

Prepared for:

**Pennsylvania Public Utilities Commission**

Addendum to 2015 SWE Market Potential Studies

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**Application of Market Potential Study Results to Phase III Goals**

Prepared by:

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# Summary of Findings

The Statewide Evaluation (SWE) team recently completed two market potential studies (MPS) to assess demand-side management potential in Pennsylvania; energy efficiency (EE MPS) and demand response (DR MPS). A key purpose of these studies was to provide information to assist the Commission to establish the reduction targets for Phase III for the electric distribution companies (EDCs) subject to Act 129. This report addendum summarizes the key findings of the market potential studies completed by the SWE Team and provides the Phase III MWh and MW savings targets established by the Commission’s policy regarding the mix for energy efficiency and demand response expenditures in Phase III. The Commission is proposing that Phase III cover a five year period starting on June 1, 2016.

Act 129 of 2008 imposed an annual spending limit of 2% of 2006 revenues for each EDC. The SWE’s EE MPS examined program potential assuming that the entire 2% funding allocation would be devoted to energy efficiency. These program potential estimates are presented in Table 1 along with the SWE’s technical, economic, achievable and program estimates of energy efficiency potential. This table was presented as Table ES-1 of the EE MPS report. Table 1 presents the energy savings that can be achieved by the end of Phase III in two ways:

* **Cumulative Annual Savings** – savings that accumulate in any given year due to participation in energy efficiency programs in that year, as well as participation in prior years, to the extent that participation in prior years continues to yield savings. Cumulative annual energy savings account for the fact that measures installed in prior years may have useful lives longer than one year, and therefore produce savings that persist into the future for some time. However, cumulative annual energy savings also reflect savings decay – that is, savings that can no longer be counted in any given year once a measure is no longer operational or has “burned out.”
* **Incremental Annual Savings** – Incremental annual savings are those that occur in a given year due to participation in energy efficiency programs in that year. In the context of the EE MPS and this report addendum, Phase III program potential reflects the 5-year sum of incremental annual savings from June 1, 2016 through May 31, 2021.

Table : Statewide Summary of Potential EE Savings and Costs by Scenario and Year

|  | **2016** | **2017** | **2018** | **2019** | **2020** | **2025** |
| --- | --- | --- | --- | --- | --- | --- |
| **Cumulative Savings Potential - MWh** | | | | | | |
| **Technical** | 6,707,085 | 13,016,622 | 18,973,644 | 24,294,903 | 25,336,859 | 41,190,328 |
| **Economic** | 4,895,392 | 9,387,083 | 13,662,316 | 17,628,245 | 17,253,764 | 26,944,933 |
| **Maximum Achievable** | 2,761,211 | 5,438,518 | 8,133,238 | 10,772,462 | 10,983,129 | 19,357,092 |
| **Base Achievable** | 1,610,739 | 3,285,284 | 4,980,543 | 6,649,165 | 6,748,807 | 12,111,889 |
| **Program** | 1,217,554 | 2,480,941 | 3,758,994 | 5,015,090 | 5,092,433 | - |
| **Cumulative Savings Potential - % of 2010 Load** | | | | | | |
| **Maximum Achievable** | 1.9% | 3.7% | 5.5% | 7.3% | 7.5% | 13.2% |
| **Base Achievable** | 1.1% | 2.2% | 3.4% | 4.5% | 4.6% | 8.3% |
| **Program** | 0.8% | 1.7% | 2.6% | 3.4% | 3.5% | - |
| **Incremental Savings Potential - MWh** | | | | | | |
| **Maximum Achievable** | 2,761,211 | 2,866,823 | 2,989,121 | 3,104,271 | 2,610,702 | 2,574,169 |
| **Base Achievable** | 1,610,739 | 1,725,249 | 1,836,917 | 1,943,976 | 1,665,279 | 1,794,256 |
| **Program** | 1,217,554 | 1,302,307 | 1,386,202 | 1,466,663 | 1,256,735 | - |
| **Incremental Savings Potential - % of 2010 Load** | | | | | | |
| **Maximum Achievable** | 1.9% | 2.0% | 2.0% | 2.1% | 1.8% | 1.8% |
| **Base Achievable** | 1.1% | 1.2% | 1.3% | 1.3% | 1.1% | 1.2% |
| **Program** | 0.8% | 0.9% | 0.9% | 1.0% | 0.9% | - |
| **EDC Program Costs - Million $** | | | | | | |
| **Maximum Achievable** | $581.8 | $601.9 | $619.9 | $638.5 | $607.0 | $642.6 |
| **Base Achievable** | $302.1 | $316.2 | $329.3 | $342.6 | $325.7 | $361.6 |
| **Program** | $228.7 | $239.2 | $249.1 | $259.2 | $246.4 | n/a\* |
| \*Program potential was only estimated for five years to be consistent with a Phase III of Act 129. Program potential in 2025 would be part of Phase IV of Act 129 | | | | | | |

Table 2 is a copy of Table 6-3 of the EE MPS report and shows the SWE’s estimates of incremental annual program potential savings for each EDC assuming 100% spending on energy efficiency.

Table : Five-Year Program Potential Savings and Budget by EDC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Portfolio Spending Ceiling (Million $) | Program Acquisition Costs ($/1st-YR MWh Saved) | 2016-2020 Potential Savings (MWh)[[1]](#footnote-2) | % of 2010 Forecast |
| 2016-2020 – Five-Year Program Potential | | | | |
| Duquesne | $97.7 | $186.9 | 522,837 | 3.7% |
| FE: Met-Ed | $124.3 | $182.2 | 682,474 | 4.6% |
| FE: Penelec | $114.9 | $191.9 | 598,704 | 4.2% |
| FE: Penn Power | $33.3 | $176.1 | 189,107 | 4.0% |
| FE: WPP | $117.8 | $181.0 | 650,760 | 3.1% |
| PECO | $427.0 | $184.7 | 2,311,387 | 5.9% |
| PPL | $307.5 | $183.7 | 1,674,191 | 4.4% |
| Statewide | **$1,222.5** | **$184.4** | **6,629,460** | **4.5%** |

The SWE’s DR MPS examined demand response program potential beyond projections of PJM commitments informed by historical participation assuming 10%, 15%, and 20% budget allocation to demand response. The results of this “Business as Usual” scenario are presented in Table 3. This table is a copy of Table 7-3 in the DR MPS report. The values in Table 3 marked with an “\*” indicate that the EDC’s demand response potential (as opposed to budget) is the constraining factor in the scenario. The average annual MW potential figures shown in Table 3 are at the generator level and assume DR programs are active in each of the five summers of Phase III. In addition, the methodology used to develop the DR program potential figures shown in Table 3 below assumes that demand response that is already committed to PJM is not included as part of the DR potential for Phase III.

Table : Phase III DR Program Potential – Net of Projected PJM Commitments

| EDC | 5-Year DR Spending Ceiling (Million $) | Program Acquisition Costs ($/MW/year) | Average Annual Potential Savings (MW) | % Reduction Relative to 2007-2008 Peak Demand |
| --- | --- | --- | --- | --- |
| 2016-2020 – 10% DR Spending | | | |  |
| Duquesne | $9.77 | $57,976 | 34 | 1.3% |
| FE: Met-Ed | $12.43 | $51,210 | 49 | 1.8% |
| FE: Penelec | $11.49 | $50,782 | 0\* | 0.0% |
| FE: Penn Power | $3.33 | $49,349 | 13 | 1.4% |
| FE: WPP | $11.78 | $46,203 | 51 | 1.5% |
| PECO | $42.70 | $64,257 | 133 | 1.7% |
| PPL | $30.75 | $41,622 | 95\* | 1.4% |
| Statewide | **$122.25** | **$52,310** | **375** | **1.4%** |
| 2016-2020 – 15% DR Spending | | | |  |
| Duquesne | $14.66 | $57,976 | 51 | 2.0% |
| FE: Met-Ed | $18.65 | $51,210 | 50\* | 1.9% |
| FE: Penelec | $17.23 | $50,782 | 0\* | 0.0% |
| FE: Penn Power | $4.99 | $49,349 | 20 | 2.1% |
| FE: WPP | $17.67 | $46,203 | 76 | 2.2% |
| PECO | $64.05 | $64,257 | 199 | 2.5% |
| PPL | $46.13 | $41,622 | 95\* | 1.4% |
| Statewide | **$183.38** | **$52,310** | **492** | **1.9%** |
| 2016-2020 – 20% DR Spending | | | |  |
| Duquesne | $19.55 | $57,976 | 67 | 2.7% |
| FE: Met-Ed | $24.87 | $51,210 | 50\* | 1.9% |
| FE: Penelec | $22.97 | $50,782 | 0\* | 0.0% |
| FE: Penn Power | $6.66 | $49,349 | 27 | 2.8% |
| FE: WPP | $23.56 | $46,203 | 102 | 2.9% |
| PECO | $85.40 | $64,257 | 266 | 3.4% |
| PPL | $61.50 | $41,622 | 95\* | 1.4% |
| Statewide | **$244.51** | **$52,310** | **607** | **2.3%** |

# Application of Findings to Phase III Goals

Based on the findings of the SWE potential studies, stakeholder input, and policy considerations the Commission requested the SWE Team to calculate energy efficiency potential assuming a 90% funding allocation to EE and a 10% funding allocation to DR. The Commission also recognized that because of the timing of the Implementation Order, EE&C plan approval, and CSP selection implementing a demand response program by June 1, 2016 will be extremely challenging for the EDCs. Consequently the Commission requested the SWE team to calculate DR program potential for the 10% funding allocation scenario assuming that DR performance would be assessed only for a four-year period during Phase III, from PY9 to PY12. As shown in Table 3, the DR MPS for this four-year term shows that Penelec and PPL would be unable to spend 10% of Act 129 funds on DR because of a lack of DR potential in their service territory; however, after the analysis was completed for the DR goals to be considered over a four-year term, Met-Ed also becomes unable to spend its suggested 10% of budget on DR due to lack of DR potential. Consequently, the SWE considered alternate budget allocations for Penelec, Met-Ed and PPL. The revised budget allocations for a four-year term and resulting estimates of program potential are presented in Table 4. The statewide figures in Table 4 are weighted by EDC budget size.

Table : Budget Allocation by EDC

|  |  |  |
| --- | --- | --- |
| EDC | % of Total Spending on EE | % of Total Spending on DR |
| Duquesne | 90% | 10% |
| FE: Met-Ed | 92% | 8% |
| FE: Penelec | 100% | 0% |
| FE: Penn Power | 90% | 10% |
| FE: WPP | 90% | 10% |
| PECO | 90% | 10% |
| PPL | 95% | 5% |
| Statewide | **92.4%** | **7.6%** |

Table 5 presents a modified version of the information that was shown in Table 1. The cumulative savings potential estimates have been removed and program potential estimates have been modified to reflect the energy efficiency spending allocations in Table 4. The estimates of achievable potential are unaltered.

Table : Statewide Summary of Potential EE Savings and Costs by Scenario and Year Based on Funding Allocation

|  | **2016** | **2017** | **2018** | **2019** | **2020** | **2025** |
| --- | --- | --- | --- | --- | --- | --- |
| **Incremental Annual Savings Potential - MWh** | | | | | | |
| **Maximum Achievable** | 2,761,211 | 2,866,823 | 2,989,121 | 3,104,271 | 2,610,702 | 2,574,169 |
| **Base Achievable** | 1,610,739 | 1,725,249 | 1,836,917 | 1,943,976 | 1,665,279 | 1,794,256 |
| **Program** | 1,124,675 | 1,202,963 | 1,280,458 | 1,354,781 | 1,160,867 | - |
| **Incremental Annual Savings Potential - % of 2010 Load** | | | | | | |
| **Maximum Achievable** | 1.9% | 2.0% | 2.0% | 2.1% | 1.8% | 1.8% |
| **Base Achievable** | 1.1% | 1.2% | 1.3% | 1.3% | 1.1% | 1.2% |
| **Program** | 0.8% | 0.8% | 0.9% | 0.9% | 0.8% | - |
| **EDC Program Costs - Million $** | | | | | | |
| **Maximum Achievable** | $581.8 | $601.9 | $619.9 | $638.5 | $607.0 | $642.6 |
| **Base Achievable** | $302.1 | $316.2 | $329.3 | $342.6 | $325.7 | $361.6 |
| **Program** | $211.3 | $221.0 | $230.1 | $239.4 | $227.6 | n/a\* |
| \*Program potential was only estimated for five years to be consistent with a Phase III of Act 129. Program potential in 2025 would be part of Phase IV of Act 129 | | | | | | |

The decision to allocate less than 100% of the available funding to energy efficiency means that the program potential estimates for energy efficiency are lowered by a proportional amount. Table 6 presents estimates of the sum of 2016 – 2020 incremental annual program potential savings at these reduced EE budget amounts[[2]](#footnote-3).

Table : Modified Five-Year Energy Efficiency Program Potential Savings and Budget by EDC

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EDC** | **Portfolio EE Spending Ceiling (Million $)** | **Program Acquisition Costs ($/1st-YR MWh Saved)** | **2016-2020 EE Potential Savings[[3]](#footnote-4) (MWh)** | **% of 2010 Forecast** |
| **2016-2020 – Five-Year EE Program Potential** | | | | |
| **Duquesne** | $88.0 | $186.9 | 470,609 | 3.3% |
| **FE: Met-Ed** | $114.4 | $182.2 | 627,814 | 4.2% |
| **FE: Penelec** | $114.9 | $191.9 | 598,612 | 4.2% |
| **FE: Penn Power** | $30.0 | $176.1 | 170,182 | 3.6% |
| **FE: WPP** | $106.0 | $181.0 | 585,807 | 2.8% |
| **PECO** | $384.3 | $184.7 | 2,080,553 | 5.3% |
| **PPL** | $292.1 | $183.7 | 1,590,264 | 4.2% |
| **Statewide** | **$1,129.6** | **$184.4** | **6,123,842** | **4.2%** |

Table 7 presents modified DR program potential estimates based on the EDC-specific budget allocations shown in Table 4. Table 7 also reflects the direction to assume no demand response events will be called during the summer of 2016. Dividing the available budget by four years instead of five years increases the average annual program potential estimates relative to what was presented in Table 3 for those EDCs receiving a 10% DR spending allocation.

Table : Modified Phase III DR Program Potential – Net of Projected PJM Commitments

| **EDC** | **5-Year DR Spending Allocation (Million $)** | **Program Acquisition Costs ($/MW/year)** | **Average Annual Potential Savings (MW)** | **% Reduction (Relative to 2007-2008 Peak Demand)** |
| --- | --- | --- | --- | --- |
| **2016-2020 – 10% DR Spending Allocation Except Where Noted by Asterisk** | | | |  |
| **Duquesne** | $9.77 | $57,976 | 42 | 1.7% |
| **\*FE: Met-Ed** | $9.95 | $51,210 | 49 | 1.8% |
| **\*FE: Penelec** | $0.00 | $50,782 | 0 | 0.0% |
| **FE: Penn Power** | $3.33 | $49,349 | 17 | 1.7% |
| **FE: WPP** | $11.78 | $46,203 | 64 | 1.8% |
| **PECO** | $42.70 | $64,257 | 166 | 2.1% |
| **\*PPL** | $15.38 | $41,622 | 92 | 1.4% |
| **Statewide** | **$92.90** | **$52,310** | **430** | **1.6%** |

# GNI and Low Income Carve-Outs

Phase II of Act 129 has specific targets for two “carve-out” sectors: residential low income and government, nonprofit and institutional (GNI). The EE MPS analysis considered the market opportunity for these “carve-out” sectors based on specific residential and commercial segments. However, the EE MPS does not directly recommend whether targets should be established for the carve-outs in Phase III or what those targets should be. This report addendum provides the Commission with additional detail on the GNI and residential low-income carve-outs relative to program potential.

The GNI “carve-out” sector is comprised of various market segments analyzed in the energy efficiency market potential study including education, healthcare, government/public service, public street lighting and other institutional buildings. The SWE team utilized these segments as a proxy for informing the available savings potential in the GNI sector[[4]](#footnote-5). Based on the energy efficiency MPS findings, the SWE estimates that the statewide sum of first-year base achievable energy savings potential from 2016 to 2020 attributable to the GNI sector is equal to 6.7% of the portfolio’s statewide base achievable savings potential during that same time horizon[[5]](#footnote-6). When applied to the 5-year portfolio program potential (6,123,842 MWh) discussed in Table 6, the SWE team estimates there to be 410,297 MWh of statewide program potential for the GNI sector (again representing 6.7% of the estimated program potential for all sectors combined). Table 8 provides the additional detail regarding the GNI carve-outs by EDC associated with the five-year program potential estimated in the EE MPS. It is important to note that Table 8 maintains the default 90%/10% annual funding allocation for EE versus DR for Penn Power, West Penn Power and PECO. The three utilities marked with an “\*” in Table 8 below have slightly different EE versus DR funding allocations, as discussed in Section II above.

Table : Commercial GNI Sector 2016 to 2020 1st Year Program Potential Savings by EDC

| **EDC** | **2016-2020 Incremental Annual Program Potential Savings (MWh)[[6]](#footnote-7)** | **% of Commercial Savings** | **% of Total Portfolio Savings** |
| --- | --- | --- | --- |
| **2016-2020 – 90% EE Spending Except Where Noted by Asterisk** | | | |
| **Duquesne** | 48,943 | 34.1% | 10.4% |
| **\*FE: Met-Ed** | 21,973 | 25.5% | 3.5% |
| **\*FE: Penelec** | 34,719 | 33.5% | 5.8% |
| **FE: Penn Power** | 6,637 | 22.7% | 3.9% |
| **FE: WPP** | 28,119 | 31.7% | 4.8% |
| **PECO** | 191,411 | 33.3% | 9.2% |
| **\*PPL** | 93,826 | 27.1% | 5.9% |
| **Statewide** | **410,297** | **30.9%** | **6.7%** |

From 2016 through 2020, the statewide sum of first-year kWh program potential savings estimated to be attributable to low-income households is approximately 12.9% of the program potential portfolio. When applied to the 5-year portfolio program potential (6,123,842 MWh) discussed in Table 6, the SWE team estimates there to be 788,335 MWh of program potential for the low-income sector (again representing 12.9% of the estimated program potential for all sectors combined). Low income potential includes savings stemming directly from low income-specific measures as well as additional savings attributed to low income participants in non-low income-specific programs. Low income-specific measures include those offerings where EDCs are expected to pay 100% of the measure cost to low income-qualified customers. Savings attributed to the low income sector from non-low income measures do not assume any additional incentives above and beyond the standard offering. The percent of savings attributed to the low income sector from non-low income measures was estimated at 15%, and was based on the average reported values in the EDCs’ most recent annual reports (PY5) to the Commission.

Table 9 provides the additional detail regarding the low income carve-outs by EDC associated with the five-year program potential estimated in the EE MPS.

Table : Residential Low-Income Sector 2016 to 2020 1st Year Program Potential Savings by EDC

| **EDC** | **2016-2020 Incremental Annual Program Potential Savings (MWh)[[7]](#footnote-8)** | **% of Residential Savings** | **% of Total Portfolio Savings** |
| --- | --- | --- | --- |
| **2016-2020 – 90% EE Spending Except Where Noted by Asterisk** | | | |
| **Duquesne** | 58,165 | 21.0% | 12.4% |
| **\*FE: Met-Ed** | 75,284 | 17.5% | 12.0% |
| **\*FE: Penelec** | 82,622 | 22.2% | 13.8% |
| **FE: Penn Power** | 24,592 | 21.8% | 14.4% |
| **FE: WPP** | 86,454 | 21.1% | 14.8% |
| **PECO** | 251,890 | 19.9% | 12.1% |
| **\*PPL** | 209,328 | 20.0% | 13.2% |
| **Statewide** | **788,335** | **20.1%** | **12.9%** |

1. Phase III program potential reflects the 5-year sum of incremental annual savings from June 1, 2016 through May 31, 2021. [↑](#footnote-ref-2)
2. Penelec’s energy efficiency budget is not reduced between Table 2 and Table 6 because 100% of the budget is allocated to EE. [↑](#footnote-ref-3)
3. Phase III program potential reflects the 5-year sum of incremental annual savings from June 1, 2016 through May 31, 2021. [↑](#footnote-ref-4)
4. While the SWE was able to identify government and institutional buildings in the EDCs customer databases, no reliable data was available to identify nonprofit customers since nonprofits cut across multiple building types. Therefore, the SWE team used education and healthcare buildings as a proxy for nonprofit customers since many of these buildings types are occupied by nonprofits. [↑](#footnote-ref-5)
5. The sum of first-year base achievable energy savings from 2016 to 2020 for the portfolio is 8,782,160 MWh. See Table 1. [↑](#footnote-ref-6)
6. Phase III program potential reflects the 5-year sum of incremental annual savings from June 1, 2016 through May 31, 2021. [↑](#footnote-ref-7)
7. Phase III program potential reflects the 5-year sum of incremental annual savings from June 1, 2016 through May 31, 2021. [↑](#footnote-ref-8)