

Appendix B

Technical Methodologies,
Calculations, & Assumptions

Washington County Technical Appendix

GHG Reduction Estimate Method

As an implementation application under the Oregon Metro region PCAP, Washington County Oregon estimated GHG reductions for this application using the same methods and data that were used to estimate the benefits of Measure Res-2 in the Oregon Metro and Portland-Vancouver MSA's PCAP. The scope of implementation is updated to reflect scope specific details from this application. Washington County's method is described below and draws on methodology from Metro's application and PCAP.

1. Estimating the average reduction in energy use and greenhouse gas emissions that funding for energy efficiency measures would achieve.
2. Applying average reductions to the average GHG emissions for single family and multifamily units using emission factors specific to each of the three counties within the applications geographic scope.
3. Scaling the benefits on assumptions of the number of multifamily and single family units upgraded in each county.

Measure Implementation Assumptions

The following implementation assumptions are used in project scope calculations

Number of units impacted by the project (Calculator Table 13.)

- Washington County - 264 Single Family 180 MultiFamily
- Clackamas County- 145 Single Family
- Clark County- 318 MultiFamily

Assumed rate of implementation (Calculator Table 13.)

The scope of work includes energy efficiency upgrades to units in all three counties described. Each of the project partners will be identifying contractors to perform work in line with local requirements. This implementation style will allow for work to be completed in parallel. The assumed timeline for the five year requirement includes, one year of planning, three years of implementation in which 33% of the scope will be completed in each year, and one year for any remaining projects to be finalized.

Lifetime of Project Scope

Based on building age and the equipment proposed in the scope of work, the estimated lifetime for the project is 15 years.

GHG Reduction Estimate and Assumption

Fuel Type and Household Energy Consumption

This application draws on the regional average household energy consumption provided in the Metro PCAP. Metro's data for residential energy consumption by fuel type was shared for the purposes of this application and was gathered from regional utilities. This information is provided on a per single family and per multifamily basis. Estimates are shown in Table 14. Basic estimates include 7124.91 kWh and 258.78 therms per single family household and 2840.27 and 126.34 therms per multifamily household.

Emission Factors

Emission factors for natural gas combustion came from the EPA Emissions Factors Hub assuming IPCC AR5 global warming potential values for carbon dioxide equivalence. Electricity emission factors however, were market based calculations on a county level provided through the Metro PCAP and GHG Inventory. The market based calculations consider the relative emission factors of each electric utility in the county. All emission factors are included in Table 14. of the GHG calculator.

Reference Case Scenario

The business as usual case for the scope of this application assumes that the publicly owned housing units described will receive upgrades as traditional funding mechanisms allow. Publicly owned housing does not receive funding through typical housing channels and is often lacking in high energy efficiency measures. The publicly owned housing units described will continue to operate and produce emissions at a likely higher rate than the conservative average estimates described in this application. If units receive upgrades they will be to minimum standards while the upgrades in the application describe more high quality and energy efficient upgrades. This also implies that the utility paying residents of these dwellings will continue to pay a higher than average cost for energy utilities.

Measure Specific Activity Data

Energy savings are assumed to total 40% when all upgrades have been applied. The following upgrades contribute to the assumed reduction.

- Natural Gas Furnace to 22 SEER2 Ducted Heat Pump
- Electric Furnace to 22 SEER2 Ducted Heat Pump
- Zonal Electric Heat to 22 SEER2 Ducted Heat Pump
- Gas & Electric water heater to UEF 3.0 Heat Pump Water Heater
- Building Envelope Sealing and attic Insulation to R-49

- Windows upgraded to a U value of 22 and Solar Heat Gain Coefficient of less than .5
- Refrigerators and clothes dryers upgraded to energy star models, replacement of gas stoves with electric
- 2-3 Trees Planted at most properties

In addition to the energy efficiency component of the savings, it is assumed that natural gas space and water heating will be converted to electricity. When these activities are considered the following reductions are estimated: 10,278,404 kWh and 454,640 therms.

GHG Emissions Reduced

As identified in previous sections GHG reductions were calculated by first utilizing regional average values for single family home and multi family home annual energy consumptions. Emission factors were generated using a market based approach for each county and natural gas emission factors were taken from EPA standard values. A 40% overall energy reduction is assumed for the total impact of the energy efficiency upgrades proposed in this application. These values were scaled to the level of the project scope and applied to the 2030 and 2050 timelines identified in the application requirements.