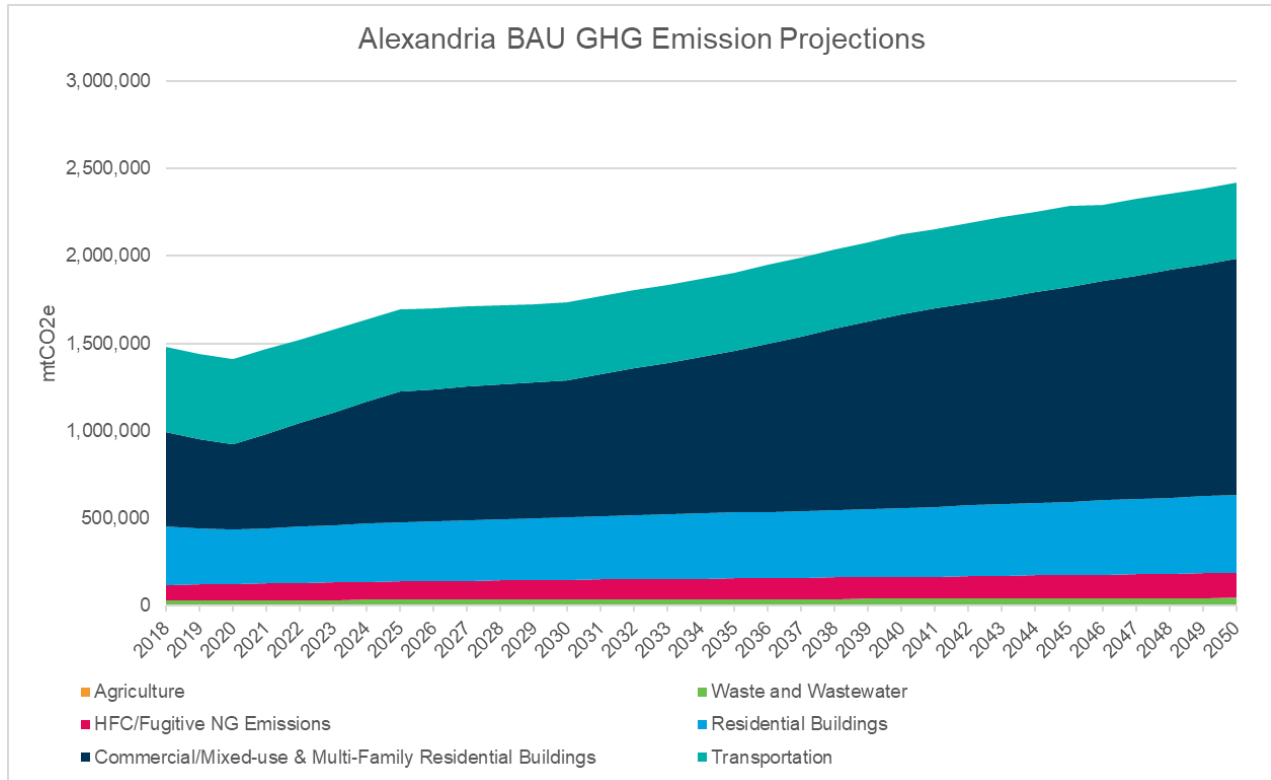


Alexandria Energy and Climate Change Action Plan (ECCAP)

Business-as-Usual (BAU) Assumptions and Methodology Summary Draft

Summary Business-As-Usual GHG Emissions



Transportation

- On-road emissions projections are estimated using vehicle miles traveled (VMT) and emissions projections developed by MWCOG as part of the *Transportation Planning Board's Long-Range Transportation Plan*. GHG and VMT estimates are provided for 2018, 2030, and 2045. These are used together to calculate an implied emission factor for these years. VMT, emission factors, and then total emissions for intervening years are interpolated, and 2046–2050 are extrapolated using a linear trend.
- Off-road emissions are projected through 2050 using population forecasts, with the 2018 estimate from MWCOG's *Long-Range Transportation Plan* as the starting point.
- Rail emissions are held constant through 2050 and are based on the 2018 estimate from MWCOG's Inventory, which calculates emissions using diesel consumption data for transit authorities, provided by the Federal Transit Administration (FTA).
- Aviation travel emissions are projected through 2050 using population forecasts, with the 2018 estimate from MWCOG's Inventory as the starting point.

Building Energy Use

- Building emissions projections are based on energy consumption (electricity, natural gas, fuel oil, and propane) for existing and new construction in residential and commercial subsectors.
- Energy consumption for existing buildings for 2018 base year uses the *2018 Alexandria GHG Inventory and Contribution Analysis* to establish 2018 baseline and perform calibration. Each subsequent year through 2050 of existing building emissions from energy consumption is the sum of prior year energy consumption from existing and new construction.
- New construction energy consumption is based on Energy Use Intensity (EUI) expressed as energy consumption per household (or commercial building square foot) and multiplied by new households (or new commercial building square feet) in each year. The 2018 EUI is derived from the 2018 Alexandria Inventory ICLEI Local GHG Contribution Analysis Tool and new household data (commercial square feet data) is derived from the *MWCOG Summary of Intermediate Household Forecasts Draft Round 9.2 Cooperative Forecasts for the City of Alexandria (CoStar Commercial Property Records)*.
- Adjust for any double counting between household projections and CoStar commercial growth trend data to account for mixed-use and multi-family development (classified as commercial)..
- Energy consumption in 2019 is calculated by applying a weighted average of energy consumption in newly constructed households (or new commercial square feet) which employs a stricter energy code and electricity consumption in existing houses. In addition, a 95% compliance rate is applied to newly constructed houses to account for discrepancies in code compliance. 2020 and 2021 energy consumption were calculated similarly.
- All building EUIs are held constant at 2021 levels for BAU through 2050.
- Fuel oil and propane use and greenhouse gas emissions held constant.
- Calibration against *Draft 2020 Alexandria GHG Inventory*.
- The impact of the 2019 Green Building Policy is represented as a greenhouse gas mitigation strategy and is not considered as an adjustment to BAU.

Waste

Solid Waste

- Solid waste projections assume that no waste is treated by landfill and that all waste is treated at the Covanta waste-to-energy (WTE) plant according to *2018 Alexandria GHG Inventory and Contribution Analysis*.
- The Covanta WTE plant is assumed to continue operations through 2050.
- Emissions assumptions for MSW incineration based on ICLEI – U.S. Community Protocol for Accounting and Reporting of GHG Emissions with most recent values updated in 2013.
- Waste combustion emissions are projected through 2050 using population forecasts with the 2018 estimates of waste combustion emissions as a base year taken from the *2018 Alexandria GHG Inventory and Contribution Analysis*.

Wastewater

- Wastewater projections assume that the population is entirely served by sewer and no population is served by septic systems based on the *2018 Alexandria GHG Inventory and Contribution Analysis*.
- Wastewater emissions are projected through 2050 using population forecasts with the 2018 estimates of wastewater emissions in sewer and sewer N₂O effluent as the starting point taken from the *2018 Alexandria GHG Inventory and Contribution Analysis*, including Alexandria Renew Enterprises GHG Inventory.
- Emission factors for incineration of MSW are based on *ICLEI – U.S. Community Protocol for Accounting and Reporting of GHG Emissions* with most recent values updated in 2013.

Agriculture

- Agriculture emissions projections are based on *2018 Alexandria GHG Inventory and Contribution Analysis*.
- Emission projections are extrapolated to 2050 based on the inferred annual growth rate of – 5.4% between 2005 and 2018 from emissions from agricultural activities, mainly soil fluxes from urban fertilizer applications.

HFCs

- HFC emissions in 2018 are derived as a proportion of total HFC usage found in EPA's greenhouse gas emissions inventory and Alexandria's population in relation to the total U.S. population.
- HFC emissions are projected through 2050 using population forecasts of Alexandria.

Fugitive Emissions

- Fugitive emissions are based on applying a natural gas leakage rate to the natural gas consumption of residential and commercial buildings from the *2018 Alexandria GHG Inventory and Contribution*, which is derived from the *Metropolitan Washington Energy Utility Data Survey Analysis*.
- The natural gas leakage rate is derived using reported 2018 natural gas fugitive emissions from the *2018 Alexandria GHG Inventory and Contribution* Alexandria's inventory divided by natural gas consumption.

Additional Supporting Data

Global Warming Potential

- Global warming potentials (GWP) are based on the IPCC's 5th Assessment Report as follows:

Gas	100-year GWP
CO ₂	1
CH ₄	28
N ₂ O	265

- Emissions are reported in aggregate across all gases (in CO₂e) based on the GWPs above.

Demographic Data

- Demographic data are based on MWCOG projections, *MWCOG Cooperative Forecasts Round 9.2 (employment, households) for City of Alexandria*.
- Emissions through 2050 are extrapolated from 2018 emission data based on demographic information including changes to population, households, employment, and commercial building square footage.

Electricity Emission Factors

- Electricity grid emission factors are held constant for BAU scenario (2020–2050). This is consistent with approaches used in other jurisdictions and with MWCOG.
 - AEO projections (which account for policies such as the Virginia Clean Economy Act and RGGI) may be used depending on the City's preference, or may be used to show an adjusted BAU. The emission factors for this case are already developed and on the Emission Factors tab, row 32.
- Current grid factors are projected using the latest available dataset from eGRID, which contains 2020 emission factors (<https://www.epa.gov/egrid/download-data>).