Technical Appendix

PLACED Program

1. **GHG Reduction Estimate Method:** We estimate the GHG emissions avoided by weatherization of 2,000 homes in the region by using estimates of energy and natural gas saved annually after weatherization.
2. **Models/Tools Used:** We use the eGrid factors to estimate GHG reductions based on expected energy savings from weatherization.
3. **Measure Implementation Assumptions:** We assume that 400 LIDAC households per year are upgraded from 2025 to 2029. To compute the GHG emissions avoided by weatherization we estimate the reduction in energy consumption using the estimated mean savings by single-family homes served by People Working Cooperatively in 2010[1] shown in Table 1.

Method	Gas heat	Electric baseload	Electric Heat
Savings	137 therms	1,124 kWh	2,118 kWh

Table 1: Estimated energy savings by heat type.

We assume that homes are weatherized throughout the region's LIDAC population. The distribution of LIDAC communities in the region is shown in Table 2. Kentucky is in eGrid subregion SRTV and Ohio and Indiana are in region RFCW.

4. **Reference Case Scenario:** The reference case scenario assumes the 2,000 households served by this grant funded program do not receive any weatherization assistance during the time period considered.
5. **Measure-Specific Activity Data:** To compute GHG reductions we use the reduction expected based on heating type from Table 1. Each state's LIDAC tracts have a different mix of gas and electric heat[2] shown in Table 2.

State	Percent LIDAC population	Percent with gas heat	Percent with electric
Indiana	2.6%	39%	61%
Kentucky	20.7%	55%	45%
Ohio	76.7%	60%	40%

Table 2: LIDAC population and heat mode distribution.

6. **GHG Emissions Reduced:** GHG reductions per year for 2025 – 2029 are shown in Table 3. For 2030 – 2049 the reduction in CO_2e remains 2,284 MT. The total reduction from 2025 – 2029 is 9,981 MT CO_2e and from 2025 – 2049 is 76,519 MT CO_2e.

Year	CO2 Reduced (MT)	CH4 Reduced (MT)	N2O Reduced (MT)	CO2e Reduced (MT)
2025	661.98	0.05	0.01	665.35
2026	1,325.70	0.10	0.01	1,332.45
2027	1,984.39	0.15	0.02	1,994.49
2028	2,648.10	0.20	0.03	2,661.58
2029	3,310.08	0.25	0.04	3,326.93

Table 3: GHG emission reductions for residential weatherization.

[1] https://weatherization.ornl.gov/wp-content/uploads/pdf/2016_Present/ORNLTM2017-245.pdf Page C-2

[2] Estimated from ACS 2019 5 Year Estimates for House Heating Fuel by Census Tract

GREEN Program

1. **GHG Reduction Estimate Method:** For each of the components of this program we compute the GHG reduction by estimating the electricity saved by the implementation measure.
2. **Models/Tools Used:** Solar production is estimated using the PVWatts calculator[3]. Building energy efficiency calculations use eGrid GHG emission factors for electricity and EPA GHG factors for natural gas consumption.
3. **Measure Implementation Assumptions:** *Solar:* The CVG 8.9 MW array is expected to go online in 2026 and will be funded at 70% by the grant. For the remaining solar installations we assume that commercial solar panels cost $2.50 per Watt based on dialogue with local contractors. With a $7.5 million program budget covering up to 50% of the cost of the panels, we estimate that this program will help install 6,000 kW of solar panels. We assume that 20% of the panels are installed each program year. To estimate kWh of energy produced we apportion the panels based on LIDAC communities to each state and use the PVWatts calculator on a representative location in each state as in Table 5. Default values were used for all parameters except DC System Size. The amount of electricity produced is reduced by 0.5% annually due to panel degradation. *Public/Non-profit building energy program:* Based on national commercial energy usage[4] we assume that 60% of a building's energy use is electricity and 40% is natural gas. For school and nonprofit sites we use values for Energy Use Intensity (EUI) from the ENERGY STAR Portfolio Manager Technical Reference[5] for property types school and office respectively. EUI for public buildings was provided by the City of Cincinnati as an average site EUI for 150 City of Cincinnati facilities. Values are shown in Table 4. We further assume that the energy program will result in a 21% decrease in EUI based on the average impact of ENERGY STAR improvements[6] and that public buildings start to see impacts in year 2, with 25% of the targeted square footage being improved each year from 2026 through 2029.

Facility Type	School	Public building	Nonprofit
Site EUI (kBtu/sqft)	48.5	84	52.9
Sq Ft	6,000,000	6,000,000	3,000,000

Table 4: EUI estimates and total square footage

   Public entities will also be able to upgrade streetlights with LED. We assume that the streetlights being replaced are 400W HPS cobra head streetlights. Duke Energy estimates that each uses 2,037 kWh/yr. We assume the replacement LED streetlight will use 815 kWh/yr. According to Duke Energy, replacement of an HPS lamp with LED costs approximately $800 on average, so the program will be able to support the conversion of approximately 4,500 streetlights. We assume 20% of total available LED bulbs are installed each year from 2025 to 2030. Streetlights will be distributed based on population in CEJST communities in each state.
4. **Reference Case Scenario:** The reference case assumes that no solar installation or energy efficiency upgrades occur in the absence of the grant program.
5. **Measure-Specific Activity Data:** *Solar:* Annual panels installed per state each year as well as kWh produced per year are in Table 5. Panels installed at CVG are expected to produce 11,631,798 kWh per year starting in 2026. The expected energy savings from public and

[3] https://pvwatts.nrel.gov/pvwatts.php
[4] https://www.eia.gov/energyexplained/use-of-energy/commercial-buildings.php
[5] https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf
[6] https://www.energy.gov/sites/prod/files/2017/03/f34/qtr-2015-chapter5.pdf

nonprofit energy efficiency upgrades for 2025 – 2029 are in Table 6. LED streetlight replacements are apportioned by LIDAC population as seen in Table 7.

State	City for PVWatts	kW of panels	kWh generated annually
Indiana	Brookville, IN	31	41,778
Kentucky	Independence, KY	248	321,937
Ohio	Fairfield, OH	920	1,229,636

Table 5: Annual solar power generation

Year	Reduced mmBTU (all sources)	Reduced MWh electricity (KY)	Reduced MWh electricity (OH/IN)	Reduced mmBTU natural gas
2025	0.00	0.00	0.00	0.00
2026	50,069.25	1,822.05	6,980.12	20,027.70
2027	100,138.50	3,644.10	13,960.25	40,055.40
2028	150,207.75	5,466.15	20,940.37	60,083.10
2029	200,277.00	7,288.20	27,920.50	80,110.80

Table 6: Expected energy reductions for public buildings

State	Percent LIDAC population	LED Street Lights
Indiana	2.6%	117
Kentucky	20.7%	932
Ohio	76.7%	3,451

Table 7: Distribution of LED streetlights

6. **GHG Emissions Reduced:** Total annual emission reductions for all projects are shown in Table 8. The total GHG emission reduction for 2025 – 2029 is 148,480 MT CO_2e and for 2025-2049 is 1,172,714 MT CO_2e.

Year	Reduced CO2 (MT)	Reduced CH4 (MT)	Reduced N2O (MT)	Reduced CO2e (MT)
2025	2,156.72	0.20	0.03	2,170.72
2026	18,459.01	1.66	0.24	18,571.95
2027	28,681.75	2.55	0.37	28,855.25
2028	38,898.32	3.44	0.50	39,132.34
2029	49,108.76	4.32	0.63	49,403.25
2030	49,047.41	4.32	0.62	49,341.50
2031	48,986.36	4.31	0.62	49,280.06
2032	48,925.62	4.31	0.62	49,218.93
2033	48,865.18	4.30	0.62	49,158.11
2034	48,805.04	4.30	0.62	49,097.58
2035	48,745.20	4.29	0.62	49,037.36
2036	48,685.67	4.29	0.62	48,977.45
2037	48,626.43	4.28	0.62	48,917.83
2038	48,567.49	4.27	0.62	48,858.51
2039	48,508.84	4.27	0.62	48,799.48
2040	48,450.48	4.26	0.62	48,740.76
2041	48,392.42	4.26	0.62	48,682.32
2042	48,334.65	4.25	0.61	48,624.18
2043	48,277.16	4.25	0.61	48,566.33
2044	48,219.97	4.24	0.61	48,508.76
2045	48,163.06	4.24	0.61	48,451.49
2046	48,106.43	4.23	0.61	48,394.50
2047	48,050.09	4.23	0.61	48,337.80
2048	47,994.03	4.22	0.61	48,281.38
2049	47,938.25	4.22	0.61	48,225.24

Table 8: GHG emission reductions for public building projects

TRANSIT RIDE Program

1. **GHG Reduction Estimate Method:** Fare-free program reduction estimates are based on reductions in single occupancy vehicle (SOV) trips due to individuals using transit. Reductions due to introduction of battery electric buses (BEB) into the fleet are computed by considering the difference in GHG created by diesel buses and BEB using EPA GHG factors.
2. **Models/Tools Used:** *Fare-free program:* Ridership and census data were used to estimate current work/school ridership and potential increases in the near term. Projections from the OKI Demographer, Michael Outrich, were used to forecast changes in work/school ridership through 2050 due to implementation of fare free riding for these groups from 2025 – 2030. VMT, traffic volume, and average speed data were estimated and forecast using the OKI regional travel demand model. The MOVES4[7] tool was used to estimate emissions for both the base scenario and implementation. *BEB fleet replacement:* EPA GHG emissions factors and eGRID factors are used to estimate GHG emissions.
3. **Measure Implementation Assumptions:** *Fare-free program:* Base scenario transit ridership is projected annually by assuming 5% annual growth through 2028 and then 1% annual growth thereafter. The rapid recovery of local transit ridership since the COVID pandemic will slow and these rates reflect that slowdown.

   Using census and agency data the current saturation rate for students is estimated to be 6%, for employees in uptown is 1.5%, and for CVG/Hebron employees is 0.5%. Saturation rate is defined as the number of transit riders that ride at least 5 days per week. Based on the experiences of other large urban universities with fare free transit increases in saturation rate for students are 3% per year for the first 5 years and then taper with a maximum saturation of 25% by 2040. For employees in uptown Cincinnati we estimate a doubling in saturation rate for each of the first two years and then an increase of 3% for the next three program years. The employee saturation rate never exceeds 15% in the projections. For employees in the CVG/He bron region we assume doubling of the saturation rate the first two years of the program and then an increase of 1% each of the remaining 3 years. It is assumed that saturation remains at 5% until 2049. We assume that each additional student or employee completes 520 annual trips on transit. These assumptions are used to create the ridership estimates in Table 10 and Table 11.

   The OKI Travel Demand Model and MOVES4 were used to obtain GHG emissions data for weekday travel in the month of July in 2026, 2030, 2040, and 2050. Linear interpolation was used to estimate emissions in intervening years. To estimate the full year weekday GHG emissions we adjust for use of air conditioning but assume all other travel behavior remains similar. Calculations using the FHWA NHTS vehicle distribution and information on AC fleet prevalence from MOVES4 documentation show that approximately 95% of vehicles have functioning AC. We use the quadratic relationship between heat index and proportion of vehicles that use AC[8] to adjust MOVES4 July output for each month.

   BEB fleet replacement: We assume that 5 BEB replace diesel buses in Ohio and 5 BEB replace diesel buses in KY. We also assume that each bus being replaced is diesel and has a mileage of

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[7] https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves

[8] Population and Activity of Onroad Vehicles in MOVES4 https://www.epa.gov/moves/moves-onroad-technical-reports

3.7 mpg[9] and annual VMT of 42,940[10]. Each BEB is assumed to be 40' with a 686 kWh capacity battery and estimated fuel economy of 2.10 kWh/mile[11].

4. **Reference Case Scenario:** *Fare-free project:* The reference case assumes no change in service or fares for the duration of the measure. GHG emissions are calculated annually from 2025 – 2050 using projected changes in ridership for transit at the current service level.
   BEB fleet replacement: The reference case assumes that no BEB will replace the buses during the project.
5. **Measure-Specific Activity Data:** *Fare-free project:* SORTA estimates a 1.5% saturation rate among employees in uptown and census data was used to estimate a 0.5% saturation rate for riders in the CVG/Hebron area. Estimates for employees currently taking transit and estimates of total annual rides from these riders are shown in Table 9.

Region	Employees using transit	Annual rides
Uptown (SORTA)	750	390,000
CVG/Hebron (TANK)	275	143,000

Table 9: Estimated employee ridership, 2024

Reference case annual ridership calculations are in Table 10 and Fare-free annual ridership projections are in Table 11.

Year	SORTA Uptown Routes	TANK CVG/Hebron Routes	Year	SORTA Uptown Routes	TANK CVG/Hebron Routes
2025	7,729,580	291,156	2038	9,884,115	372,311
2026	8,116,063	305,712	2039	9,982,957	376,035
2027	8,521,865	320,998	2040	10,082,785	379,796
2028	8,947,959	337,048	2041	10,183,613	383,593
2029	9,037,440	340,419	2042	10,285,449	387,429
2030	9,127,813	343,824	2043	10,388,305	391,302
2031	9,219,091	347,263	2044	10,492,187	395,216
2032	9,311,283	350,735	2045	10,597,108	399,168
2033	9,404,393	354,242	2046	10,703,081	403,161
2034	9,498,438	357,784	2047	10,810,112	407,191
2035	9,593,424	361,362	2048	10,918,214	411,264
2036	9,689,359	364,976	2049	11,027,395	415,375
2037	9,786,252	368,625			

Table 10: Reference Case Ridership Projections

Year	SORTA Uptown Routes	TANK CVG/Hebron Routes	Year	SORTA Uptown Routes	TANK CVG/Hebron Routes
2025	7,460,043	436,757	2038	17,450,119	1,771,633
2026	9,334,545	746,414	2039	17,842,552	1,777,696
2027	11,224,773	1,062,000	2040	18,064,189	1,783,797
2028	13,755,511	1,383,550	2041	18,146,239	1,793,444
2029	15,544,326	1,697,621	2042	18,229,110	1,803,130
2030	15,898,670	1,724,425	2043	18,312,809	1,812,855
2031	16,284,948	1,730,203	2044	18,397,345	1,822,618
2032	16,359,970	1,736,016	2045	18,482,726	1,832,420
2033	16,747,742	1,741,863	2046	18,568,961	1,842,262
2034	16,824,271	1,747,746	2047	18,656,059	1,852,143
2035	17,213,566	1,753,663	2048	18,744,028	1,859,725

[9] https://afdc.energy.gov/data/10310 derived from https://apta.com/wp-content/uploads/APTA_Fact-Book-2019_FINAL.pdf
[10] https://afdc.energy.gov/data/10309
[11] https://www.nrel.gov/docs/fy21osti/80022.pdf

2036	17,291,633	1,759,617	2049	19,043,476	1,866,178
2037	17,370,482	1,765,607			

Table 11: Fare Free Program Ridership Projections

MOVES4 computations for July emissions in 2026, 2030, 2040, and 2050 are shown in Table 12. Values for GHG emissions between these years are estimated using linear interpolation.

Year	NOx (US Tons)		VOC (US Tons)		CO2 (MT)	
	Base	Fare-Free	Base	Fare-Free	Base	Fare-Free
2026	27.11	26.90	17.80	17.73	28089.75	27867.21
2030	18.45	18.25	14.91	14.82	25263.25	24988.74
2040	9.27	9.17	10.86	10.79	21178.51	20939.41
2050	7.78	7.71	9.27	9.21	21077.62	20860.93

Table 12: MOVES4 Output July Weekday 2026, 2030, 2040, 2050

BEB fleet replacement: Annual GHG emission reduction for the 10 BEBs are shown in Table 13

State	CO2 Reduced (MT)	CH4 Reduced (MT)	N2O Reduced (MT)	CO2e Reduced (MT)
OH	224.5774392	-0.034625029	-0.002611867	222.933477
KY	257.8313002	-0.03033025	-0.001998328	256.4775424
Total	482.4087394	-0.064955279	-0.004610195	479.4110193

Table 13: BEB GHG emission reduction

6. **GHG Emissions Reduced:** Total annual GHG emission reductions for both transit projects are shown in Table 14. GHG emissions are reduced by 16,608 MT CO2e between 2026 and 2030 and by 81,228 MT CO2e between 2026 and 2050.

Year	Total CO2 Reduction (MT)	Total Nox Reduction (US Tons)	Total VOC Reduction (US Tons)
2026	3,039.46	2.55	0.87
2027	3,169.66	2.52	0.90
2028	3,318.06	2.48	0.93
2029	3,466.45	2.44	0.96
2030	3,614.84	2.41	0.99
2031	3,574.40	2.29	0.97
2032	3,533.95	2.17	0.96
2033	3,493.51	2.05	0.94
2034	3,453.06	1.94	0.92
2035	3,412.62	1.82	0.90
2036	3,372.17	1.70	0.88
2037	3,331.73	1.58	0.86
2038	3,291.28	1.46	0.84
2039	3,250.84	1.35	0.82
2040	3,210.39	1.23	0.80
2041	3,184.79	1.19	0.79
2042	3,159.19	1.15	0.77
2043	3,133.59	1.11	0.76
2044	3,107.99	1.06	0.74
2045	3,082.39	1.02	0.73
2046	3,056.79	0.98	0.71
2047	3,031.19	0.94	0.69
2048	3,005.58	0.90	0.68
2049	2,979.98	0.86	0.66
2050	2,954.38	0.82	0.65

Table 14: Annual transit GHG emission reductions.

CLEAN INDUSTRY Equipment Replacement Program

1. **GHG Reduction Estimate Method:** Reduction estimates for the equipment replacement program are based on expected reductions in diesel fuel usage or electric battery information estimated from manufacturers' spec sheets.
2. **Models/Tools Used:** EPA stationary and mobile combustion factors for diesel were used to estimate GHG emissions for current equipment and new diesel equipment. eGrid emissions factors were used to estimate GHG emissions for new electric equipment.
3. **Measure Implementation Assumptions:** Calculations assumed that all requested equipment is procured and replaces older equipment by the end of 2025. Assumptions of fuel use were based on stated fuel savings from manufacturer spec sheets. Electric locomotive power use was provided by the manufacturer based on a standard workday. For electric forklifts it was assumed that a battery would consume 80% of its capacity in a standard 8-hour workday. GHG emissions due to electricity consumption assumed all electricity was consumed in eGrid subregion RFCW.
4. **Reference Case Scenario:** The reference scenario is calculated based on the 2023 diesel fuel used for each item of equipment being replaced. The EPA stationary and mobile combustion factors for diesel fuel equipment were used to estimate the reference case scenario.
5. **Measure-Specific Activity Data:** Fuel use projections are based on the manufacturer's spec sheets. Procurement and implementation of new equipment is assumed to be completed by the end of 2025. It is assumed that if the equipment life-cycle is less than 25 years it will be replaced by comparable equipment. In Table 15 descriptions of current and replacement equipment as well as their fuel use are outlined. This equipment is representative of industrial equipment used in the region, obtained directly from industry partners and manufacturers' spec sheets and directly from manufacturers when possible.

Status	Equipment Type	Example Unit	Fuel Type	Fuel (gal/yr)	Battery (kWh)	Energy per hour (kWh)	Hours per year	Est. Cost
Existing	Forklift	Toyota 7FDU45 10,000 LB	Diesel (Tier 3)	600				
Replacement	Forklift	Toyota 05-8FBm40T 8,000 LB	Electric		67		1,000	$89,747
Existing	Forklift	Taylor TN30 30,000 LB	Diesel (Tier 2)	2,200				
Replacement	Forklift	Taylor Z360M 36,000 LB	Electric		245		1,000	$634,000
Existing	Skid Steer	Bobcat S250	Diesel (Tier 3)	600				
Replacement	Skid Steer	Bobcat T7X	Electric		72		188	$200,000
Existing	Locomotive	EMD SD40-2	Diesel (Tier 0)	30,000				
Replacement	Locomotive	Z18C-RS	Electric			124	2,500	$2,200,000
Existing	Locomotive	EMD MP15AC	Diesel	11,500				
Replacement	Locomotive	900 THP 115-TON ECOx2	Electric			80	2,500	$1,300,000

Table 15: Representative Industrial Equipment Replacements

We estimate the GHG emissions for each piece of equipment using EPA GHG emissions factors. Annual emissions for each type of equipment are listed in. As renewable energy becomes more prevalent in the region emissions from electric equipment will be further reduced.

Equipment Type	Fuel Type	CO2 (MT/yr)	CH4 (MT/yr)	N2O (MT/yr)	CO2e (MT/yr)
Forklift (8,000 - 10,000 LB)	Diesel	6.174	0.000	0.000	6.195
Forklift (8,000 - 10,000 LB)	Electric	3.179	0.000	0.000	3.199
Forklift (30,000 - 40,000 LB)	Diesel	22.638	0.001	0.000	22.714
Forklift (30,000 - 40,000 LB)	Electric	11.623	0.001	0.000	11.696
Skid Steer	Diesel	6.174	0.000	0.000	6.195
Skid Steer	Electric	0.642	0.000	0.000	0.646

Equipment Type	Fuel Type	CO2 (MT/yr)	CH4 (MT/yr)	N2O (MT/yr)	CO2e (MT/yr)
Locomotive	Diesel	308.700	0.024	0.008	311.624
Locomotive	Electric	147.189	0.013	0.002	148.111
Switcher Locomotive	Diesel	118.335	0.009	0.003	119.456
Switcher Locomotive	Electric	95.240	0.009	0.001	95.836

Table 16: GHG Emissions from current and replacement equipment

6. **GHG Emissions Reduced:** The average cost per metric ton of CO_2e reduction for the listed equipment is $4,280 per metric ton per year for 2025 – 2030. Since this will be a competitive proposal process, we use this average together with the equipment budget of $31.25 million ($25 million from grant, $6.25 million from applicant match) to estimate GHG reduction. Each year starting in 2026 it is estimated that 1,460 metric tons less CO_2e will be emitted due to equipment replacement. Between 2025 and 2030 the GHG reduction is 5841 metric tons of CO_2e. Between 2025 and 2050 the GHG reduction is 35,043 metric tons of CO_2e.

FOOD Program

1. **GHG Reduction Estimate Method:** We estimate the increase in food and yard waste diverted from landfills by increased capacity for food rescue and composting. This is offset by some equipment needed to perform these operations.
2. **Models/Tools Used:** Estimates for GHG emissions created by the refrigeration unit on refrigerated box trucks are from the TRU[12] emissions calculator. Mobile emissions are calculated assuming a 2021 truck using the EPA provided diesel emissions factors. Walk in freezer estimates are obtained by estimating the daily energy used and multiplying by the appropriate eGRID GHG emission factor. To estimate the GHG emissions reductions from food rescue, composting, and recycling we estimate the quantity of material diverted from the landfill and use the EPA WARM tool[13] to estimate emissions reduced.
3. **Measure Implementation Assumptions:** Based on the Hamilton County Residential Waste Composition Study (2018)[14] we assume that food waste accounts for 15% of municipal solid waste and yard waste for 17%. This is reflected in Table 18 where the waste totals were obtained from each state. We assume that landfilled waste would remain constant without implementation of this project. Local experts estimate that the amount of additional food rescued is 2% of landfilled food in year 1, increasing to 4% in year 2, 7% in year 3, and 10% in year 4 and beyond. The additional food waste composted would be 5% of compostable waste in year 1, increasing by 5% each year to 25% in year 5 and beyond.

   For the refrigerated truck unit we assume a diesel engine with electric refrigeration unit that is used 1,040 hours per year, plugged in 50% of the time. Trucks are assumed to drive 30,000 miles per year at 22 mpg. Walk in freezers were estimated to have a 230V/16.7A condenser based on industry specs and are assumed to be housed in Ohio for calculations. We assume the condenser runs approximately 80% of the time, or 7,008 hours per year. We estimate that 25 trucks and 15 freezers will be needed distributed approximately 20% per year for each program year.

[12] https://www.epa.gov/verified-diesel-tech/refrigerated-trailers-and-transport-refrigeration-units-trus
[13] https://www.epa.gov/warm
[14] https://hamiltoncountyr3source.org/ArchiveCenter/ViewFile/Item/113

4. **Reference Case Scenario:** For the reference case we assume that no additional food waste is diverted from landfills for the duration of the program beyond existing rescue operations.
5. **Measure-Specific Activity Data:** Estimated energy use and GHG emissions for each piece of equipment is shown in Table 17. Estimates of total municipal solid waste in the MSA, food waste, and potential for rescue and compost are in Table 18.

Equipment	Energy Use	per year	CO_2 (MT)	CH_4 (MT)	N_2O (MT)	CO_2e (MT)
Refrigerated Truck (TRU)	Diesel	1,040 hrs	2.8	0.00018	0	2.8
Refrigerated Truck	22 mpg	30,000 miles	13.9	0.00029	0.0013	14.3
Walk-in Freezer	3.9 kWh	7,008 hrs	22.3	0.00213	0.00031	22.4

Table 17: Food rescue equipment GHG emissions

Year	Total Waste (US Ton)	Food waste (US Ton)	rescue %	Food waste rescued (US Ton)	compost %	Food waste composted (US Ton)
2025	2,417,348	362,602	2%	7,252	5%	18,130
2026	2,417,348	362,602	4%	14,504	10%	36,260
2027	2,417,348	362,602	7%	25,382	15%	54,390
2028	2,417,348	362,602	10%	36,260	20%	72,520
2029	2,417,348	362,602	10%	36,260	25%	90,651

Table 18: Municipal Solid Waste in and potential food diverted 2025-2029

6. **GHG Emissions Reduced:** Table 19 shows the GHG emissions reduced by diverting food waste and the anticipated equipment GHG emissions for 2025 – 2029. After 2029 the emission reduction remains a constant 425,426 MT CO_2e per year. The total GHG reduction is their difference. From 2025-2029 the reduction is 668,513 MT CO_2e and from 2025-2049 it is 4,823,502 MT CO_2e.

Year	CO2e Reduced Food Waste (MT)	CO2e equipment emissions (MT)	Total CO2e Reduced (MT)
2025	41,703	152.91	41,550
2026	83,405	305.83	83,099
2027	140,197	458.74	139,738
2028	196,988	611.66	196,376
2029	208,514	764.57	207,749

Table 19: GHG Emissions Reduced by reducing landfilled food waste.

Tree For Me Program

1. **GHG Reduction Estimate Method:** Estimated CO_2 avoided and sequestered due to planting 30,000 new trees in the region.
2. **Models/Tools Used:** The i-Tree Planting Calculator was used to estimate emissions avoided and sequestered as well as reductions in energy and fuel use.
3. **Measure Implementation Assumptions:** Trees are apportioned to counties with LIDAC tracts in the region by population in LIDAC tracts using ACS 2019 data. The mix of trees being planted is assumed to be the same for each county. It is assumed that 6,000 tree will be planted each year.
4. **Reference Case Scenario:** The reference case assumes no trees are planted for the duration of the measure timeframe and that tree canopy remains constant.
5. **Measure-Specific Activity Data:** For this estimate trees are apportioned by type to each county by population in low income disadvantaged communities as in Table 20. Since the i-Tree tool requires a selection of city for each computation, the largest city in a LIDAC tract for each county was chosen. Median housing stock age was used to determine which housing age range is used

in the tool. For median housing years prior to 1975 we use buildings built 1950-1980. For median housing years after 1975 we use buildings built after 1980. Default values for Electricity and Fuel Emissions factors were used. It is assumed that 3% of the planted trees die each year as recommended by the i-Tree tool. For this estimate we assume that we plant 7,500 of each of Red Maple, Swamp White Oak, Tupelo Sp., and Redbud, with 25% of each variety making up the trees planted in each county. Trees are planted over 5 years, with approximately 6,000 trees planted in LIDAC tracts per year from 2025 through 2030.

County	City for i-Tree	Median Housing Year	% LIDAC population	Trees to plant
Boone County, KY	Florence	1986	1.90%	570
Bracken County, KY	Brooksville	1975	1.20%	365
Brown County, OH	Georgetown	1976	3.40%	1,020
Butler County, OH	Hamilton	1957	21.30%	6,400
Campbell County, KY	Newport	1956	2.70%	800
Clermont County, OH	Bethel	1986	2.90%	880
Dearborn County, IN	Lawrenceburg	1972	1.10%	335
Franklin County, IN	Brookville	1969	1.50%	440
Gallatin County, KY	Warsaw	1991	1.40%	405
Grant County, KY	Williamstown	1987	3.50%	1,060
Hamilton County, OH	Cincinnati	1959	47.70%	14,320
Kenton County, KY	Covington	1965	9.00%	2,705
Ohio, IN			0.00%	0
Pendleton County, KY	Falmouth	1973	1.00%	310
Union, IN			0.00%	0
Warren County, OH	Turtlecreek	1993	1.30%	390

Table 20: Trees per county

6. **GHG Emissions Reduced:** Annual GHG reduction in CO_2e (MT) are given in Table 21. The cumulative GHG reduction from 2025 – 2030 is 5,747.73 MT CO_2e and from 2025 – 2050 is 81,496.5 MT CO_2e.

Year	CO2 Reduced MT	Year	CO2 Reduced MT
2025	377.22	2038	3,473.37
2026	757.45	2039	3,644.23
2027	1,143.80	2040	3,915.96
2028	1,535.89	2041	4,175.06
2029	1,933.37	2042	4,421.81
2030	1,958.85	2043	4,656.97
2031	2,037.92	2044	4,851.17
2032	2,213.95	2045	4,889.99
2033	2,432.70	2046	5,029.26
2034	2,691.31	2047	5,161.03
2035	2,987.03	2048	5,285.55
2036	3,230.67	2049	5,317.03
2037	3,374.92		

Table 21: Annual GHG reduction in Metric Tons