Technical Appendix - Emissions Reduction Calculations

17,482	***134,032***
Total MTCO2e Reduced for 2025-2030	***Total MTCO2e Reduced for 2025-2050***

Emissions reductions were calculated based on example buildings from municipalities within the MetroCOG region that have expressed interest in participating in the project. Reductions associated with distributed generation of solar on building rooftops and parking lot canopies were calculated based on available square footage and average capacity and size of the panels. The EPA Avoided Emissions and Generation Tool (AVERT) was employed to determine annual generation.

Emissions reductions associated with building HVAC, envelope, and efficiency upgrades were calculated by assuming a 15% reduction in energy could be achieved in six example buildings. This simplified approach was used because details pertaining to the type of improvements needed are unknown at this time.

It was assumed design and implementation would take 2 years and emissions reductions would begin occurring in 2027.

Solar Calculations

[input] **Roof area**

Building	Square feet
Example 1	20,709
Example 2	58,586
Example 3	*25,928*
Example 4	39,033
Example 5	111,951
Example 6	89,805
Example 7	31,563
Example 8	29,613
Example 9	33,653
Example 10	40,626
Total	**481,467**

Estimated open roof/canopy area based on aerial images from possible projects within participating communities.

[value] **Panel Size**

18.00 (sq ft/solar panel) *Assumed 3 ft x 6ft*

[calc] **Number of solar panels**

26,748 (panels)

[input] **Energy output per panel**

480.00 (watts/panel) *Assumed output per panel*

[calc] **Solar PV capacity**
12,839.13 (kW)

[value] **Electricity generation from solar**
16,640,000 (kWh) *Source: EPA AVERT for every 10 MW of distributed solar*

[calc] **Electricity generation from solar**
21,364,310 (kWh) *For quantity estimated by projects*

[value] **Electricity emissions factor**
0.0002467 (MTCO2e/kWh) *Source: EPA Emissions Factor Hub*

[calc] **Emissions reduction compared to grid supplied electricity**
5,269.69 (MTCO2e/year)

Building Upgrade Calculations

[calc] **Example Building Annual Energy Usage**

Building	Electricity (kWh/year)	Natural Gas (MMBtu/year)
Example 1	1,045,247	4,522
Example 2	2,857,689	15,361
Example 3	508,982	2,280
Example 4	459,280	2,549
Example 5	2,070,296	6,000
Example 6	604,800	4,256
Total	**7,546,294**	**34,967**

[input] **Percent reduction in energy use**
15% (percent) *Assumption*

[calc] **Estimated natural gas savings**
5,245 (MMBtu/year)

[value] **Natural gas emissions factor**
0.05311 (MTCO2e/MMBtu) *Source: EPA Emissions Factor Hub*

[calc] **Emissions reductions associated with natural gas**
278.59 (MTCO2e/year)

[calc] **Estimated electricity savings**
1,131,944 (kWh/year)

[value] **Electricity emissions factor**
0.0002467 (MTCO2e/kWh) *Source: EPA Emissions Factor Hub*

[calc] **Estimated emissions reductions associated with electricity**

279.20 (MTCO2e)

[value] **Number of years**

3.00 (years)

Assuming design and implementation would take 2 years and emissions reductions are experienced 2027-2030

[value] **Number of years**

23.00 (years)

Assuming design and implementation would take 2 years and emissions reductions are experienced 2027-2050

[FINAL] **Total Reduced for 2025-2030**

17,482.44 (MTCO2e)

Sum of emissions reductions from solar and building upgrades

[FINAL] **Total Reduced for 2025-2050**

134,032.02 (MTCO2e)

Sum of emissions reductions from solar and building upgrades