

2024



METROPARKS  
TOLEDO



PROJECT

# BEACON

Technical Appendix

CPRG Grant  
Application



# Climate Pollution Reduction Grants

## Implementation Grants

### Technical Appendix

#### Documentation of GHG Reduction Assumptions

For this CPRG grant application, Hans Rosebrock, Director, Power Energy Services & Project Manager with The Mannik & Smith Group, performed three-emission reduction/offset analyses using U.S. EPA AVERT (AVoided Emissions and geneRation Tool) modeling software.

- Annual Analysis
- 6-year (2025-2030) Analysis
- 26-year (2025-2050) Analysis

The following GHG Reduction Assumptions were part of the analysis:

- For the 6-year and 26-year analyses, data was extrapolated from the initial AVERT annual analysis.
- For methane (CH<sub>4</sub>) emissions, which is not part of the AVERT model, an annual calculation was performed by using various data sources which included; the US EPA, US Energy Information Administration, Global Energy Monitor, and Boston University's Institute for Global Sustainability. The calculation is based on methane emitted into the atmosphere from US coal mining activities and natural gas transmission & distribution. The total annual emission offset was derived from establishing coal and natural gas inputs needed to produce one megawatt hour (mWh) of electricity, corresponding ratio of methane released (in metric tons) into the atmosphere from the mining and distribution of these fossil fuels, and the percentage of coal and natural gas electric generation in the Mid-Atlantic (PJM) Region.
- Emissions of hydrofluorocarbons, nitrous oxide, perfluorocarbons, and sulfur hexafluoride were not included based on that fact these chemicals are generally not considered an underlying pollution problem in grid scale electric generation.
- For extrapolated data findings, no future electric generation plant starts or closures are accounted for.
- For extrapolated data findings, an annual reduction or degradation factor of .3% was used in the calculations based on the performance characteristics of First Solar Series 6 PV panels that will be installed.
- Geographies in the analyses are based on where the proposed solar project will be sited (Toledo, OH), in which the local utility (FirstEnergy/Toledo Edison) is within the electric generation boundary portfolios of:
  - Mid-Atlantic Region (PJM RTO),
  - State of Ohio,
  - Toledo MSA (Fulton, Lucas, & Wood Counties), and
  - Lucas County

Please see the GHG emission reduction calculation spreadsheet in the attachments for additional detail.


**Project Aggregate Emissions Reductions/Offsets by Geography 2025-2030**

Pollutant	Mid-Atlantic Region (PJM)	State of Ohio	Toledo MSA	Lucas County
SO <sub>2</sub> (tons)	65.47	23.79	.02	.01
NO <sub>X</sub> (tons)	58.19	15.27	.37	.04
CO <sub>2</sub> (tons)	150,844	30,498	2,140	938
PM <sub>2.5</sub> (tons)	8.67	1.65	.10	.03
VOCs (tons)	2.08	.33	.006	.002
NH <sub>3</sub> (tons)	2.83	.76	.102	.038
CH <sub>4</sub> – coal (tons)	.32	not available	not available	not available
CH <sub>4</sub> – gas (tons)	.01	not available	not available	not available

As described on the cover page, the estimated cumulative GHG reductions for 2025-2030 (in metric tons) is 150,981. FirstEnergy/Toledo Edison is tapped directly into the Mid-Atlantic Region grid's electronic generation portfolio, so reducing/offsetting within this geography will make a significant impact.

**Project Aggregate Emissions Reductions/Offsets by Geography 2025-2050**

Pollutant	Mid-Atlantic Region (PJM)	State of Ohio	Toledo MSA	Lucas County
SO <sub>2</sub> (tons)	265.58	96.51	.04	.02
NO <sub>X</sub> (tons)	236.05	61.95	1.54	.18
CO <sub>2</sub> (tons)	611,925	123,720	8,682	3,805
PM <sub>2.5</sub> (tons)	35.15	6.71	.41	.12
VOCs (tons)	8.42	1.33	.03	.01
NH <sub>3</sub> (tons)	11.49	3.06	.41	.16
CH <sub>4</sub> – coal (tons)	1.31	not available	not available	not available
CH <sub>4</sub> – gas (tons)	.03	not available	not available	not available

As described on the cover page, the estimated cumulative GHG reductions for 2025-2050 (in metric tons) is 612,483. FirstEnergy/Toledo Edison is tapped directly into the Mid-Atlantic Region grid's electronic generation portfolio, so reducing/offsetting within this geography will make a significant impact.

**Cost of Effectiveness (per unit of pollutant) of Reducing Emissions by Geography 2025-2050**

Pollutant	Mid-Atlantic Region (PJM)	State of Ohio	Toledo MSA	Lucas County
SO <sub>2</sub> (ton)	\$152K	\$417K	\$916 million	\$1.9 billion
NO <sub>X</sub> (ton)	\$171K	\$650K	\$26 million	\$229 million
CO <sub>2</sub> (ton)	\$66	\$326	\$4,640	\$10,587
PM <sub>2.5</sub> (ton)	\$1.1 million	\$6 million	\$98 million	\$326 million
VOCs (ton)	\$4.8 million	\$30 million	\$1.8 billion	\$5.9 billion
NH <sub>3</sub> (ton)	\$3.5 million	\$13 million	\$97 million	\$260 million
CH <sub>4</sub> – coal (ton)	\$31 million	not available	not available	not available
CH <sub>4</sub> – gas (ton)	\$993 million	not available	not available	not available

**\*NOTE: based on a total estimated contribution of \$9,931,000 from US EPA CPRG program into the solar PV project.**


**Cost of Effectiveness (per unit of pollutant) of Reducing Emissions by Geography 2025-2050**

Pollutant	Mid-Atlantic Region (PJM)	State of Ohio	Toledo MSA	Lucas County
SO2 (ton)	\$444K	\$1.2 million	\$2.7 billion	\$5.7 billion
NOX (ton)	\$499K	\$1.9 million	\$77 million	\$670 million
CO2 (ton)	\$193	\$952	\$13,570	\$30,963
PM2.5 (ton)	\$3.5 million	\$18 million	\$287 million	\$954 million
VOCs (ton)	\$14 million	\$88 million	\$5.3 billion	\$17.4 billion
NH3 (ton)	\$10 million	\$38 million	\$283 million	\$762 million
CH4 – coal (ton)	\$91 million	not available	not available	not available
CH4 – gas (ton)	\$2.9 billion	not available	not available	not available

**\*NOTE: based on a total estimated \$29,043,700 project investment into the solar PV project**