	**399**
% of 2007/2008 load	**0.30%**	**0.30%**	**0.30%**	**0.30%**	**0.30%**	**1.50%**

Note(s): Totals may not equal sum of column or row due to rounding
Peak demand impacts are reported as the average of summer and winter peak MW reductions intentionally for ease of comparison to the DR MPS.

- This table presents the potential for **Traditional EE** coincident peak demand savings, in MW and as a percent of 2007/2008 peak demand, again under the assumption that coincident peak savings are captured evenly across Phase V.
- This results in a **0.28% peak demand reduction** each year relative to 2007/2008 peak load levels.
- Note that peak MW reduction per modeled GWh saved is lower relative to the findings of the previous, Phase IV EEPDR MPS—an outcome driven by an evolving measure mix, updated demand reduction factors in the TRM, and a change of established convention to present demand impacts as the average of summer and winter peak coincident reductions.
- Again, values reflect assumption of a 100% Act 129 budget allocation for Traditional EE. CHP and Solar PV potential is only included in the blended Act 129 EE Potential.

TRADITIONAL ENERGY EFFICIENCY RESULTS SUMMARY

Phase IV & Phase V – Modeled Act 129 Traditional EE Potential Acquisition Costs

EDC	Phase IV - EE Program Potential Acquisition Cost ($/MWh)	Phase IV - Inflated EE Program Potential Acquisition Cost ($/MWh)	Phase V Act 129 Traditional EE Potential Acquisition Cost ($/MWh)
PECO	$319.7	$383.3	$419.9
PPL	$251.9	$301.9	$404.8
Duquesne Light	$289.7	$347.3	$404.1
FirstEnergy	$260.8	$312.6	$382.5
Statewide	**$278.4**	**$333.8**	**$402.3**

Note(s): The Phase IV EEPDR MPS did not explicitly present the Traditional-EE Potential acquisition costs (i.e., the acquisition costs without the impacts of CHP). To provide an appropriate comparison, the Program Potential acquisition costs from the previous study are presented here as they are equivalent to the Traditional EE Potential costs had they been reported separately.

- Table presents the modeled acquisition costs for **Traditional EE** from the respective Phase IV and Phase V EEPDR Potential Studies.
- **When Phase IV costs are adjusted for inflation** assuming the CPI-derived estimates of inflation and a fixed 2% for July 1, 2024, and beyond, **Phase V costs are only 1.20x the values for the previous phase**, whereas costs are 1.44x on a nominal basis.
- The remaining increases in acquisition costs are driven by the reduction in C&I lighting potential, the remaining C&I lighting opportunities becoming more expensive, and the inclusion of more, higher cost measures such as air-source ductless mini-split and central heat pumps.

RESIDENTIAL ENERGY EFFICIENCY PROGRAM POTENTIAL RESULTS

PROGRAM POTENTIAL RESIDENTIAL GWH SAVINGS AND TOTAL RESOURCE COSTS, BENEFITS, AND BCRS

EDC	2026 (GWh)	2027 (GWh)	2028 (GWh)	2029 (GWh)	2030 (GWh)	Total (GWh)
PECO	65.4	122.7	169.4	141.6	157.6	**656.6**
PPL	89.6	162.7	223.8	188.0	203.9	**868.0**
Duquesne Light	15.5	27.0	35.7	32.6	35.6	**146.4**
FirstEnergy	100.8	185.4	256.5	215.2	235.5	**993.4**
Statewide	**271.3**	**497.8**	**685.3**	**577.4**	**632.7**	**2,664.5**

Note: Totals may not equal sum of column or row due to rounding.

EDC	Costs ($MM)	Benefits ($MM)	Net Benefits ($MM)	Benefit Cost Ratio (X:1)
PECO	$388.4	$519.4	$131.0	1.34
PPL	$598.4	$931.7	$333.3	1.56
Duquesne Light	$83.0	$115.6	$32.6	1.39
FirstEnergy	$569.7	$809.2	$239.5	1.42
Statewide	**$1,639.4**	**$2,375.9**	**$736.4**	**1.45**

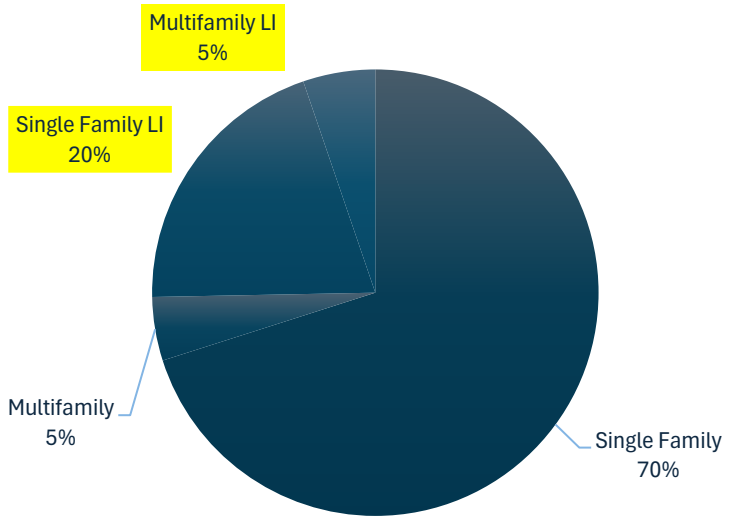
Note: Totals may not equal sum of column or row due to rounding. Values reflect 2026-2030 totals in real 2026 dollars.

- Key economic values associated with Program Potential residential savings. It is worth noting that the residential sector BCRs are consistently lower than the portfolio-level BCRs, indicating that these savings are less cost-effective from a Total Resource Cost perspective than average.
- This is due to the significant role heat pumps and heat pump water heaters have in the measures mix, in addition to their higher cost. This is also in part due to the influence of the low-income sector, and in part due to the loss of lighting in residential sectors.
- Low-cost home energy report driven savings serve to offset some of these factors in keeping acquisition costs lower. The addition of the benefit of avoided arrears in the low-income sector has also allowed for more, higher cost potential to screen as cost-effective.

PROGRAM POTENTIAL RESIDENTIAL GWH SAVINGS BY BUILDING TYPE, 2026-2030 TOTAL

Building Type	PECO	PPL	Duquesne Light	FirstEnergy	Statewide
Single Family	473.8	590.4	98.4	709.6	**1,872.2**
Multifamily	22.4	44.8	13.0	42.3	**122.6**
Single Family LI	133.7	181.8	21.7	193.8	**531.0**
Multifamily LI	26.8	51.0	13.3	47.7	**138.7**
Total	**656.6**	**868.0**	**146.4**	**993.4**	**2,664.5**

Note: Totals may not equal sum of column or row due to rounding.



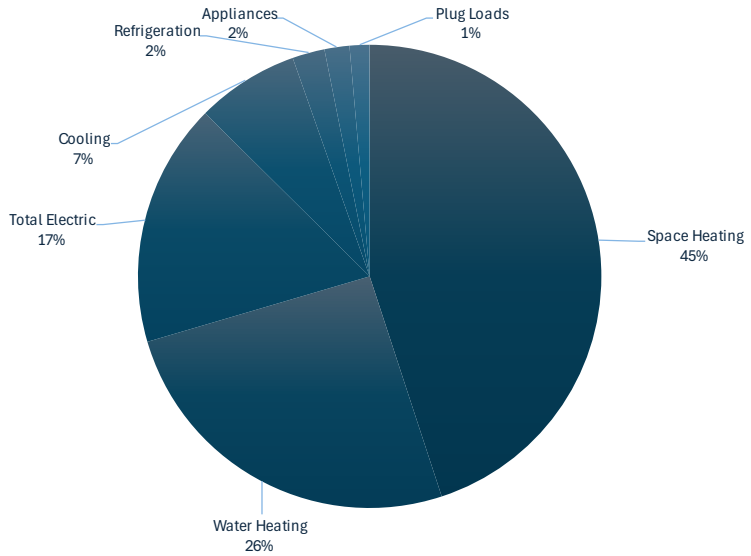
Note: Yellow-highlighted data in the chart above correspond to the low-income building types.

- Residential savings broken out among the four residential building types modeled in this study: single-family, multifamily, single-family low-income, and multifamily low-income. Note the “single family” and “multifamily” segments are not inclusive of low-income.
- Owing primarily to housing demographics, the SWE estimated higher potential in single-family building types than in multifamily.

PROGRAM POTENTIAL RESIDENTIAL GWH SAVINGS BY END-USE, 2026-2030 TOTAL

End-Use	PECO	PPL	Duquesne Light	FirstEnergy	Statewide
Appliances	15.1	10.1	5.3	15.3	**45.8**
Cooling	61.5	39.2	28.8	59.6	**189.0**
Exterior Lighting	0.0	0.0	0.0	0.0	**0.0**
Interior Lighting	0.1	0.1	0.0	0.1	**0.4**
Plug Loads	12.3	7.9	4.0	12.1	**36.3**
Refrigeration	22.8	14.4	5.1	17.4	**59.7**
Space Heating	230.5	449.3	43.8	464.8	**1,188.4**
Water Heating	180.0	227.1	27.8	260.5	**695.4**
Total Electric	134.3	119.9	31.7	163.6	**449.6**
Total	**656.6**	**868.0**	**146.4**	**993.4**	**2,664.5**

Note: Totals may not equal sum of column or row due to rounding.



- **Space heating** is the largest end-use in the residential sector both in terms of EE potential and the underlying sales disaggregation.
- Space heating savings are driven by electric resistance heating to heat pump conversions, incremental improvements to air-source heat pumps systems, and air sealing. Water heating, driven primarily by heat pump water heaters, "total electric," driven home energy reports

PROGRAM POTENTIAL LOW-INCOME GWH SAVINGS BY EDC AND LI BUILDING TYPE

EDC	Single family low-income	Multifamily low-income	Low-income total	% of total residential savings
PECO	133.7	26.8	160.4	24.43%
PPL	181.8	51.0	232.8	26.82%
Duquesne Light	21.7	13.3	35.0	23.88%
FirstEnergy	193.8	47.7	241.5	24.31%
Statewide	**531.0**	**138.7**	**669.7**	**25.13%**

Note: Totals may not equal sum of column or row due to rounding.

- In the **Program Potential** scenario, low-income savings represent 25% of residential portfolio savings or 13% of the total portfolio savings.
- **Program Potential** estimates are not constrained by assumed Act 129 budget caps. When the assumed low-income budget carve-out is introduced in the Act 129 EE Potential scenario, LI potential, and the upward pressure high low-income acquisition costs place on the overall residential sector, is significantly reduced.
- Single-family savings opportunities are larger than multifamily when examining the low-income sector in isolation, a finding which is consistent with historical low-income programming in EE.

SMALL COMMERCIAL AND INDUSTRIAL (C&I) ENERGY EFFICIENCY PROGRAM POTENTIAL RESULTS

PROGRAM POTENTIAL SMALL C&I GWH SAVINGS AND TOTAL RESOURCE COSTS, BENEFITS, AND BCRS

EDC	2026 (GWh)	2027 (GWh)	2028 (GWh)	2029 (GWh)	2030 (GWh)	Total (GWh)
PECO	41.9	47.5	54.7	61.0	66.0	**271.1**
PPL	47.5	53.9	62.2	69.3	74.6	**307.5**
Duquesne Light	20.4	23.1	26.6	29.9	32.3	**132.4**
FirstEnergy	63.7	72.5	83.6	93.3	100.4	**413.5**
Statewide	**173.6**	**197.0**	**227.1**	**253.5**	**273.3**	**1,124.5**

Note: Totals may not equal sum of column or row due to rounding.

EDC	Costs ($MM)	Benefits ($MM)	Net benefits ($MM)	Benefit-cost ratio (X:1)
PECO	$129.0	$309.7	$180.8	2.40
PPL	$141.5	$388.8	$247.3	2.75
Duquesne Light	$70.1	$172.5	$102.4	2.46
FirstEnergy	$193.7	$503.1	$309.4	2.60
Statewide	**$534.2**	**$1,374.1**	**$839.9**	**2.57**

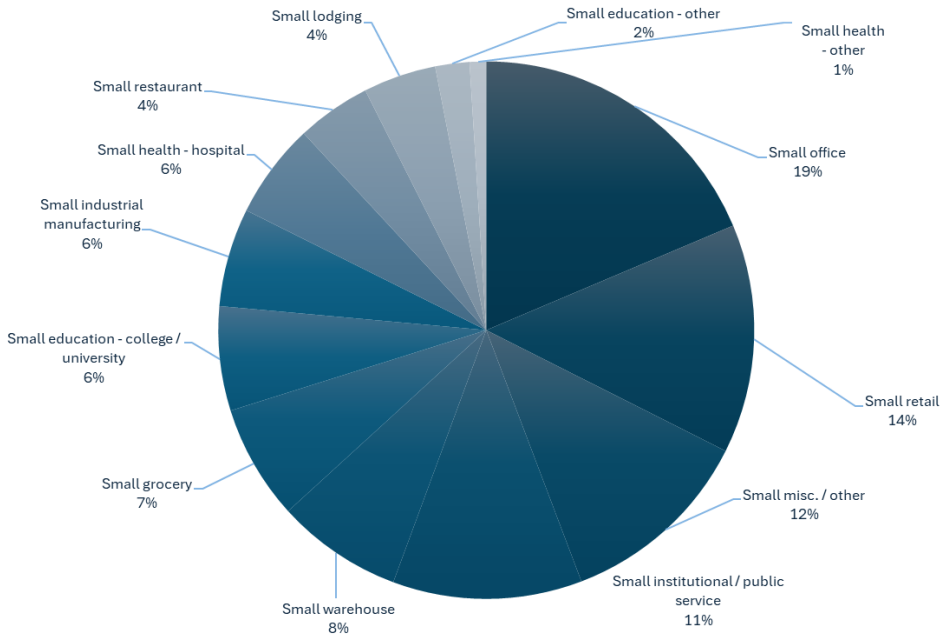
Note: Totals may not equal sum of column or row due to rounding. Values reflect 2026-2030 totals in real 2026 dollars.

- The **Program Potential** for the small C&I sector exhibits robust BCRs ranging from 2.40:1 to 2.75:1 across EDCs, resulting in a 2.57:1 sector-level statewide BCR.
- High cost-effectiveness relative to the overall portfolio primarily driven by the relatively low cost of C&I lighting measures.

PROGRAM POTENTIAL SMALL C&I GWH SAVINGS BY BUILDING TYPE, 2026-2030 TOTAL

Building type	PECO	PPL	Duquesne Light	FirstEnergy	Statewide
Small office	80.0	40.4	32.4	56.8	**209.6**
Small retail	31.9	42.7	16.0	64.4	**155.0**
Small education - college / university	16.6	19.0	9.9	25.0	**70.5**
Small education - other	5.6	6.1	3.3	8.2	**23.2**
Small grocery	13.5	27.6	6.3	30.4	**77.8**
Small health - hospital	13.2	21.5	6.6	23.0	**64.4**
Small health - other	2.3	3.7	1.1	4.0	**11.2**
Small industrial manufacturing	10.8	20.8	5.2	29.8	**66.6**
Small institutional / public service	28.2	30.5	20.2	49.5	**128.4**
Small lodging	6.7	15.2	3.4	24.1	**49.4**
Small misc. / other	30.6	35.5	14.1	52.5	**132.7**
Small restaurant	11.0	12.4	6.4	20.5	**50.3**
Small warehouse	20.7	32.0	7.5	25.3	**85.5**
Statewide	**271.1**	**307.5**	**132.4**	**413.5**	**1,124.5**

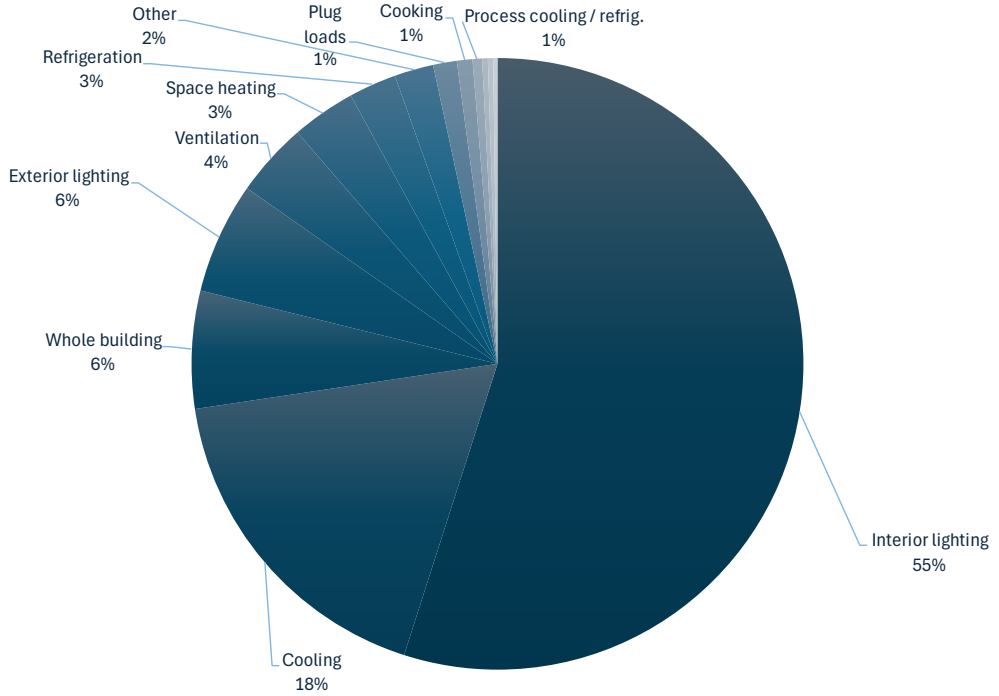
Note: Totals may not equal sum of column or row due to rounding.



- **The three building types with the highest potential are** small offices, small retail, and small miscellaneous.
- These values are highly correlated to the underlying sales disaggregation where small offices, small retail, and small miscellaneous make up three of the four highest consuming building types with 19%, 9.4%, and 9.4% of forecasted 2026 sales, respectively, on a statewide basis.

PROGRAM POTENTIAL SMALL C&I GWH SAVINGS BY END-USE, 2026-2030 TOTAL

End-use	PECO	PPL	Duquesne Light	FirstEnergy	Statewide
Cooling	50.2	49.4	27.1	72.3	**199.0**
Exterior lighting	15.8	18.5	7.6	24.1	**66.1**
Interior lighting	149.4	171.7	70.6	226.1	**617.8**
Other	5.6	6.4	2.6	8.7	**23.3**
Plug loads	4.0	3.5	1.8	4.7	**14.1**
Refrigeration	5.9	9.0	2.8	10.5	**28.3**
Space heating	8.3	10.3	4.3	15.1	**38.0**
Water heating	0.7	0.8	0.4	1.2	**3.1**
Whole building	16.6	19.4	8.2	25.7	**69.9**
Cooking	1.9	2.5	1.1	3.9	**9.3**
Ventilation	10.8	12.4	5.0	15.9	**44.1**
Process cooling / refrigeration	0.9	1.8	0.4	2.5	**5.7**
Process heating	0.4	0.8	0.2	1.1	**2.6**
Compressed air systems	0.5	1.1	0.3	1.5	**3.4**
Statewide	**271.1**	**307.5**	**132.4**	**413.5**	**1,124.5**



Note: Totals may not equal sum of column or row due to rounding.

- Consistent with current EDC programs, **interior lighting** potential dominates the small C&I savings portfolio driven by LED fixture retrofits, LED linear replacements, and LED high-bay lighting opportunities.
  - Opportunities for both market-driven and retrofit measures are limited to the projected stock of baseline lighting equipment
- This is followed by **cooling**, driven by controls and unitary HVAC replacement opportunities.
- Note that the "**whole building**" end-use captures opportunities that cannot easily be disaggregated into individual end-uses such as retro-commissioning, deep energy retrofits, and integrated building design in the new construction market.

LARGE COMMERCIAL AND INDUSTRIAL (C&I) ENERGY EFFICIENCY PROGRAM POTENTIAL RESULTS

PROGRAM POTENTIAL LARGE C&I GWH SAVINGS AND TOTAL RESOURCE COSTS, BENEFITS, AND BCRS

EDC	2026 (GWh)	2027 (GWh)	2028 (GWh)	2029 (GWh)	2030 (GWh)	Total (GWh)
PECO	73.4	82.4	94.2	105.1	113.8	**468.9**
PPL	47.9	55.5	65.8	75.6	83.6	**328.4**
Duquesne Light	21.5	24.4	28.2	32.0	35.0	**141.2**
FirstEnergy	58.2	68.4	82.2	95.7	106.8	**411.4**
Statewide	**201.1**	**230.7**	**270.5**	**308.4**	**339.2**	**1,349.8**

Note: Totals may not equal sum of column or row due to rounding.

EDC	Costs ($MM)	Benefits ($MM)	Net benefits ($MM)	Benefit-cost ratio (X:1)
PECO	$276.2	$526.5	$250.4	1.91
PPL	$163.0	$373.6	$210.7	2.29
Duquesne Light	$76.5	$164.5	$88.0	2.15
FirstEnergy	$191.1	$450.6	$259.5	2.36
Statewide	**$706.7**	**$1,515.2**	**$808.5**	**2.14**

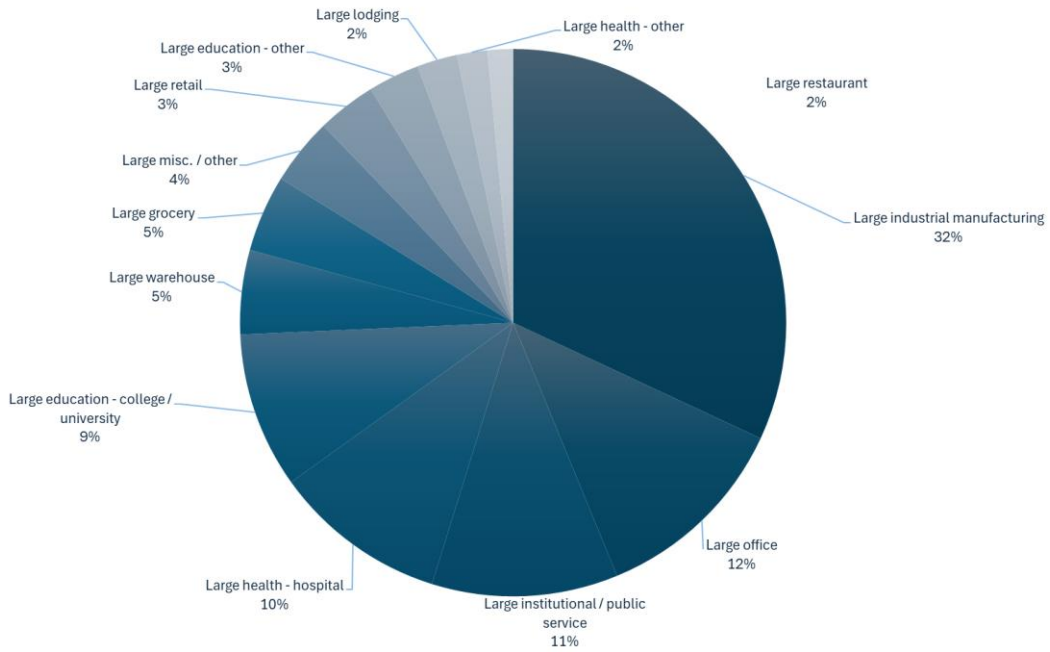
Note: Totals may not equal sum of column or row due to rounding. Values reflect 2026-2030 totals in real 2026 dollars.

- Similar to the small C&I sector, the **Program Potential** for the large C&I sector exhibits robust BCRs ranging from 1.91:1 to 2.36:1 across EDCs, resulting in a 2.14:1 sector-level statewide BCR.
- High cost-effectiveness relative to the overall portfolio primarily driven by the relatively low cost of C&I lighting measures.
- Lower cost-effectiveness relative to the small C&I sector driven by assumed higher non-incentive program costs and prevalence of higher cost industrial measures.

PROGRAM POTENTIAL LARGE C&I GWH SAVINGS BY BUILDING TYPE, 2026-2030 TOTAL

Building Type	PECO	PPL	Duquesne Light	FirstEnergy	Statewide
Large office	95.1	23.0	19.3	22.4	**159.7**
Large retail	19.6	13.5	6.1	7.9	**47.1**
Large education - college / university	55.6	18.2	18.7	31.9	**124.4**
Large education - other	18.5	5.9	6.2	10.4	**41.0**
Large grocery	23.0	12.7	6.1	19.5	**61.2**
Large health - hospital	52.4	33.1	23.6	30.0	**139.0**
Large health - other	9.3	5.7	4.1	5.2	**24.3**
Large industrial manufacturing	48.7	134.9	32.4	215.2	**431.3**
Large institutional / public service	72.9	28.3	15.3	32.2	**148.7**
Large lodging	13.0	11.0	2.4	5.6	**32.1**
Large misc. / other	26.2	15.3	3.2	8.7	**53.4**
Large restaurant	0.7	0.9	0.1	18.6	**20.3**
Large warehouse	34.0	25.7	3.6	3.9	**67.1**
Statewide	**468.9**	**328.4**	**141.2**	**411.4**	**1,349.8**

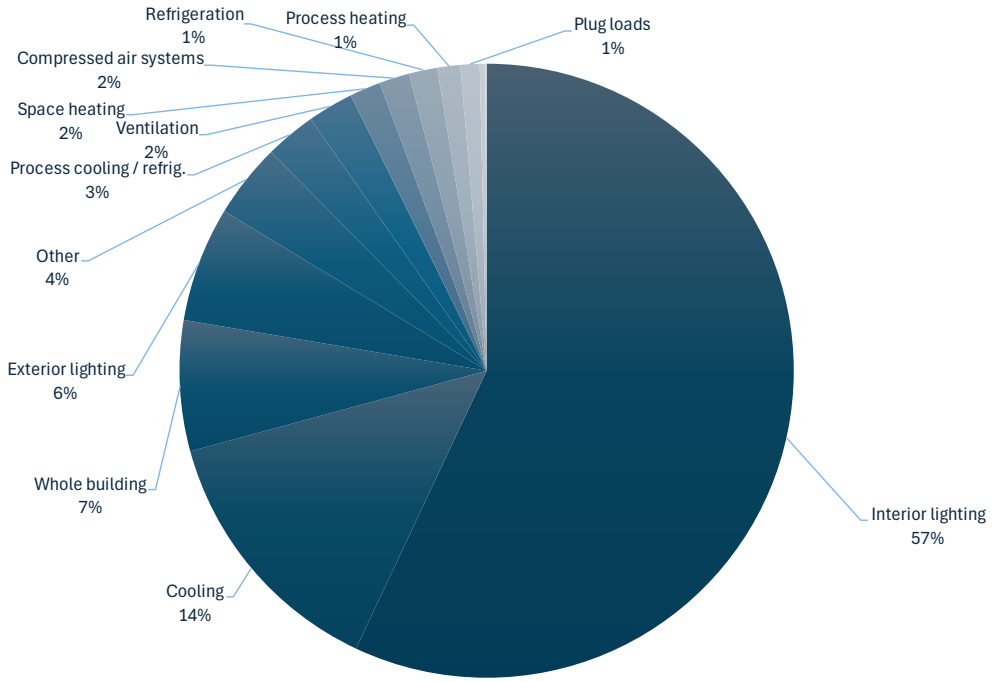
Note: Totals may not equal sum of column or row due to rounding.



- The three building types with highest potential are large industrial manufacturing, large office, and large institutional/public service.
- Large industrial manufacturing's prominence largely driven by sales disaggregation (58% of total estimated 2026 statewide GWh sales).

PROGRAM POTENTIAL LARGE C&I GWH SAVINGS BY END-USE, 2026-2030 TOTAL

End-Use	PECO	PPL	Duquesne Light	FirstEnergy	Statewide
Cooling	76.9	40.3	22.0	46.8	**186.1**
Exterior lighting	29.6	19.7	8.7	23.7	**81.8**
Interior lighting	272.5	186.4	80.3	230.1	**769.3**
Other	11.3	14.8	4.8	22.0	**52.9**
Plug loads	6.6	2.5	1.7	2.8	**13.6**
Refrigeration	8.0	4.9	1.8	5.4	**20.2**
Space heating	9.8	5.2	2.4	4.6	**22.0**
Water heating	0.4	0.2	0.1	0.2	**0.8**
Whole building	28.7	23.0	9.9	31.2	**92.7**
Cooking	1.7	0.9	0.4	1.0	**4.0**
Ventilation	14.9	7.3	3.5	7.0	**32.6**
Process cooling / refrigeration	4.1	11.3	2.7	17.9	**36.0**
Process heating	1.8	5.1	1.2	8.1	**16.2**
Compressed air systems	2.4	6.7	1.6	10.7	**21.4**
Statewide	**468.9**	**328.4**	**141.2**	**411.4**	**1349.8**



Note: Totals may not equal sum of column or row due to rounding.

- As with the small C&I sector, interior lighting potential dominates the large C&I savings portfolio driven by LED fixture retrofits, LED linear replacements, and LED high-bay lighting opportunities.
  - Opportunities for both market-driven and retrofit measures are limited to the projected stock of baseline lighting equipment
- Cooling is the end-use with the second highest potential, driven by controls and unitary HVAC replacement opportunities.
- Whole building opportunities such as strategic energy management, retro-commissioning, deep energy retrofits, and integrated building design in the new construction market represent the third largest end-use category.

COMBINED HEAT AND POWER METHODS AND RESULTS

CHP METHODS AND PHASE IV RESULTS

- Based on guidance from TUS and Commission staff, the SWE did not develop an updated CHP potential for this study phase in a similar manner to Phase IV.
  - The Phase V potential was determined by using the average actual acquisition cost of all projects completed in Phase IV through Nov. 2024, combined with an estimated annual budget allocation for each EDC, to determine the Act 129 CHP Potential for Phase V.
- During Phase IV, the EDCs rebated seven CHP projects from PY 13–PY16 to-date, resulting in approximately;
  - **138,673 MWh and 19 MW in total first-year savings.**
  - **$4.54 million in rebates provided.**
- The Achievable CHP Potential results from the previous, Phase IV EEPDR MPS significantly exceed the rate of actual CHP project development in the state for Phase IV.

Phase IV Annualized Potential and Actual Annualized Phase IV Savings to Date

EDC	Phase IV Achievable Potential (Estimated) Annualized Over 4 Years		Phase IV Potential To Date (Actuals) Annualized Over 3.5 Years	
	MWh	MW	MWh	MW
PECO	44,218	6	15,489	2
PPL	62,237	8	4,159	0
Duquesne Light	5,714	1	N/A	N/A
FirstEnergy	67,794	9	19,973	3
Statewide	**179,962**	**23**	**39,621**	**6**

Note: Totals may not equal sum of column or row due to rounding.

PHASE V ACT 129 CHP POTENTIAL BUDGET ALLOCATION AND SAVINGS

Phase V Budget and Savings Potential Allocation by EDC

EDC	Assumed Phase V CHP Budget ($MM)	Annual CHP Budget ($MM)	Incremental Annual Savings (MWh)	Incremental Annual Peak Demand Savings (MW)
PECO	$4.27	$0.85	26,607	4
PPL	$3.08	$0.62	19,144	3
Duquesne Light	$0.98	$0.20	6,084	1
FirstEnergy	$3.90	$0.78	24,300	3
Statewide	**$12.23**	**$2.45**	**76,136**	**11**

Note: Totals may not equal sum of column or row due to rounding.

To estimate the Phase V Act 129 CHP potential, an effective acquisition cost of approximately $0.032/kWh saved was assumed based on data from the seven CHP projects completed for Phase IV through November 2024.

Using this acquisition cost and a total estimated budget of $2,445,900 annually, (1% of Act 129 annual budget), established in consultation with TUS and Commission staff, the total five-year Act 129 CHP Potential incremental energy savings potential was estimated.

PHASE V ACT 129 CHP POTENTIAL GWH SAVINGS AND MW PEAK DEMAND REDUCTION BY EDC AND YEAR

EDC GWh Savings Potential (GWh) by Year

EDC	2026 (GWh)	2027 (GWh)	2028 (GWh)	2029 (GWh)	2030 (GWh)	Total (GWh)
PECO	26.6	26.6	26.6	26.6	26.6	133.0
PPL	19.1	19.1	19.1	19.1	19.1	95.7
Duquesne Light	6.1	6.1	6.1	6.1	6.1	30.4
FirstEnergy	24.3	24.3	24.3	24.3	24.3	121.5
Statewide	76.1	76.1	76.1	76.1	76.1	380.7
% of 2009/2010 Load Forecast	0.05%	0.05%	0.05%	0.05%	0.05%	0.26%

EDC Peak Demand Reduction (MW) by Year

EDC	2026 (MW)	2027 (MW)	2028 (MW)	2029 (MW)	2030 (MW)	Total (MW)
PECO	4	4	4	4	4	19
PPL	3	3	3	3	3	13
Duquesne Light	1	1	1	1	1	4
FirstEnergy	3	3	3	3	3	17
Statewide	11	11	11	11	11	53
% of 2007/2008 Load	0.04%	0.04%	0.04%	0.04%	0.04%	0.20%

Note: Totals may not equal sum of column or row due to rounding.

- Significant savings potential exists for CHP installations in Pennsylvania, however, given the technical complexities in development and project execution, the estimated annual potential will likely vary due to the “irregular“ nature of these projects in application.
- For program participation estimates, CHP projects would generally be eligible for custom rebates at higher $/kWh levels. However, most of the projects would be limited to project level incentive caps (generally $500,000 in Phase IV EDC programs) due to the high upfront costs, effectively making the acquisition costs very low on average.

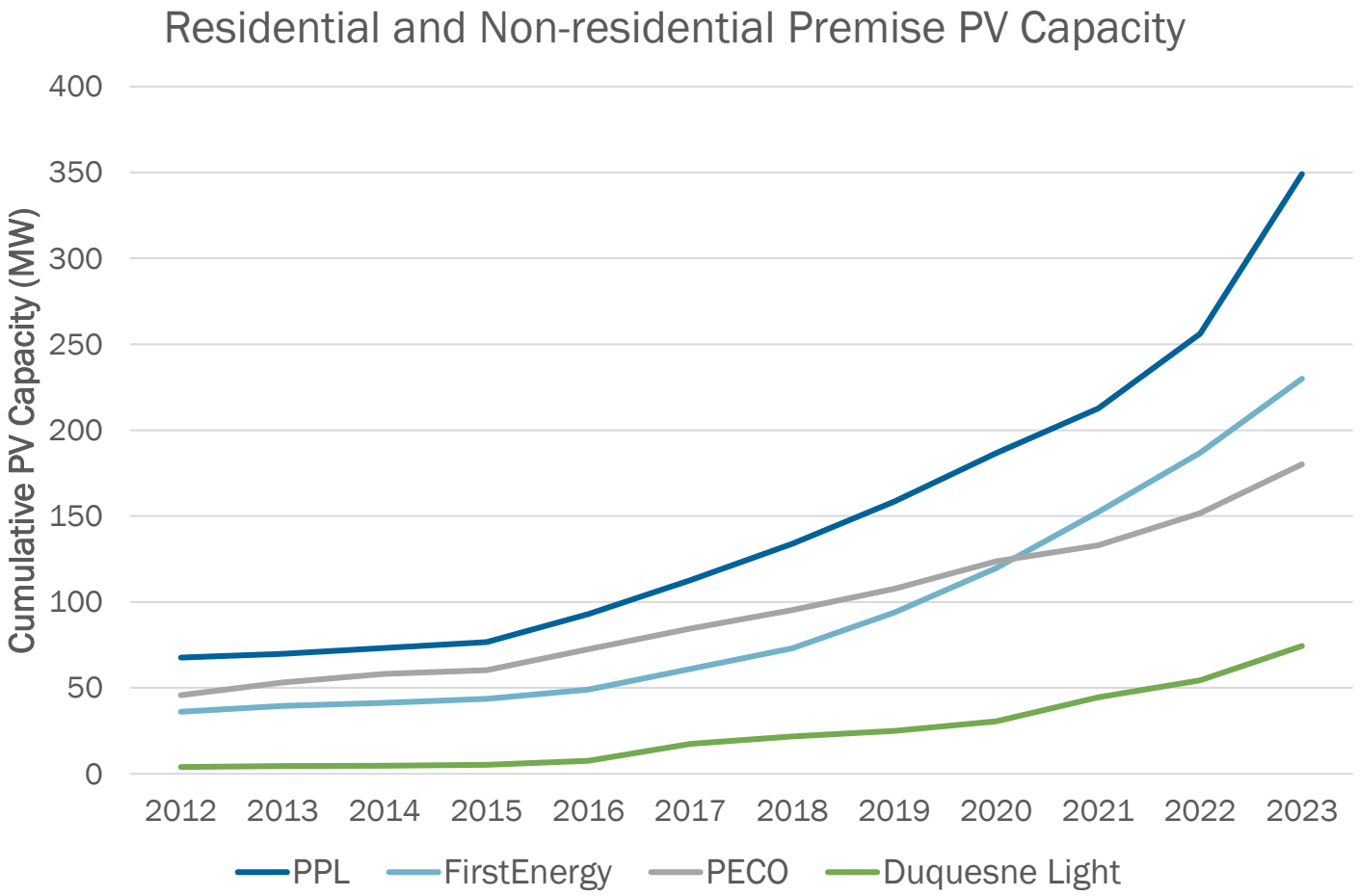
SOLAR PV METHODS AND RESULTS

SOLAR PHOTOVOLTAIC IN ACT 129 BACKGROUND

SOLAR PHOTOVOLTAIC (PV) PROJECTS ARE INCREASING IN PENNSYLVANIA

- In the second half of Phase IV, there is a notable increase in the number of participating and planned PV projects in Act 129.
  - Solar projects have not been excluded from Act 129, but historically they have been an insignificant share of reported program savings.
  - Customers without kWh load offset by solar are not eligible for Act 129 incentives.
  - Grid scale projects are not allowed.
- EDCs have added Solar specific non-residential and residential programs or delivery streams throughout the phase.
- Expectations are that solar projects may account for 7.5 – 10% of Phase IV total savings goal achievements.
- Solar technology measures were added to the Phase V TRM.

HISTORICAL PENNSYLVANIA INSTALLATIONS



Source: PA Alternative Energy Portfolio Standards (AEPS) and EIA-861 reporting

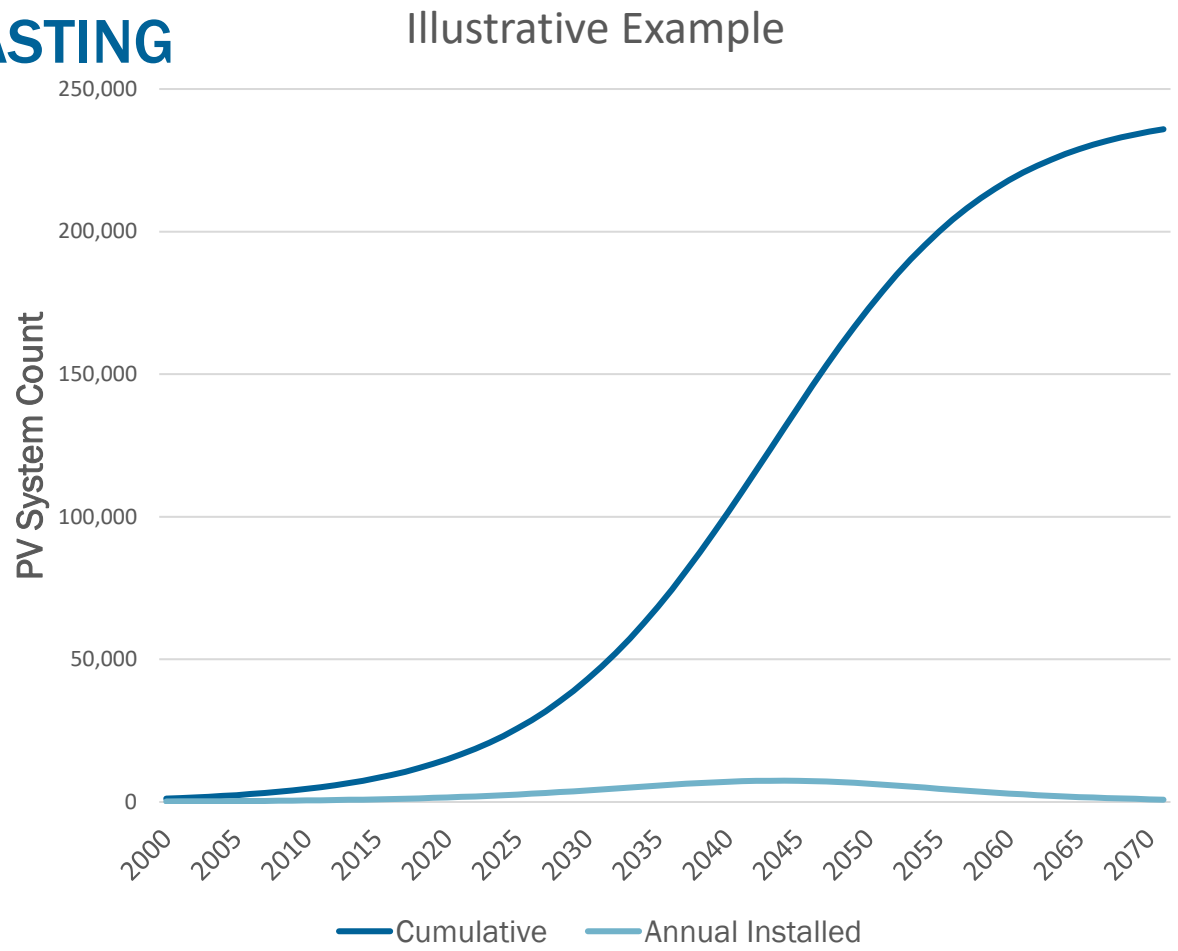
Does not include grid-connected systems

- Factors driving increasing customer adoption include:
  - Declining solar equipment costs
  - Maturing solar installation market
  - Federal tax credits
  - Pennsylvania net metering rules
  - AEPS Credits
  - EDC support
- PJM forecasts behind-the-meter solar systems will continue to grow, potentially doubling by the end of Phase V in Pennsylvania.

SOLAR PV POTENTIAL MODELING

BUSINESS AS USUAL (BAU) MARKET FORECASTING

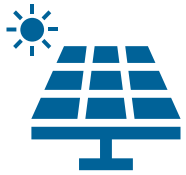
- How is the Pennsylvania Solar PV market expected to grow into Phase V?
- How will added EDC Act 129 incentives affect solar PV growth?
- SWE utilized a “S-curve”, Bass diffusion, new technology customer adoption model to forecast future solar systems installations.
  - A similar methodology to energy efficiency customer adoption modeling.



SOLAR PV DATA MODELING ASSUMPTIONS

DATA SOURCES

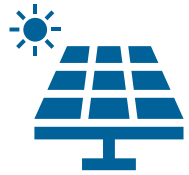
- Bass diffusion customer adoption models were adapted from NREL Solar Market Acceleration Studies.
  - Model parameters differ for residential and non-residential systems.
  - Customer willingness-to-participate surveys inform long-term adoption thresholds for different incentive inputs.
  - Adoption is based on customer perspective of payback period and supporting cost reductions (e.g. incentives, tax credits, etc.).
- PA Alternative Energy Portfolio Standards (AEPS) and EIA-861 reporting inform historical progress on curves.
  - EDC specific PV count of installations and total capacity (MW) installed data by year.
  - Segmented by residential, commercial, and industrial facilities.
- Program costs are based on statewide average of current Phase IV structure.
  - Program administrative costs are EDC specific sector average.
  - Non-residential = $0.10/kWh first year generated.
  - Residential = $500/system.



SOLAR PV COST-EFFECTIVENESS

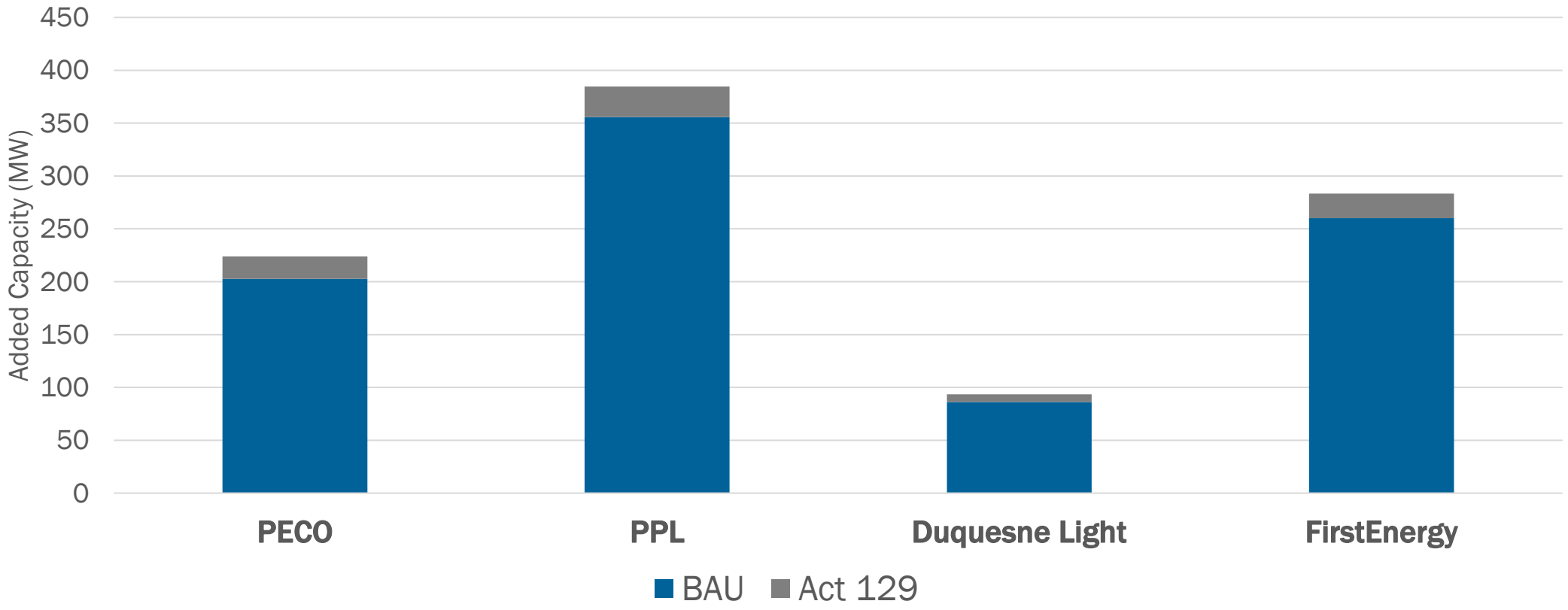
SOLAR PV IS MARGINALLY COST-EFFECTIVE

- Residential Systems
  - TRC cost test outcomes range from 0.75 to 1.0 using Phase V EDC avoided energy and capacity costs.
  - Likewise, simple payback may range from 7 to 10 years.
- Non-Residential Systems
  - TRC cost test outcomes from 0.95 to 1.25 using Phase V EDC avoided energy and capacity costs.
  - Simple payback may range from 4 to 6 years.
  - Larger systems benefit from lower costs from economies of scale.
- Caveat: System performance is greatly impacted by a number of site-specific factors including weather, orientation, shading, and type.



PHASE V ESTIMATED ADDED SOLAR CAPACITY

- Statewide total of almost 1,000 MW of Solar PV in 5 years.
- However, forecasts indicate a lift of approximately 7% from Act 129 incentives, as incentives are a relatively small share of payback



PHASE V SOLAR PV GENERATION AND PEAK DEMAND IMPACTS

- Benchmarks if all customer sited PV installations were claimed through Act 129 programs:
  - Phase V PV energy generated would be 27% of Phase IV energy goals.
  - Phase V PV demand generated would be 20% of Phase IV energy goals.
    - Phase V peak demand uses a 50% summer and 50% winter definition.

EDC	Ph V Generation (MWh)	Ph V Peak Demand Savings (MW)
PECO	291,846	36.7
PPL	479,947	63.9
Duquesne Light	111,624	15.6
First Energy	350,228	47.6
Statewide	**1,233,644**	**163.8**

SOLAR PV PHASE V BUDGETS

- Statewide Business as Usual Solar PV forecast, including Act 129 funds, finds that solar projects would represent:
  - $193.4 million dollars of program spending, which represents 16% of statewide Act 129 budget.
  - A statewide acquisition cost of $157.4/MWh.
  - A statewide acquisition cost of $1,194/kW.

EDC	PV Unconstrained Budget ($MM)	Acquisition Cost ($/MWh)	Acquisition Cost ($/kW)
PECO	$46.9	$160.8	$1,279
PPL	$74.1	$154.3	$1,159
Duquesne Light	$18.2	$162.9	$1,163
First Energy	$54.2	$154.5	$1,138
Statewide	**$193.4**	**$157.4**	**$1,194**

ACT 129 EE POTENTIAL RESULTS

ACT 129 EE POTENTIAL RESULTS

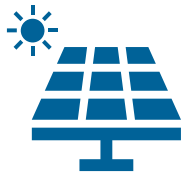
Act 129 EE Potential GWh Savings by EDC, Year and Component

EDC	2026 (GWh)	2027 (GWh)	2028 (GWh)	2029 (GWh)	2030 (GWh)	Total (GWh)
Traditional EE Potential (94% Budget Allocation)						
PECO	191.3	191.3	191.3	191.3	191.3	**956.7**
PPL	142.8	142.8	142.8	142.8	142.8	**714.0**
Duquesne Light	45.5	45.5	45.5	45.5	45.5	**227.3**
FirstEnergy	191.8	191.8	191.8	191.8	191.8	**959.2**
Statewide	**571.4**	**571.4**	**571.4**	**571.4**	**571.4**	**2,857.2**
CHP (1% Budget Allocation)						
PECO	26.6	26.6	26.6	26.6	26.6	**133.0**
PPL	19.1	19.1	19.1	19.1	19.1	**95.7**
Duquesne Light	6.1	6.1	6.1	6.1	6.1	**30.4**
FirstEnergy	24.3	24.3	24.3	24.3	24.3	**121.5**
Statewide	**76.1**	**76.1**	**76.1**	**76.1**	**76.1**	**380.7**
Solar PV (5% Budget Allocation)						
PECO	21.7	24.0	26.4	29.0	31.8	**132.9**
PPL	16.5	18.1	19.8	21.7	23.6	**99.6**
Duquesne Light	4.9	5.4	6.0	6.5	7.2	**30.0**
FirstEnergy	20.7	22.8	25.1	27.5	30.1	**126.2**
Statewide	**63.8**	**70.3**	**77.3**	**84.7**	**92.7**	**388.7**
Act 129 EE Potential						
PECO	239.6	241.9	244.3	247.0	249.8	**1,222.6**
PPL	178.4	180.0	181.8	183.6	185.6	**909.4**
Duquesne Light	56.5	57.0	57.5	58.1	58.7	**287.7**
FirstEnergy	236.9	239.0	241.2	243.6	246.2	**1,206.9**
Statewide	**711.4**	**717.9**	**724.8**	**732.3**	**740.2**	**3,626.6**

Note: Totals may not equal sum of column or row due to rounding

- Note the **Traditional EE Potential** presented in this **table assumes a 94% budget allocation** to traditional energy efficiency measures. This is in contrast to the estimates presented earlier that assumed 100% of Act 129 budget would be allocated to traditional EE measures.
- The combined **Act 129 EE Potential** achieves **3,626.6 GWh** in total incremental annual savings from 2026-2030 or **2.5% relative to the 2009/2010 load forecast.**
- Given the lower $/MWh acquisition costs for CHP and PV relative to Traditional EE, including these components, even at a modest 6% combined budget allocation, significantly increases the resulting energy savings relative to funding Traditional EE alone (2.1% relative to the 2009/2010 load forecast).
- **Traditional EE accounts for 78.8%** of total savings, **CHP accounts for 10.5%,** and **PV accounts for the remaining 10.7%.**





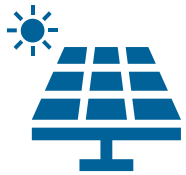
ACT 129 EE POTENTIAL RESULTS

Act 129 EE Potential MW Peak Demand Reduction by EDC, Year, and Component

EDC	2026 (MW)	2027 (MW)	2028 (MW)	2029 (MW)	2030 (MW)	Total (MW)
Traditional EE Potential (94% Budget Allocation)						
PECO	25	25	25	25	25	**125**
PPL	19	19	19	19	19	**95**
Duquesne Light	6	6	6	6	6	**31**
FirstEnergy	25	25	25	25	25	**124**
Statewide	**75**	**75**	**75**	**75**	**75**	**375**
CHP (1% Budget Allocation)						
PECO	4	4	4	4	4	**19**
PPL	3	3	3	3	3	**13**
Duquesne Light	1	1	1	1	1	**4**
FirstEnergy	3	3	3	3	3	**17**
Statewide	**11**	**11**	**11**	**11**	**11**	**53**
Solar PV (5% Budget Allocation)						
PECO	3	3	3	4	4	**17**
PPL	2	2	3	3	3	**13**
Duquesne Light	1	1	1	1	1	**4**
FirstEnergy	3	3	3	4	4	**17**
Statewide	**8**	**9**	**10**	**11**	**12**	**51**
Act 129 EE Potential						
PECO	32	32	32	32	33	**161**
PPL	24	24	24	25	25	**122**
Duquesne Light	8	8	8	8	8	**40**
FirstEnergy	31	31	32	32	32	**158**
Statewide	**94**	**95**	**96**	**97**	**98**	**479**

Note: Totals may not equal sum of column or row due to rounding

- Note the **Traditional EE Potential** presented in this **table assumes a 94% budget allocation** to traditional energy efficiency. This is in contrast to the estimates presented earlier that assumed 100% of Act 129 budget would be allocated to traditional EE measures.
- The combined **Act 129 EE Potential** achieves **479 MW** in total incremental annual peak reduction from 2026-2030 or **1.8% relative to the 2007/2008 load.**
- Given the lower $/kW acquisition costs for CHP and PV relative to EE, including these components, even at a modest 6% combined budget allocation, significantly increases the resulting peak demand reduction relative to funding EE alone (1.5% relative to the 2007/2008 load forecast).
- **Traditional EE accounts for 78.2%** of total peak demand reduction, **CHP accounts for 11.0%,** and **PV accounts for the remaining 10.7%.**



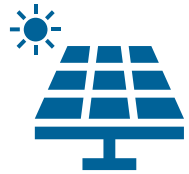
ACT 129 EE POTENTIAL RESULTS

Act 129 EE Potential Energy Savings, Peak Demand Reductions, and Acquisition Costs by EDC

EDC	Acquisition Cost ($/MWh)	Budget ($MM)	Energy Savings (GWh)	Peak Reduction (MW)
PECO	$349.6	$427.4	1,222.6	161
PPL	$338.1	$307.5	909.4	122
Duquesne Light	$339.6	$97.7	287.7	40
FirstEnergy	$323.4	$390.3	1,206.9	158
Statewide	**$337.2**	**$1,222.9**	**3,626.6**	**479**

Note(s): Budgets and acquisition costs are in nominal dollars. MWh and peak MW are the sum of first-year incremental annual savings for 2026–2030. Peak demand impacts are reported as the average of summer and winter peak MW reductions intentionally for ease of comparison to the DR MPS.

- The **Act 129 EE Potential** portfolio results in an average **acquisition cost of $337.2 per MWh saved** over the five-year phase.
- For comparison, actual statewide energy acquisition costs for PY15 were approximately $290.0 per MWh saved.
- While higher than recent evaluated acquisition costs, the increase in modeled Act 129 EE Potential portfolio acquisition costs of 16% relative to PY15 reflects reasonable portfolio cost pressures primarily due to the reduced potential for lower cost C&I lighting.

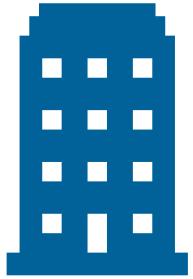


SENSITIVITY ANALYSIS OF POSSIBLE IMPACTS OF EXTERNAL FUNDING

INTRODUCTION

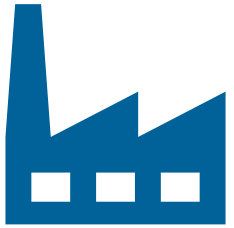
- At the request of TUS and in coordination with DEP the SWE team estimated the impact of three separate federal funding sources on Act 129 Traditional Energy Efficiency potential.
- The primary **objectives** of this analysis were:
  - Estimating the impact of certain external funding sources on the low-income potential,
  - Ensuring additional savings would not exceed identified achievable potential for any measure, and
  - Informing the low-income goals for Phase V.

EXTERNAL FUNDING CONSIDERED



Home Efficiency Rebate Program (HER)

Home Electrification and Appliance Rebate Program (HEAR)



Reducing Industrial Sector Emissions in Pennsylvania (RISE PA)

SUMMARY OF EXTERNAL FUNDING SOURCES

HER

- $113 Million in funding for energy reduction projects
- Requirements on achieving specific project-level percentage energy reductions
- Targeted towards multifamily housing and low-income households
- $5 million of EDC Act 129 budgets assumed for conducting ASHRAE Level 2 audits in support of this program

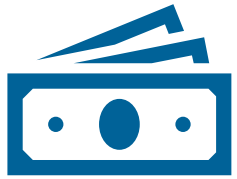
HEAR

- $92 Million in funding for appliance rebates
- Targeted towards low-and-moderate income customers

RISE PA

- $360 Million in funding for industrial decarbonization
- Electric efficiency projects qualify as well as renewable energy, biofuels and gas efficiency
- Due to complexity and uncertainty surrounding its implementation it has been excluded from this analysis

ACT 129 ELIGIBLE PORTION OF EXTERNAL FUNDING



Only a portion of the external funding will be applicable to Act 129 programs.

Differentiating the funding opportunities into applicable portions is critical in estimating the potential impact of the funding.

Determine what percentage of total funding EDC territories will utilize. For HER and HEAR, it is assumed that 75 percent of the funding will be used within EDC territories.

Determine allocated funding for electric savings measures. For HER and HEAR, the estimated breakdowns from the DEP applications result in $42 million for HER and $14 million for HEAR.

While most HER and HEAR funding will contribute to serving LMI populations, the definition of low-income in the IRA programs differs from that in the Act 129 programs.

The difference between these definitions shows that the eligible market for LMI measures through the IRA programs is significantly larger than the eligible market for low-income measures in the Act 129 programs. As a result, a 50 percent cost share is assumed for a minority of measures that qualify under both low-income definitions, but a lower utility cost share is assumed for most measures.

IMPACT ON POTENTIAL MEASURE ACQUISITION COST AND ACT 129 EE POTENTIAL SCENARIO

Potential Measure Acquisition Cost:

- Analysis uses the eligible funding pool to lower the aggregate acquisition costs of valid measures.
- Approach recognizes the flexibility in program implementation and what projects they might undertake

Act 129 EE Potential Scenario:

- Once aggregate acquisition costs are lowered, the total measure production was adjusted back up to impact the Act 129 EE Potential scenario cost projections for both market rate and low-income measures.
- Individual measure projections were compared to their Achievable Potential scenario production, and any measure that exceeded this value was adjusted

CAVEATS TO ASSUMPTIONS

- This methodology provides an estimate of the impact external funding may have on the portfolio in general but does not assess how the funding might influence individual projects.
- Program guidance on how external funding may be integrated could significantly alter the outcome of this analysis.
- As of January 2025, neither HER nor HEAR have been approved by the DOE. It is possible that the funding assumed in this sensitivity analysis could be altered or eliminated.
- The assumption that Act 129 funding is used to cover most or all ASHRAE Level 2 audits required by HER, while consistent with DEP's program applications, is not a likely outcome.

ESTIMATED ACT 129 ELIGIBLE HEAR FUNDING

- HEAR impact on ACT 129 savings is largely mitigated by prevalence of non-electric baselines for the measures of interest.

Measure	Estimated Total Budget ($MM)	Appliance Applicability – Percent Electric Baseline	EDC Territory Modified	Total Act 129 Eligible Budget ($MM)	Low-Income Budget ($MM)	Market Rate Budget ($MM)
Heat Pump Water Heaters	$6.0	45%	75%	$2.0	$1.1	$0.9
HVAC Heat Pump	$35.2	31%	75%	$8.2	$4.5	$3.7
Heat Pump Clothes Dryer	$1.4	73%	75%	$0.8	$0.4	$0.4
Electric Cooking Equipment	$1.4	61%	75%	$0.7	$0.4	$0.3
Envelope Improvements	$9.8	31%	75%	$2.3	$1.3	$1.0
Total	**$53.8**	N/A	N/A	**$13.9**	**$7.7**	**$6.3**

Note: Totals may not equal sum of column or row due to rounding.

ESTIMATED ACT 129 ELIGIBLE HER FUNDING

Measure	Estimated Total Budget ($MM)	Appliance Eligibility – Percent Electric Baseline	EDC Territory Modified	Total Act 129 Eligible Budget ($MM)
Gas Upgrades (Gas Furnace/Boiler	$14.4	0%	75%	$0.0
Gas Upgrades + Basic Weatherization	$10.9	0%	75%	$0.0
Gas Upgrades + Basic Weatherization + Central A/C	$5.3	20%	75%	$0.8
Gas Upgrades + Central A/C	$11.4	42%	75%	$3.6
Gas Upgrades + Enhanced Weatherization	$2.0	0%	75%	$0.0
Gas Upgrades + Enhanced Weatherization + Central A/C	$0.5	18%	75%	$0.1
Heat Pump Upgrades	$21.9	100%	75%	$16.5
Heat Pump + Basic Weatherization	$5.0	100%	75%	$3.8
Heat Pump + Enhanced Weatherization	$0.4	100%	75%	$0.3
Heat Pump + Heat Pump Water Heater	$23.4	100%	75%	$17.5
Whole Home Electrification	$15.4	0%	75%	$0.0
Whole Home Electrification + Basic Weatherization	$1.9	0%	75%	$0.0
Whole Home Electrification + Enhanced Weatherization	$0.3	0%	75%	$0.0
Total	**$112.8**	N/A	N/A	**$42.5**

Note: Totals may not equal sum of column or row due to rounding.

- HER funding has significantly more program overlap, due to emphasis on electric resistance to heat pump upgrades

ESTIMATED ACT 129 ELIGIBLE HEAR FUNDING

Measure	Low-Income Budget ($MM)	Acquisition Cost ($/MWh)	Additional Savings (GWh)
Heat Pump Water Heaters	$1.1	$322.0	3.5
HVAC Heat Pump	$4.5	$1,039.0	4.3
Heat Pump Clothes Dryer	$0.4	N/A	N/A
Electric Cooking Equipment	$0.4	N/A	N/A
Envelope Improvements	$1.3	$834.0	1.5
Total	**$7.7**	**$825.0**	**9.3**

Note: Totals may not equal sum of column or row due to rounding.

- Additional savings through low-income programs
  - Applicable budgets are assumed to be applied towards designated measures
  - The low-income portion of the budget is assumed to create additional program savings potential at the acquisition cost of those measures

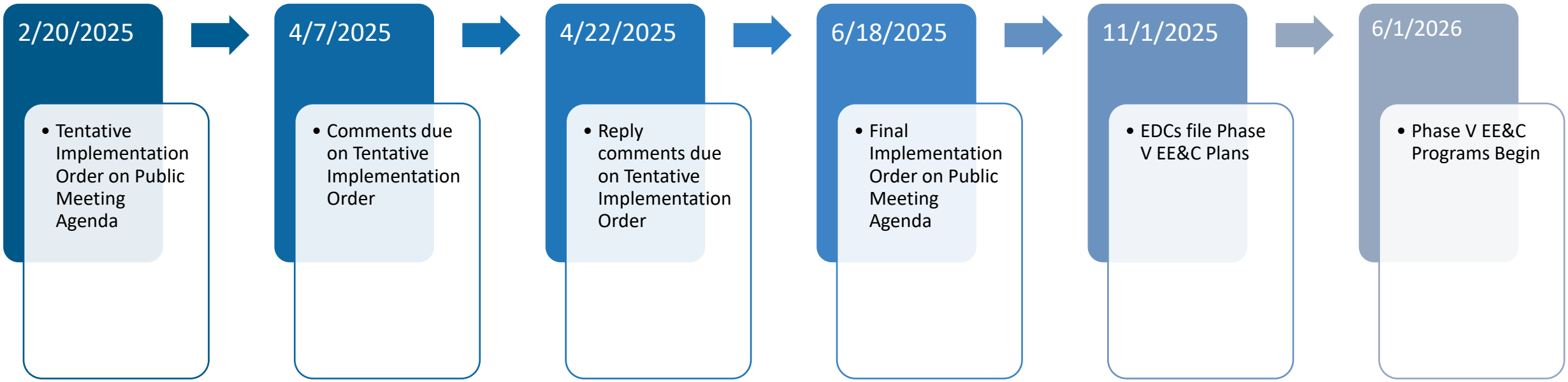
ESTIMATED TOTAL EXTERNAL FUNDING IMPACT

- Total increase in potential savings is 42.7 GWh (16.9% increase) for low-income, and -5.6 GWh (0.5% decrease) for non-low-income relative to the potential for respective market segments assuming 100% Act 129 budget allocation for traditional EE.
  - Most of the increase is on low-income multifamily, resulting in a higher increase for that sector
- Results indicate coordination of programs is valuable in increasing reach of Act 129 programs in traditionally difficult sectors.

Adjustment Category	Additional Low-Income Savings (GWh)	Additional Non-Low-Income Savings (GWh)
HER	37.7	N/A
HEAR	9.3	N/A
Audit Funding	-4.3	-5.6
Total Change In Savings (GWh)	**42.7**	**-5.6**

PHASE V PLANNING TIMELINE

PHASE V PLANNING TIMELINE



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