Appendix A

GHG Accounting and Projections Methodology

West Hollywood Climate Action & Adaptation Plan

Greenhouse Gas Accounting and Projections Methodology

08 August 2021

Revision 02

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Purpose

This methodology memorandum describes the greenhouse gas (GHG) accounting and projections methodology for the West Hollywood Climate Action & Adaptation Plan (CAAP), which is expected to be completed and released in late 2021. The document is organized into two sections corresponding with the following objectives:

Part I: GHG Emissions Inventory

This section describes the methodology for estimating 2018 GHG emissions from community-scale and municipal activities and sources. The community-scale inventory includes emissions and sequestration from transportation, stationary energy, product use, waste and wastewater, urban trees, and other scope 3 emissions associated with electricity use for water supply and wastewater treatment. The municipal GHG inventory section documents emissions from municipal buildings and facilities, vehicle fleet, and other scope 3 emissions from employee commute, employee generated waste, and water consumption at municipal facilities. This section also summarizes the emission trends between 2008 to 2018 and explains the differences between the accounting approaches used for estimating community-scale and municipal emissions, between the 2008 and 2018 inventories.

Part II: Emission Scenarios and Pathways

This section describes the approach for modelling GHG emission scenarios to provide estimates of future emission levels based on several factors: continuation of existing trends in demographic growth, activity or resource consumption, as well as technology changes, State legislation, citywide programs, and proposed pathways for achieving carbon neutrality. Part II describes three emission scenarios:

- The business-as-usual (BAU) scenario projects future emissions based on current population and regional growth trends, climate patterns, and regulations introduced before the 2018 baseline year. The BAU scenario demonstrates the growth in GHG emissions that would occur if no further action were to be taken by the City or State after 2018.
- The business-as-planned (BAP) scenario uses the same growth assumptions as the BAU scenario, but also accounts for emissions reduced from regulations that were introduced between the 2018 baseline year and 2021 CAAP release. The BAP scenario demonstrates an emission trajectory that accounts for climate actions and programs that are already in the pipeline.
- The Carbon Neutrality (CN) scenario builds upon BAP projections and estimates the emission reduction potential of relevant measures and sub-actions proposed in this CAAP. These projections demonstrate sector-specific pathways will allow the City of West Hollywood to achieve carbon neutrality by 2035, consistent with the State's Executive Order B-55-18 that sets a goal of achieving carbon neutrality statewide by 2045.

Part I: GHG Emissions Inventory

Community-scale GHG Emissions Inventory

The 2018 Community-scale GHG emissions inventory for the City of West Hollywood was developed using the Global Protocol for Community-scale GHG Emission Inventories (GPC). This protocol is used for calculating and reporting emissions from community activities and sources from seven gases: Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur hexafluoride (SF_6) and Nitrous trifluoride (NF_3). GHG emissions from these activities are organized into five sectors: Transportation, Stationary Energy, Waste (including Wastewater), Industrial Processes and Product Use (IPPU), and Agriculture, Forestry and Other Land Use (AFOLU). The protocol further offers two related frameworks—the Scopes Framework and the City-induced Framework—for reporting emissions from each sector:

Scopes Framework: This framework captures GHG emissions produced within a geographic boundary by categorizing emissions as scope 1, 2 and 3 emissions in each Sector:

- Scope 1: Scope 1 emissions are produced from activities and sources within the city boundary.
- Scope 2: Scope 2 emissions are generated from the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary; and
- Scope 3: Scope 3 emissions occur outside the city boundary due to activities taking place within the city boundary.

City-induced Framework: This framework measures GHG emissions attributable to activities and sources within a geographic boundary and covers selected scope 1, 2 and 3 emissions from each sector. This framework offers two reporting levels:

- BASIC: The BASIC reporting level includes emissions from Transportation, Stationary Energy, and Waste Sectors.
- BASIC+: The BASIC+ reporting level includes all BASIC requirements as well as emissions from Transmission and Distribution Grid Losses, Transboundary Transportation, In-Boundary Generated Waste emission sources, IPPU, and AFOLU.

The 2018 GHG emissions inventory for the City of West Hollywood utilizes the City-induced BASIC+ Framework with global warming potential (GWP) values from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), unless otherwise specified. The inventory is prepared using sector-specific generation and resource consumption data for relevant sub-sectors included in the BASIC+ protocol. The accounting methodology, data sources and emission factors used for accounting 2018 emissions are detailed in the subsequent sections.

Stationary Energy

The Stationary Energy sector includes emissions from energy use in residential, commercial, and institutional buildings and facilities. Emissions from natural gas combustion in buildings and facilities and grid electricity consumption are reported under this sector. GHG emissions from natural gas consumption in residential and non-residential buildings are calculated using 2018 SoCalGas consumption data and emission factors from the Climate Registry.[1] [2] GHG emissions from electricity consumption in residential and non-residential buildings are calculated using 2018 SCE consumptions data and an emissions factor from SCE.[3] Emissions associated with transmission and distribution losses are accounted using a loss factor of 4.80%.[4]

Table 1: Stationary Energy Emissions

Category	Scope	Activity	Emissions (in MTCO2e)
Residential: Gas	1	6,526 thousand therms	34,724
Residential: Electricity	2 and 3	97,100 MWh	23,459
Non-Residential: Gas	1	3,644 thousand therms	19,388
Non-Residential: Electricity	2 and 3	208,004 MWh	50,253
TOTAL			127,824

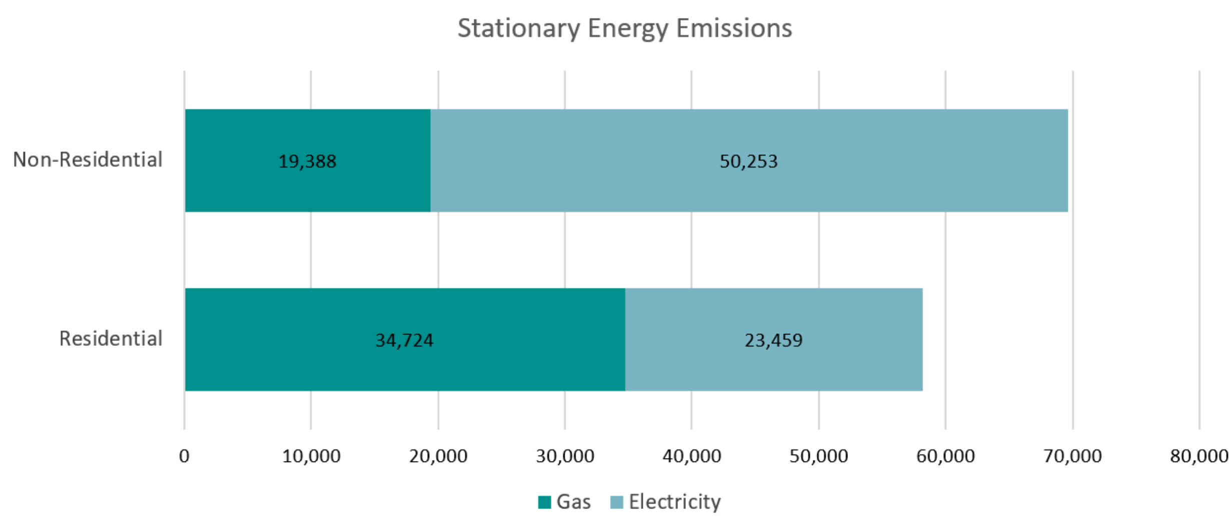


Figure 1: 2018 Residential and Commercial Energy Use

Transportation

The Transportation sector accounts for emissions from fuel combustion and electricity consumption from passenger vehicles, light-duty and medium-duty trucks, and public transit systems. These emissions are estimated using average weekday vehicle miles travelled (VMT) data obtained from West Hollywood's 2017 Travel Demand Model and SCAG's 2016 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) Model, emission factors from CARB's On-Road Mobile-Source Emissions Factors (EMFAC 2017) Model, and the 2018 EMFAC Fleet Database for West Hollywood.[5] [6] The travel demand model accounts for the city's modal share and segregates VMT into speed bins (five mile-per-hour intervals) to estimate CO2 equivalent (CO2e) emissions using emission factors from the EMFAC 2017 Model.

This inventory uses the induced activity method to estimate emissions from the city's transportation activities, including trips that begin and/or end within the city. It does not include through trips that neither begin nor end within the city, as those trips are typically accounted for by the jurisdictions of origin and destination. For this reason, heavy duty trucks (HDT) are not accounted for in the model. It is assumed that HDT trips are based on commodity flow patterns within the broader region and therefore emissions associated with these trips are not allocated to the city. 100% of the VMT for all trips within the city and 50% of the VMT for trips with one trip end inside the city are allocated to West Hollywood. In summary, this inventory includes:

- Internal to Internal: Trips beginning and ending inside the City (100%)
- Internal to External: Trips beginning inside the City and ending outside the City (50%)
- External to Internal: Trips beginning outside the City and ending inside the City (50%)
- External to External trips (i.e. those that neither begin nor end inside the City) are not included.

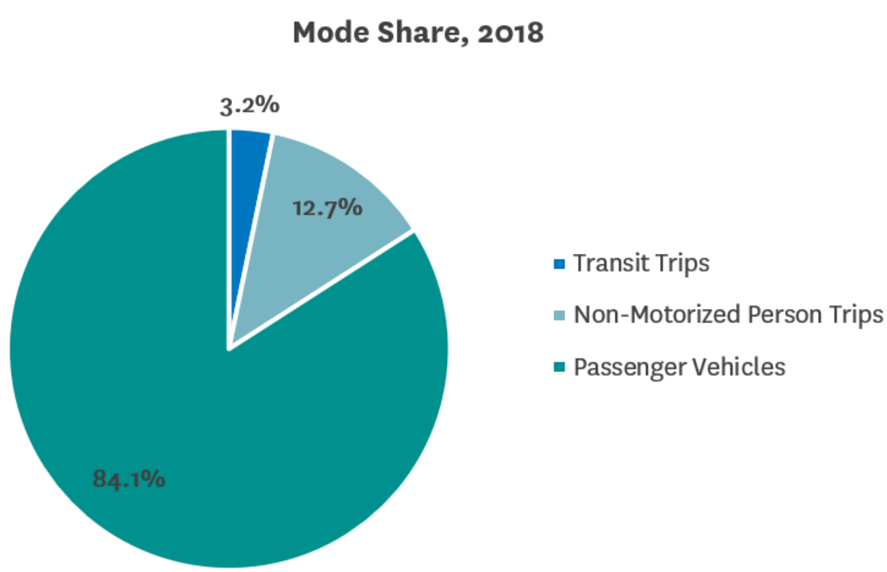


Figure 2: 2018 Mode Share/Split

GHG emissions from electricity consumption at publicly accessible EV charging stations are calculated using ChargePoint 2018 sessions data and the Southern California Edison (SCE) emission factor (0.00023 MTCO2e per kWh).[7] Emissions associated with transmission and distribution electricity losses are accounted using a loss factor of 4.80%.[8] Electricity-related emissions from EV chargers are listed under the transportation sector for informational purposes only, and not accounted under the transportation sector total, to avoid double counting with the Stationary Energy sector.

Emissions from City Public Transit Systems including Cityline and Dial-A-Ride services are accounted using gasoline and compressed natural gas (CNG) consumption data.[9] [10] GHG emissions from Metro buses are calculated using diesel, gasoline, and CNG gallon per gallon equivalent data from the Federal Transit Administration's (FTA) National Transit database (NTD) and emission factors from the EMFAC database.[11] [12] Emissions from Metro buses in West Hollywood are apportioned based on 2017 passenger patronage at each bus station.[13] For Metro bus services, only 50% of the emissions are accounted, as these trips are assumed to have one trip end inside the City on average.

Table 2: Transportation Emissions

Category	Scope	Activity	Emissions (in MTCO2e)
Passenger Vehicles and Trucks	1 and 3	1,010,330 average weekday VMT	62,089
Buses (Metro and City)	1	Diesel = 7,653 gallons Gasoline = 50,676 gallons CNG = 397,107 gallon equivalents	4,105
TOTAL			66,194
Public EV chargers*	2 and 3	102 MWh	25*

** Not included in the transportation total to avoid double counting with electricity emissions under Stationary Energy.*

Product Use

HFCs are synthetic gases that are often used to replace ozone-depleting substances. They are short lived climate pollutants (SLCPs), which are much more potent than CO_2 when measured in terms of GWP. Emissions from HFCs used in aerosols, foams, fire retardants, and refrigerants used for residential and commercial purposes in West Hollywood, and are estimated by scaling California's HFC emissions based on population.[14] This inventory includes nine short-lived hydrofluorocarbons: HFC-125, HFC-134a, HFC-143a,HFC-152a, HFC-227ea, HFC245fa, HFC-32, HFC-365mfc, and HFC-43-10mee.[15] Emissions from other HFC-based products and refrigerants that are used in the industrial and transportation sectors are not accounted in this Inventory.

Table 3: Product Use Emissions

Category	Scope	Activity	Emissions (in MTCO2e)
Residential	1	36,854 residents	4,562
Commercial	1	36,854 residents	8,528
TOTAL			13,090

Waste and Wastewater

The Waste sector accounts for emissions generated at landfills, biological treatment (composting and anaerobic digestion), and wastewater treatment plants. Waste and wastewater generated in West Hollywood are treated outside the city boundaries. Landfill-related emissions are calculated using annual disposal tonnage and waste characterization data.[16] Methane produced in landfills are estimated using the methane commitment model and CARB-specific landfill gas parameters that are built into the SEEC ClearPath tool.[17] Emissions from biological treatment are calculated based on food waste tonnage diverted to composting facilities and emission factors from the SEEC ClearPath tool. [18] [19]

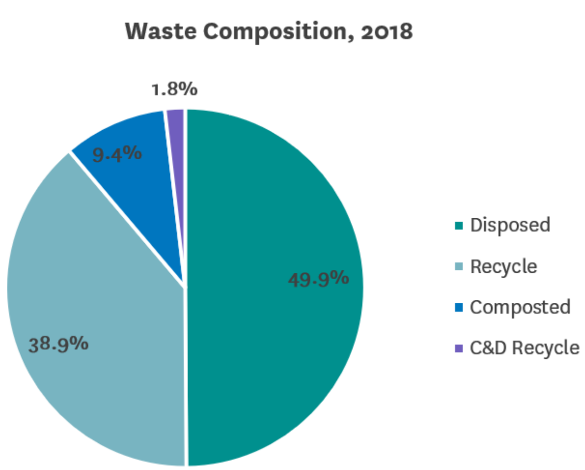


Figure 3: Waste Composition

Process emissions and direct biogenic emissions from wastewater treatment are calculated using emission factors from City of Los Angeles' wastewater treatment plants. The four water reclamation plants collectively serve over 4 million people within and outside of the City of Los Angeles, with the capacity to treat over 580 million gallons of wastewater per day.[20] Emissions for the City of West Hollywood are attributed by scaling process emissions from these plants based on population. Emissions from electricity consumption and combustion of digester gas are reported under other 3 scope emissions.

Table 4: Waste and Wastewater Emissions

Category	Scope	Activity	Emissions (in MTCO2e)
Landfills	3	23,890 tons	6,835
Composting	3	4,492 tons	186
Wastewater Treatment (Process and Biogenic)	3	36,854 residents	676
TOTAL			7,697

Urban Trees

Trees act as a sink for CO_2 by fixing carbon during photosynthesis and storing it as biomass. Emission reductions from urban trees in West Hollywood are estimated using 2016 parcel-level tree canopy area and sequestration rates (0.06 kg C/square meter/year) for the City of Los Angeles.[21] [22] Due to lack of more recent data, 2018 emissions are calculated using 2016 tree canopy data.

Table 5: Sequestration from Urban Trees

Category	Scope	Activity	Emissions (in MTCO2e)
Urban Trees	1	13.6 million square feet canopy cover	-255

Other Scope 3 Emissions

West Hollywood does not have any water filtration nor wastewater treatment plants within the city boundaries. The City does not have direct control over energy-related emissions from water filtration and wastewater treatment, and they are therefore accounted as other scope 3 emissions.

Water Consumption: Emissions from water filtration are estimated using 2016 combined emission factor for water conveyance, treatment and distribution (0.1662 MTCO2e per capita) for Los Angeles Department of Water and Power and Beverly Hills Water, which are the water suppliers serving the City of West Hollywood.[23]

Wastewater Treatment: Emissions from electricity consumption and stationary combustion from wastewater treatment are calculated using emission factors from the City of Los Angeles' wastewater treatment plants.[24] Emissions for the City of West Hollywood are attributed by scaling process emissions from these plants based on population.

Table 6: Other Scope 3 Emissions

Category	Scope	Activity	Emissions (in MTCO2e)
Water Treatment	3	36,661 residents	6,125
Wastewater Treatment (Electricity)	3	36,661 residents	685
TOTAL			6,810

Summary

In 2018, total GHG emissions from West Hollywood's community-scale activities are estimated to be 0.22 Million MTCO2e, including scope 3 emissions. The City's per capita GHG emissions are 6 MTCO2e per person. The stationary energy sector is the largest contributor of GHG emissions, followed by the transportation sector. These two categories collectively make up 91% of West Hollywood's total GHG emissions.

Table 7: 2018 GHG Emissions

Category	Scope	Emissions (in MTCO2e)
Stationary Energy (Electricity)	2 & 3	73,712
Stationary Energy (Gas)	1	54,112
On-road Transportation	1, 2 and 3	66,194
Product Use	1	13,090
Solid Waste	3	7,021
Wastewater Treatment	3	676
Urban Trees	1	-255
TOTAL		214,551
Water Supply and Treatment	*3*	*6,125*
Wastewater Treatment	*3*	*685*
TOTAL (with Other Scope 3)		221,361

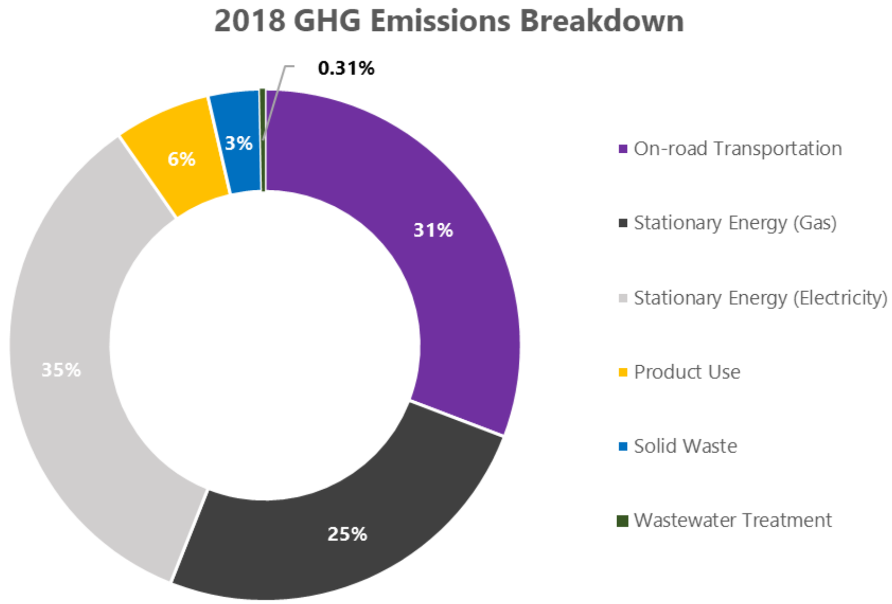


Figure 4: 2018 Community-scale GHG Emissions by Sector (excluding other scope 3)

Municipal GHG Emissions Inventory

The 2018 municipal GHG emissions inventory for the City of West Hollywood was developed using the Local Government Operations Protocol (LGOP), which provides comprehensive guidelines for reporting GHG emissions related to municipal operations. LGOP offers governments a standardized approach that can be tailored based on operational or financial control over City-owned facilities and processes. The Protocol covers six gases: Carbon dioxide (CO2), Methane (CH4), Nitrous oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur hexafluoride (SF6). The 2008 municipal inventory used LGOP to identify and report emissions from municipal assets and operations. The 2018 inventory uses the same Protocol to account for emissions from buildings and facilities, streetlights and traffic signals, vehicle and transit fleet (including public EV chargers), power generation, and other employee activities (such as commute, business travel, waste and wastewater generation).

Energy Use and Emissions

This sector accounts for GHG emissions from any City-owned or operated buildings and facilities, streetlights, and traffic lights. Emissions from natural gas combustion in buildings and grid electricity consumption are reported under this sector. In total, the City of West Hollywood owns and/or operates 13 buildings and facilities that use electricity, six of which use natural gas as well. The City's utility data (accessed through EnergyStar Portfolio Manager) was used to calculate GHG emissions from energy use in municipal buildings. This includes both grid electricity and natural gas consumption. Consumption information was extracted for the 2018 calendar year and used to calculate emissions for each building using the SCE Grid Emission Factor and natural gas emissions factors from The Climate Registry.[25] Transmission and distribution losses are also accounted for using a loss factor of 4.80% per eGRID WECC.[26]

The energy used to power streetlights and traffic signals is also included in this sector. GHG emissions from electricity use in municipal lighting operations are estimated using SCE Grid Emission Factor with a loss factor of 4.80% for transmission and distribution losses.

Table 8: Emissions from buildings and facilities

Category	Scope	Activity	Emissions (in MTCO_2e)
Buildings and Facilities – Natural Gas	1	3,965 MMBtu	210
Buildings and Facilities - Electricity	2	3,271 MWh	790
Streetlights and Traffic Signals	2	2,059 MWh	497
EV Charging	2 & 3	102 MWh	25
TOTAL			1,522

Vehicle Fleet

This sector accounts for GHG emissions generated by the City's municipal fleet and City-owned and/or operated public transit vehicles. In order to estimate CO_2 emissions from municipal vehicle trips, fuel usage data was used along with EPA emission factors to calculate the total CO_2 generated from municipal vehicles.[27] In order to calculate N_2O and CH_4 emissions from municipal vehicle trips, total gallons used by vehicle type are aggregated from the raw data by grouping by vehicle model and year. Desktop research was used to find miles per gallon (MPG) for each vehicle type. Highway and city MPG values are averaged to capture all trip types. Gallons are multiplied by MPG for each vehicle type to estimate total distance driven (in miles). Next, emissions factors from The Climate Registry were used for calculating CH_4 and N_2O emissions across the fleet.[28]

For public transit vehicles operated by the City (including Cityline and Dial-A-Ride), total gallons used in 2018 are reported by fuel type. Desktop research was used to find miles per gallon (MPG) for each vehicle type. Appropriate emission factors are applied to each unique vehicle type.[29] Emissions are multiplied by their respective GWP and summed to illustrate total MT CO_2e generated by the municipal vehicle fleet in 2018.

In 2018/19 there were 8 public EV charging stations located in West Hollywood (with another 8 curb-side stations installed in April 2020). For this inventory, 2018 energy usage data from these charging stations was obtained from the City's ChargePoint account. [30] Daily energy use in kWh was obtained for the stations for the 2018 calendar year. Energy use was summarized to provide an annual energy use value in MWh. Next, emission factors for CO_2, N_2O, and CH_4 in pounds per MWh are used to estimate total emissions resulting from municipal EV charging operations.

Table 9: Vehicle fleet emissions

Category	Scope	Activity	Emissions (in MTCO_2e)

Municipal Vehicle Fleet	1	16,711 Gallons (Gasoline)	150
City-operated Public Transit	1	32,800 Gallons (Gasoline)	288
TOTAL			438

Other Scope 3 Emissions

Employee commute: Emissions generated from employee commutes to and from work in personal vehicles are classified as Scope 3 emissions. These emissions are calculated by determining the total vehicle commute trips for all persons employed by the City of West Hollywood. Employees who commute to work via alternative modes of travel are not considered in this analysis. A city-wide daily VMT per employee figure (15.8 miles) was used per the City's Travel Demand Model.[31]

This VMT per employee figure was used to estimate total distance travelled (in miles) by all employees during a given year. From that, an average 22 MPG was used to estimate the total gallons of fuel used by all employees during the year. Emission factors per EPA and The Climate Registry are applied along with the GWP for each greenhouse gas to illustrate total CO_2e generated by employee commutes in 2018.[32] [33] It is assumed that employees commute 260 workdays per year and that the average car model year is post-2008.

Employee Generated Waste: To estimate GHG emissions generated by municipal waste, CalRecycle's per employee disposal rate (11.9 pounds per employee per work day) was used.[34] Emissions are estimated based on total employee counts to calculate the total amount of waste generated by City employees in a year, assuming 5 work days per week i.e. 260 total work days. Then, total GHG emissions are calculated per SEEC ClearPath tool emission factor of 0.1706 $MTCO_2e$/ton of waste.[35]

Water Consumption: 2018 water consumption data by street address was obtained from City records. Estimated energy intensity by acre-foot was obtained from LADWP.[36] The City is also served by Beverly Water and Power; however, 2018 water supply data was not readily available. This energy intensity was used to estimate total MWh associated with water consumption in municipal facilities. Emission factors for CO_2, N_2O, and CH_4 in pounds per MWh are used to estimate total emissions resulting from municipal water consumption.

Table 10: Other Scope 3 emissions

Category	Scope	Activity	Emissions (in MTCO2e)
Employee Commutes	3	25,093 Gallons (Gasoline)	223
Employee Generated Waste	3	429 Tons	73
Water Consumption	3	62 MWh	14
TOTAL			310

Summary

In 2018, municipal GHG emissions from the City of West Hollywood amount to 2,270 MTCO2e. Electricity and natural gas consumption in municipal facilities resulted in 67% of the total emissions. Fuel combustion in City-owned fleet and public transit systems resulted in 19% of the emissions, followed by employee generated waste, employee commutes and water consumption which contributed the remaining 14% of the total municipal emissions.

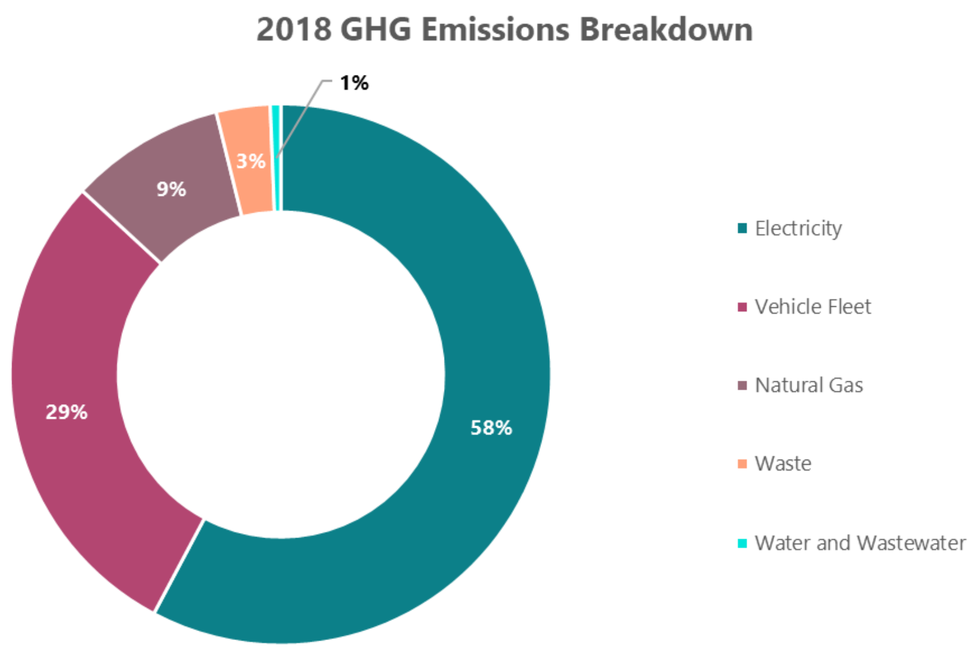


Figure 5: 2018 Municipal GHG Emissions by Source

Table 11: 2018 GHG Emissions

Category	Scope	Emissions (in MTCO2e)
Electricity	2 and 3	1312
Vehicle Fleet	1	661
Natural Gas	1	210
Waste	3	73
Water + Wastewater	3	14
TOTAL		2,270

Comparing 2008 and 2018 Emissions

Revising Baseline Inventory

The 2008 community-scale and municipal GHG emissions inventories were developed using the ICLEI US Community Protocol and LGOP, respectively. Both inventories used GWP values from the fourth assessment report by IPCC and included the emission sectors and sub-categories shown in Table 14. Over the past decade, GHG accounting and reporting methodologies have evolved significantly. To comply with the latest standards, the 2018 GHG emissions inventory developed for this Climate Action and Adaptation Plan uses the GPC, with GWP values from IPCC's fifth assessment report. WeHo Climate Action continues to use LGOP with the most recent GWP values for reporting municipal GHG emissions. The year 2018 was selected as it represents the year with the most complete annual data set for emission sectors and sub-categories shown in Table 14.

Table 12: Emission sectors and sub-categories reported in 2008 and 2018 inventories

Sectors	2008 Sub-categories	2018 Sub-categories
Stationary Energy	Electricity Use: *Residential, commercial, and municipal* Natural Gas: *Residential, commercial, and municipal* Street Lights Traffic Control	Electricity Use: *Residential, commercial, and municipal* Natural Gas*: Residential, commercial, and municipal* Street Lights Traffic Control Public EV Charging
Transportation	On-road Mobile Sources	On-road Transportation Public Transit Vehicle Fleet (municipal)
Waste and Wastewater	Solid Waste to Landfills Wastewater Treatment	Solid Waste to Landfills and Composting Facilities Wastewater Treatment
Product Use		HFC use: Residential and Commercial
Urban Forestry		Sequestration from Urban Trees
Other Scope 3	Water Consumption	Water Supply and Treatment Wastewater Generation Employee Activities: *Commute, business travel, waste generation, and water consumption*

Due to differences between the two protocols, emission sectors and sub-categories, data sources, and GWP values, it is not always possible to compare 2008 and 2018 emissions. To ensure consistency in comparing emissions, the 2008 emissions inventory is reorganized and adapted as per the GPC Protocol, to the extent possible. To ensure reliable monitoring in the future, this Climate Action and Adaptation Plan compares GHG emissions to 2008, where relevant but uses 2018 as the baseline year for setting GHG reduction targets.

Community-scale GHG Emission Trends

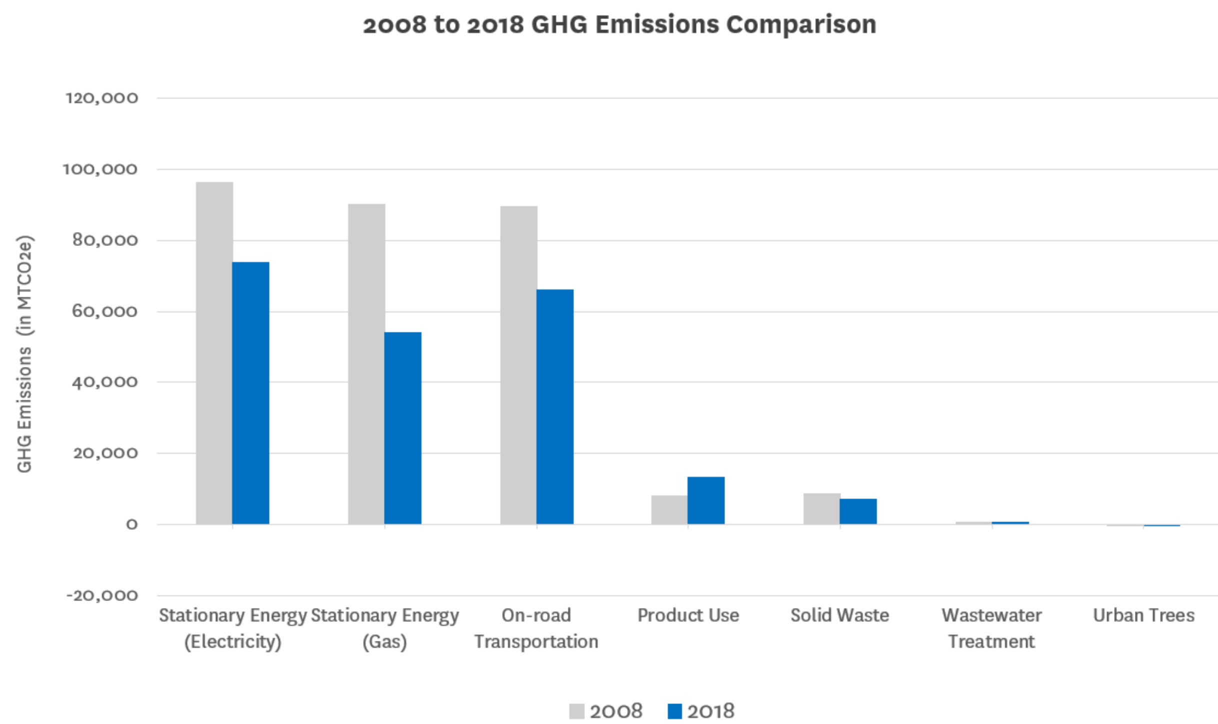
Community-scale GHG emissions in the 2008 GHG Emissions Inventory were accounted using the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (ICLEI US Community Protocol) with AR4 GWP values. The 2018 GHG emissions inventory has been prepared using the GPC Protocol with AR5 GWP values. To ensure consistency in comparing emissions, the 2008 emissions inventory has been reorganized and adapted as per the GPC Protocol, to the extent possible. Some key observations and limitations of this approach are:

- Both inventories use the same methodology and data sources for accounting emissions from stationary energy, solid waste, water, and wastewater.
- 2008 on-road transportation emissions were accounted using West Hollywood's 2010 Travel Demand Model, EMFAC 2007 Model, and 2002 National Household Travel Survey (NHTS) produced by the U.S. Department of Transportation.[37] Despite some similarities in this methodology, which also uses the induced activity method, the 2008 VMT and daily emissions from on-road transportation reported in the inventory are much higher than expected, in comparison with the 2018 inventory as well as GHG inventories issued by California jurisdictions circa 2008. Due to lack of complete documentation, it is not possible to verify the data used for 2008 emissions. To allow for one-to-one comparison, Buro Happold recalculated 2008 emissions by backcasting 2008 VMT data based on population with 2008 California fleet average GHG emission standards.[38]
- Emissions from public transit (City and Metro buses) and EV chargers were not included in the 2008 Inventory. Emissions from Metro buses cannot be estimated due to data limitations. There are no reported emissions
- from City-operated buses and EV chargers in 2008.
- The 2008 emissions inventory does not include product use emissions. HFC emissions in 2008 are estimated by scaling California's HFC emissions based on population, for the same year. [39] [40]
- The methodology and data sources for assessing sequestration from urban trees differs significantly. Sequestration in 2008 was estimated using sequestration rates for new mature trees, whereas the 2018 inventory uses tree canopy data to account for sequestration from all urban trees. Due to data limitations, 2008 sequestration values cannot be adjusted.
- Energy-related emissions from wastewater and water treatment are accounted in the 2008 emissions inventory within their corresponding sectors. In the 2018 inventory, these emissions are reported for informational purposes under other scope 3 emissions.

Table 13: Community-scale emission trends between 2008 and 2018 (in MTCO2e)

Category	2008 Adapted	2018	Change
Stationary Energy (Electricity)	96,445	73,712	-24%
Stationary Energy (Gas)	90,130	54,112	-40%
On-road Transportation	89,443	66,194	-26%
Product Use	8,077	13,090	62%
Solid Waste	8,543	7,021	-18%
Wastewater Treatment	636	676	6%
Urban Trees	-255	-255	0%
TOTAL	293,019	214,551	-27%*
Per Capita Emissions	*8.45*	*5.82*	
Water Treatment	*5,764*	*6,125*	*6%*
Wastewater Treatment	*20,305*	*685*	*-97%*
TOTAL (with Scope 3)	319,088	221,361	-31%*
Per Capita Emissions (with Scope 3)	*9.20*	*6.01*	

** after adjusting 2008 emissions from transportation and urban trees.*



Municipal GHG Emission Trends

Since 2008, the City of West Hollywood has decreased its annual emissions by approximately 726 MT CO2e, or 24%. Since emissions from vehicle fleet, waste, and water were not calculated in 2008, it is not possible to compare emissions across these sources. There was a significant drop in emissions generated by electricity usage – which is the biggest contributor to municipal emissions overall. Emissions from this source are more than halved, with a 55% reduction over the 10 years. However natural gas usage increased by four times during this period. This trend is expected to continue as the new Aquatics Recreation Center will have two pools (instead of one) and approximately three times the total water volume, and these pools will be heated by natural gas.

Table 14: Municipal GHG emission trends between 2008 and 2018 (in MTCO2e)

Category	2008	2018	Change
Electricity	2950	1312	-55%
Vehicle Fleet	0	661	Cannot be compared
Natural Gas	52	210	305%
Waste	0	73	Cannot be compared

Water + Wastewater	0	14	Cannot be compared
TOTAL	3002	2270	-24%

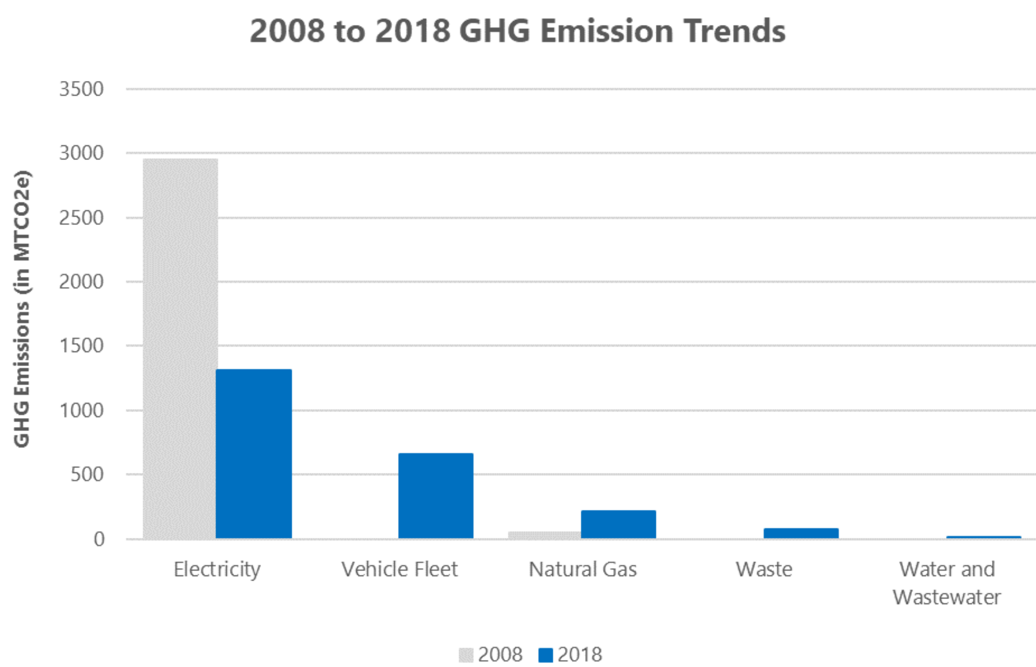


Figure 7: Municipal GHG Emissions in 2008 and 2018

Part II: Emission Scenarios and Pathways

GHG emission scenarios (or projections) provide an estimate of future emission levels based on continuation of existing trends in demographic growth, activity or resource consumption, technology changes, legislation, and/or citywide programs. Examining the impacts of technology and policy deployment on future emission levels helps us to: 1) understand the gap between projected emissions and long-term reduction targets; 2) identify areas that need significant programmatic interventions and investments; and 3) define the scale and pace for implementing mitigation pathways. This section groups sector-specific policy and activity data under three emission scenarios:

- Business-as-usual (BAU) Scenario: The BAU scenario projects future emissions based on current population and regional growth trends, climate patterns, and regulations introduced before the 2018 baseline year. BAU projections demonstrate the expected growth in GHG emissions if no further action is taken by the City or State after 2018.
- Business-as-planned (BAP) Scenario: BAP projections use the same growth assumptions as the BAU scenario but also account for emissions reduced from existing and proposed regulations, that were introduced between the 2018 baseline year and 2021 CAAP release. The BAP scenario demonstrates a more realistic emission trajectory as it accounts for State and local actions that are already in the pipeline.
- Carbon Neutrality (CN) Scenario: CN scenario builds on BAP projections and estimates the emission reduction potential of relevant measures and sub-actions proposed in this CAAP. CN projections demonstrate sector-specific pathways to achieve carbon neutrality by 2035.

IMPACT OF COVID-19 PANDEMIC

The ongoing pandemic has affected our lives, livelihoods, behavior, and daily economic activity. These changes have altered GHG emission patterns in 2020 and 2021 across various emission categories discussed in this report. Based on our current understanding of economic shutdowns in the City of West Hollywood, it is safe to assume that COVID-19 led to significant shifts in building energy use, building occupancy, commute patterns, transportation modes, and residential and commercial waste composition and volumes. In the context of this CAAP, emission reductions in building and transportation sectors are more evident than others. For example, building energy demand in commercial and institutional buildings decreased due to closure of businesses and offices but energy demand in homes and multifamily buildings may have increased as most residents stayed at home. Similarly, transportation emissions from passenger vehicles may have decreased as fewer residents commuted to work, but these emissions may increase if residents prefer passenger vehicles over public transit in the near future.

Covid-19 may have resulted in lower emissions in 2020, but it is very challenging to quantify the mitigation benefits without real activity data (e.g. electricity, gas, fuels, and waste), which is unavailable as of April 2021. It is important to note that these short-term reductions are likely temporary and there are already signs of recovery which may bring emissions back to pre-pandemic levels. Mitigating global climate change requires sustained reductions in greenhouse gas emissions induced by human activity.

More importantly, emission reductions achieved during the pandemic are a consequence of economic disruptions and personal hardships. These temporary reductions are not a celebration of the City's decarbonization progress and are therefore not accounted towards any of the scenarios in this CAAP. The CAAP considers opportunities and challenges related to Covid-19 in the implementation timeline to catalyze economic recovery while addressing climate change.

BAU Scenario

Demographic Growth

Demographic, household, and employment changes are often relied upon for scaling and extrapolating GHG emissions. For this reason, modelling various growth patterns of community characteristics is an important first step in establishing the business-as-usual scenario.

Between 2008 and 2018, West Hollywood's population grew from 34,681 to 36,854. This average growth rate of 0.61% per year is expected to increase slightly moving forward, to an average of 0.65% between 2018 and 2035. By 2035, total population in West Hollywood is projected to hover around 40,550 people, corresponding to an increase of about 3,700 from 2018's population (Figure 8).

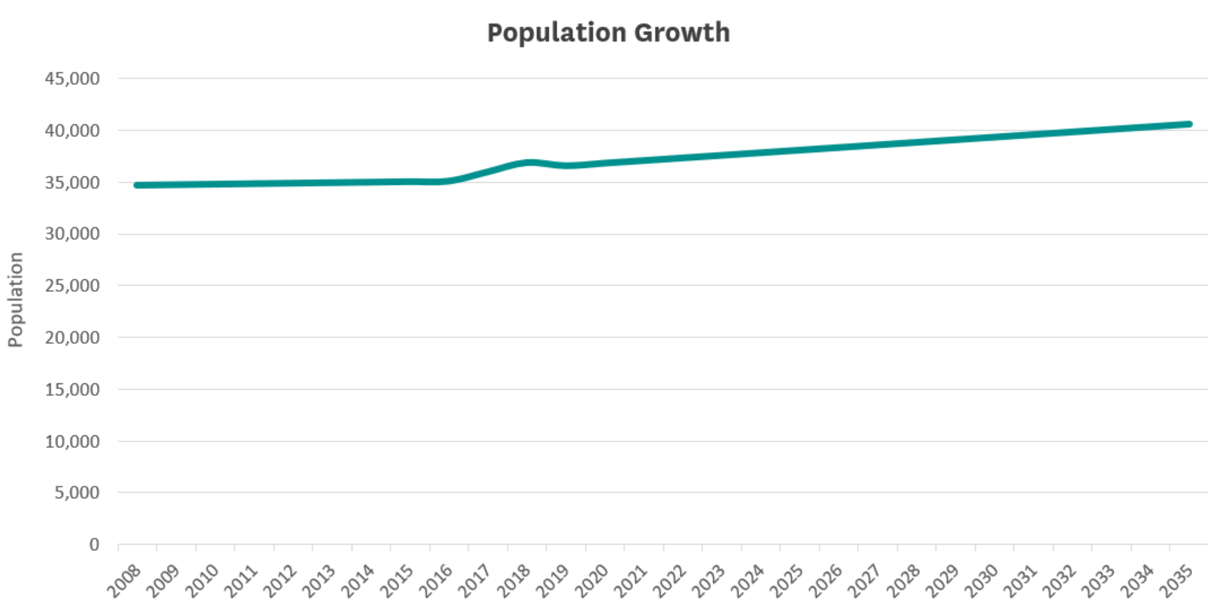


Figure 8: Projected population growth in West Hollywood

The City of West Hollywood is a dense and built-out urban community. A vast majority of the City's housing stock was constructed between 1950s and 1970s, and over 76% of the building stock in West Hollywood has not been renovated since 1978.[41] Compared to other cities in California, the City of West Hollywood has seen a very slow rate of growth, which is largely due to the fact that there is little vacant land available for development. Nearly all the development that has occurred in the past decades is a result of existing buildings being replaced with new ones, and this trend is likely to continue to occur into the future.[42] It is anticipated that land use growth will have a limited impact on future energy consumption patterns.

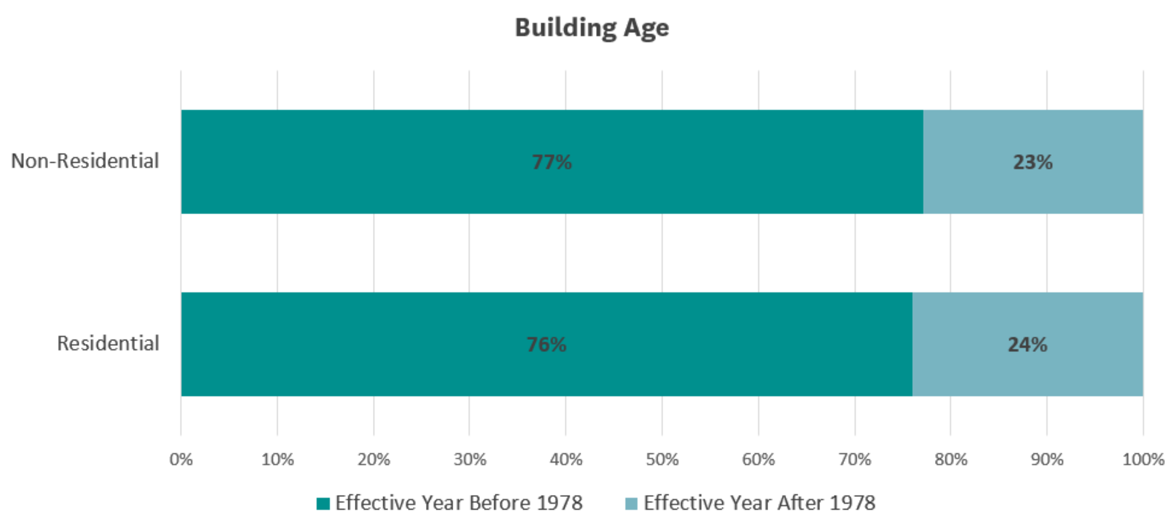


Figure 9: Building age in West Hollywood

Stationary Energy

The BAU scenario for stationary energy is based on population growth, assumed retrofits to the existing building stock, and changing climatic pattens (i.e. number of heating and cooling degree days) which collectively determine future heating and cooling energy demand profiles.[43] [44] The rate of change in space heating and cooling demands is informed by the CEC's heating and cooling load projections for the Los Angeles County Region under the IPCC's RCP 4.5 scenario.[45] These projections also account for the State's Title 24 Building Energy Efficiency Standards and Senate Bill (SB) 350 that will affect energy efficiency rates in new construction and existing buildings, respectively.

Table 15: Space heating and cooling load projections

Parameter	Unit	Rate of Change[46]	2018 Energy Demand	2035 Energy Demand
Residential: Heating Load Projection	therms	-0.471%	2,414,624	2,452,092

Residential: Cooling Load Projection	kWh	0.457%	7,139,689	8,489,212
Commercial: Heating Load Projection	therms	-0.280%	1,326,363	1,391,449
Commercial: Cooling Load Projection	kWh	0.535%	32,555,388	39,223,040

Between 2018 and 2035, electricity usage is expected to increase by over 11% in both residential and non-residential buildings, predominantly due to increased demand in space cooling and population growth. However, electricity emissions from residential buildings will decrease by 4.8% and non-residential buildings will decrease by 3.9% due to lower grid emissions factors. Electricity emission factors are assumed to decline pursuant to statewide legislation of the Renewable Portfolio Standard and SB 350. Under these standards, SCE's renewable mix needs to increase from 32% in 2017 to 50% by 2030.[47] Electricity emission factors between 2030 and 2035 are assumed to remain constant.

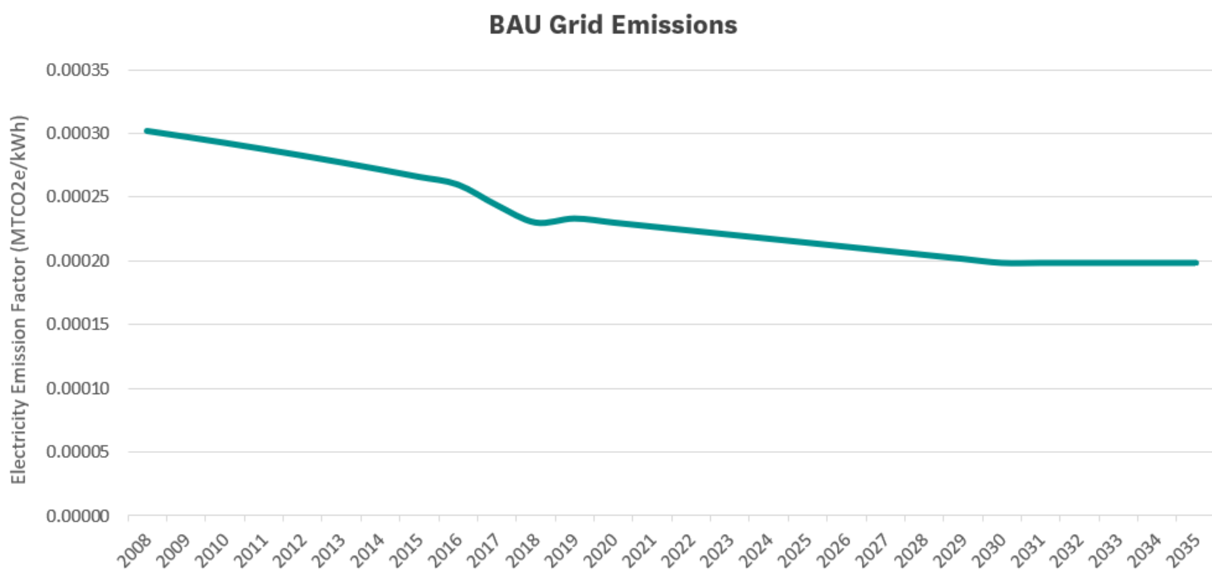


Figure 10: Grid emission factor

Emissions from natural gas use are expected to increase by 7.3% due to population growth and total demand increases, despite decreasing needs for space heating on a per-square foot basis due to a warming climate. Building emissions associated with lighting, water heating, and other applications are expected to increase with population growth, although the increase in electricity demand will be partially offset by a lower carbon intensity grid. Therefore, stationary energy emissions under BAU scenario are expected to increase by 1% between 2018 and 2035.

Table 16: Stationary Energy BAU Summary

Parameter	Units	2008	2018	2025	2035
Natural Gas Consumption	therms	16,968,905	10,169,865	10,392,329	10,917,155
Residential Buildings	therms	7,774,104	6,526,011	6,656,839	6,975,800
Single-Family	therms	1,034,460	868,383	885,792	928,234
Space Heating	therms	382,750	321,302	320,956	326,287
Water Heating	therms	506,886	425,508	439,316	468,181
Other	therms	144,824	121,574	125,519	133,766
Multi-Family	therms	6,739,644	5,657,628	5,771,047	6,047,566
Space Heating	therms	2,493,668	2,093,322	2,091,072	2,125,804
Water Heating	therms	3,302,426	2,772,238	2,862,203	3,050,259
Other	therms	943,550	792,068	817,772	871,503
Non-residential Buildings	therms	9,194,801	3,643,854	3,735,490	3,941,355
Space Heating	therms	3,346,907	1,326,363	1,342,791	1,391,449
Water Heating	therms	2,923,947	1,158,746	1,196,350	1,274,953
Other	therms	2,923,947	1,158,746	1,196,350	1,274,953
Electricity Consumption	kWh	319,028,937	320,488,095	332,282,788	356,347,947
Residential Buildings	kWh	96,213,134	101,995,561	105,490,046	112,719,614
Space Heating	kWh	1,539,410	1,631,929	1,630,174	1,657,252
Water Heating	kWh	2,886,394	3,059,867	3,159,167	3,366,734
Space Cooling	kWh	6,734,919	7,139,689	7,610,590	8,489,212
Other	kWh	85,052,410	90,164,076	93,090,115	99,206,417
Non-residential Buildings	kWh	222,815,804	218,492,534	226,792,742	243,628,333
Space Heating	kWh	3,565,053	3,495,881	3,539,179	3,667,426

Water Heating	kWh	2,005,342	1,966,433	2,030,248	2,163,642
Space Cooling	kWh	33,199,555	32,555,388	34,891,644	39,223,040
Other	kWh	184,045,854	180,474,833	186,331,671	198,574,224
Natural Gas Emissions	MTCO2e	90,130	54,112	55,472	58,544
Electricity Emissions	MTCO2e	96,445	73,712	71,134	70,612
Total Emissions	MTCO2e	186,575	127,824	126,606	129,156

Transportation

Passenger Vehicles and Trucks: BAU projections from passenger vehicles are estimated using the 2017 Travel Demand Model, 2016 SCAG RTP/SCS model, and 2017 EMFAC model. The SCAG model 2017 Travel Demand Model accounts for population and job growth and provides VMT by passenger cars, light-, and medium-duty trucks through the year 2035. Under this scenario, it is assumed that mode share between 2018 and 2035 remains constant.[48] GHG emissions are calculated using emission factors from 2017 EMFAC model corresponding to the respective SCAG model year and are estimated to increase by 11.8%.[49] The EMFAC model accounts for the following federal and state regulations:

- Pavley Clean Car Standards: Establishes GHG emission reduction standards for model years 2009 through 2016 that are more stringent than federal corporate average fuel economy (CAFE) standards.
- Advanced Clean Cars: Establishes GHG emission reduction standards for model years 2017 through 2025, that are more stringent than CAFE standards.
- Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles: Establishes Federal fuel efficiency standards for medium and heavy-duty engines and vehicles.

The BAU scenario further assumes that the number of EV chargers and GHG emissions associated with EV charging remain constant between 2018 to 2035. EV related emissions are not included in the transportation BAU projections to avoid double counting with electricity emissions under Stationary Energy.

Buses: GHG emissions from Metro buses are scaled by extrapolating ridership statistics between 2010 and 2018 and are expected to increase by 21.9% by 2035. It is assumed that West Hollywood's share of Metro riders remains constant between 2018 and 2035. Emissions from City line and Dial-A-Ride are assumed to be constant between 2019 and 2035.

Overall, transportation emissions from cars and buses are expected to increase by 14.0% between 2018 and 2035. The rate of change decreases over time due to improvements in fuel efficiency.

Table 17: Transportation BAU Summary

Parameter	Units	2008	2018	2025	2035
Daily Passenger Miles	Miles	966,596	1,010,330	1,012,495	1,146,376
Metro Ridership	Bus miles	1,495,960,390	1,143,144,015	1,386,296,874	1,393,142,784
Passenger Vehicle Emissions	MTCO2e	84,442	62,089	64,174	70,359
Bus Emissions	MTCO2e	5,002	4,105	4,955	4,978
Metro Emissions	MTCO2e	5,002	3,822	4,635	4,658
City Bus Emissions	MTCO2e	0	283	320	320
Total Emissions	MTCO2e	89,443	66,194	69,129	75,337

Product Use

GHG emissions from consumption of ozone-depleting substances (ODS) such as aerosols, fire retardants, and refrigerants in residential and commercial sectors are estimated using California's HFC phasedown projections.[50] [51] These projections estimate HFC use based on statewide population growth, CARB's refrigerant management programs, and account for existing CARB measures and EPA regulations in line with the 1987 Montreal Protocol.[52] BAU projections for the City of West Hollywood are scaled based on population growth. Emissions from product use is expected by increase by 68% in the residential sector and by 34% in the commercial sector.

Table 18: Product Use BAU summary

Parameter	Units	2008	2018	2025	2035
Residential	MTCO2e	2,765	4,562	6,234	7,676
Commercial	MTCO2e	5,312	8,528	9,975	11,417
Total Emissions	MTCO2e	8,077	13,090	16,210	19,093

Waste and Wastewater

Waste: Between 2018 to 2035, solid waste emissions from the City of West Hollywood would increase by 10%, consistent with population growth in the City. Under the BAU scenario, solid waste disposal to landfill will increase from 23,890 tons in 2018 to 26,286 tons in 2035. The tonnage of solid waste composted would increase from 4,492 tons in 2018 to 4,942 tons in 2035. It is assumed that the waste composition remains the same between 2018 and 2035. Therefore, emission factors for waste landfilled and waste composted are assumed to remain constant between 2018 and 2035.

Wastewater: Process emissions from wastewater treatment are projected based on population growth in the City of West Hollywood. The emission factor for wastewater treatment is assumed to be constant. Based on this assumption, GHG emissions increase from 676 MTCO2e in 2018 to 744 MTCO2e in 2035.

Table 19: Waste and Wastewater Summary

Sector	Units	2008	2018	2025	2035
Inorganic Waste Tonnage	tons/year	31,211	23,890	24,665	26,286
Organic Waste Tonnage	tons/year	0	4,492	4,637	4,942
Wastewater Volume	HCF/year	2,238	1,806	1,865	1,987
Waste Landfilled Emissions	MTCO2e	8,543	6,835	7,057	7,521
Waste Composted Emissions	MTCO2e	0	186	192	205
Wastewater Emissions	MTCO2e	636	676	698	744
Total Emissions	MTCO2e	9,179	7,697	7,947	8,469

Urban Trees

Sequestration from urban trees in the City of West Hollywood is constant at -255 $MTCO_2e$ between 2018 and 2035, assuming there no net gain or loss in urban tree canopy.

Other Scope 3 Emissions

Electricity consumption from water and wastewater treatment is extrapolated based on population growth in the City of West Hollywood. Grid emission factors are assumed to decline, pursuant to statewide legislation of the RPS and SB 350 and are assumed to remain constant thereafter. Based on these assumptions, electricity related GHG emissions from water supply and wastewater treatment are projected to decrease by 47%, each.

Table 20: Other Scope 3 emissions summary

Sector	Units	2008	2018	2025	2035
Water Supply	MTCO2e	5,764	6,125	5,455	2,818
Electricity Used for Water Supply	kWh	19,066,647	26,631,103	25,482,119	14,219,099
Wastewater Treatment	MTCO2e	20,305	685	610	315
Electricity Used for Wastewater Treatment	kWh	67,166,803	2,976,361	2,847,948	1,589,163

Total Emissions		26,069	6,810	6,065	3,132

BAU Summary

Based on these assumptions, total GHG emissions from West Hollywood's community-wide activities are projected to increase from 0.221 Million MTCO2e in 2018 to 0.235 Million MTCO2e in 2035. If no other actions are taken, the City's per capita GHG emissions will decrease by 3.5% to 5.79 MTCO2e per capita by 2035. Per capita emissions are expected to decrease slightly despite an increase in total emissions because of the anticipated population growth. The energy and transportation sectors remain the largest contributors of emissions, making up 87.0% of total emissions in 2035. The next largest contributing sector is product use, which accounts for an additional 8.1% of 2035 emissions. The final 4.9% of emissions come from the waste and wastewater sector as well as other scope 3 emissions. Lastly, the urban forestry sector accounts for a small amount of sequestration.

Table 21: BAU summary

Sector	Unit	2008	2018	2025	2035
Stationary Energy	MTCO2e	186,575	127,824	126,606	129,156
Transportation	MTCO2e	89,443	66,194	69,129	75,337
Waste and Wastewater	MTCO2e	9,179	7,697	7,947	8,469
Product Use	MTCO2e	8,077	13,090	16,210	19,093
Urban Trees	MTCO2e	-255	-255	-255	-255
Other Scope 3	MTCO2e	26,069	6,810	6,065	3,132
Total GHG Emissions	MTCO2e	319,088	221,361	225,702	234,933
Change from Baseline (2018)	%	-	-	+2.0%	+6.2%
Per Capita Emissions	MTCO2e	9.20	6.01	5.93	5.79

BAP Scenario

Stationary Energy

In February 2019, the City of West Hollywood joined the Clean Power Alliance (CPA), a community choice aggregator that provides renewable power to Southern California Communities. The City enrolled in CPA's Green Power option, which provides 100% renewable energy to customers by default. In 2019, 97.7% of residential customers and 96.9% of non-residential customers were enrolled in the Green Power Program. Customers who choose to opt out will continue to receive electricity from SCE.

Under the BAP Scenario, GHG emissions from electricity consumption in residential and non-residential buildings drops from 73,712 MTCO2e in 2018 to 2,118 MTCO2e in 2019. Electricity-related emissions from customers who have opted out of CPA, decreases from 23,459 MTCO2e in 2019 to 111 by 2035. This reduction occurs in alignment with SB 100, which requires that 100 percent of electricity retail sales to California end-use customers are sourced from eligible renewable energy resources and zero-carbon resources by 2045. It is estimated that by 2035 73% of California's electricity will come from renewable energy sources.

BAP emission projections for natural gas consumption in residential and non-residential buildings are assumed to remain the same as the BAU scenario. Overall, GHG emissions from stationary energy use are expected to decline by 53.9% by 2035.

Table 22: Stationary Energy BAP Summary

Parameter	Unit	2008	2018	2025	2035
Natural Gas Consumption	therms	16,968,905	10,169,865	10,392,329	10,917,155
Residential Buildings	therms	7,774,104	6,526,011	6,656,839	6,975,800
Non-residential Buildings	therms	9,194,801	3,643,854	3,735,490	3,941,355
Electricity Consumption	kWh	319,028,937	320,488,095	332,282,788	356,347,947
Residential Buildings	kWh	96,213,134	101,995,561	105,490,046	112,719,614
Non-residential Buildings	kWh	222,815,804	218,492,534	226,792,742	243,628,333
Natural Gas Emissions	MTCO2e	90,130	54,112	55,472	58,544
Residential Buildings	MTCO2e	41,292	34,724	35,420	37,117
Non-residential Buildings	MTCO2e	48,838	19,388	20,053	21,427
Electricity Emissions	MTCO2e	96,445	73,712	1,318	424
Residential Buildings	MTCO2e	29,086	23,459	346	111
Non-residential Buildings	MTCO2e	67,359	50,253	972	313
Residential Emissions	MTCO2e	70,378	58,183	35,766	37,228
Non-residential Emissions	MTCO2e	116,197	69,642	21,025	21,740
Total Emissions	MTCO2e	186,575	127,824	56,790	58,968

Transportation

Passenger Vehicles and Trucks: Same as BAU.

Buses: Under BAP Scenario, it is assumed that all Metro buses are transitioned to zero-emission buses (ZEB) by 2030, in line with Metro's commitments. GHG emissions from electricity consumption by ZEBs are estimated using countywide grid emission factors. It is further assumed that the County's electricity supply will be around 73% zero-carbon by 2035, pursuant to SB100, thus eliminating electricity-related emissions from ZEBs. It is assumed that all City buses and transit services will be electric by 2030. GHG emissions from electricity consumption in City ZEBs will decline to zero, as the City continues to receive 100% renewable electricity from the CPA through 2035.

Table 23: Transportation BAP Summary

Parameter	Unit	2008	2018	2025	2035
Passenger Vehicles and Trucks Emissions	MTCO2e	84,442	62,089	64,174	70,359
Vehicle Miles	daily miles	966,596	1,010,330	1,007,524	1,146,376
EV Chargers	kWh	0	107,543	107,543	107,543
Bus Emissions	MTCO2e	5,002	4,105	3,726	2,209
Buses: Metro	MTCO2e	5,002	3,822	3,406	1,888
Buses: City-operated	MTCO2e	0	283	320	320
Total Emissions	MTCO2e	89,443	66,194	67,900	72,568

Product Use

Same as BAU Scenario.

Waste and Wastewater

Waste: Under the BAP scenario, solid waste emissions from the City of West Hollywood would decrease by 33%, in line with Athens Services' waste diversion targets. Per Athens commitments, the City will divert 60% of solid waste by 2025 and 70% by 2030.[53] Solid waste disposal to landfill will decrease from 23,890 tons in 2018 to 15,803 tons in 2035. The tonnage of solid waste composted would increase from 4,492 tons in 2018 to 6,905 tons in 2035. In this scenario, it is assumed that the waste composition and emission factors remain the same between 2018 and 2035.

Wastewater: Same as BAU Scenario.

Athens operates three services for collecting recyclables, yard waste, and rubbish from single and multi-family residences. Athens also operates various Material Recovery Facilities for managing commercial food waste, recyclables, and C&D debris. Under the 2014 Integrated Solid Waste Management Services Agreement, Athens committed to increase the overall hauler diversion rates to 50% by 2020, 60% by 2025, and 70% by 2030. To achieve these targets, Athens will introduce public education and recycling programs for bulky waste, improve commodity recovery from residential and commercial waste streams, and use anaerobic digestion and new recycling technologies.

Table 24: Waste BAP Summary

Parameter	Unit	2008	2018	2025	2035
Solid Waste Disposal	MTCO2e	8,543	6,835	5,657	4,521
Waste Landfilled	tons/year	31,211	23,890	19,772	15,803
Biological Treatment of Solid Waste	MTCO2e	0	186	230	286
Waste Composted	tons/year	0	4,492	5,554	6,905
Wastewater Treatment (Process + Biogenic)	MTCO2e	636	676	698	744
Wastewater Generation	HCF/year	2,238	1,806	1,865	1,987
Total Emissions	MTCO2e	9,179	7,697	6,585	5,551

Urban Trees

Same as BAU Scenario.

Other Scope 3 Emissions

Like the BAU Scenario, electricity consumption from water and wastewater treatment is extrapolated based on population growth in the City of West Hollywood. Pursuant to SB100, grid emission factors are assumed to decline to zero by 2045. Based on these assumptions, both electricity related GHG emissions from water supply and emissions from wastewater are projected to decrease by 63% by 2035.

Table 25: Other Scope 3 BAP Summary

Parameter	Unit	2008	2018	2025	2035
Water Supply and Treatment	MTCO2e	5,764	6,125	4,537	2,269
Wastewater Treatment (Electricity)	MTCO2e	20,305	685	507	254

Water Consumption	HCF/year	2,238	1,806	1,865	1,987
Total Emissions	MTCO2e	26,069	6,810	5,044	2,523

BAP Summary

Based on these assumptions, total GHG emissions from West Hollywood's community-wide activities are projected to decrease from 0.22 Million MTCO2e in 2018 to 0.16 MTCO2e in 2035. Under this scenario, the City's per capita GHG emissions will decrease by 35% (compared to 2018 levels) to 3.91 MTCO2e per capita. The energy and transportation sectors remain the largest contributors of emissions, making up 83.0% of total emissions in 2035. The next largest contributing sector is product use, which accounts for an additional 12.1% of 2035 emissions. The final 4.9% of emissions come from the waste and wastewater sector since other scope 3 emissions drop to zero. Lastly, the urban forestry sector accounts for a small amount of sequestration.

Table 26: BAP Summary

Sector	Unit	2008	2018	2025	2035
Stationary Energy	MTCO2e	186,575	127,824	56,790	58,968
Transportation	MTCO2e	89,443	66,194	67,900	72,568
Waste and Wastewater	MTCO2e	9,179	7,697	6,585	5,551
Product Use	MTCO2e	8,077	13,090	16,210	19,093
Urban Trees	MTCO2e	-255	-255	-255	-255
Other Scope 3	MTCO2e	26,069	6,810	5,044	2,522
Total GHG Emissions	MTCO2e	319,088	221,361	152,274	158,447
Change from Base Year (2018)	%	-	-	-31%	-54%
Per Capita Emissions	MTCO2e	9.20	6.01	4.00	3.91

Carbon Neutrality Scenario

Transportation

Passenger Vehicles and Trucks: CN projections from passenger vehicles are estimated using population growth and VMT forecasts in the BAP scenario, but with the addition of CAAP measures and sub-actions. With the implementation of transportation related CAAP measures, the City of West Hollywood is expected to reduce sector emissions by 41% by 2035 (compared to 2018 baseline). This is primarily achieved through measures and sub-actions that shift mode share, reduce trips and miles driven in single occupancy vehicles, and increasing the proportion of electric and zero emission vehicles on the road. With major shifts from gasoline and diesel to electric energy sources, electricity demand is expected to increase to 24.8 GWh within the City by 2035. This makes grid modernization and CPA enrollment critical components of the path to carbon neutrality in the transportation sector.

Buses: The CN Scenario for emissions from buses is the same as BAP. It is assumed that all Metro buses are transitioned to zero-emission buses (ZEB) by 2030, and that the County's electricity will gradually transition to carbon free by 2045 (SB100). It is assumed that 60% of City buses are transitioned to ZEBs by 2025 and the entire fleet will be transitioned to ZEBs by 2030. GHG emissions from electricity consumption in City ZEBs will decline to zero as the City continues to receive 100% renewable electricity from CPA through 2035.

The following CAAP sub-actions are critical for the CN scenario:

- TM-1: Increase sustainable mode share in West Hollywood (Walking, Bicycling, Transit).
- TM-2: Promote zero and near zero carbon transportation.
- TM-3: Rethink curb space and parking assets.
- TM-4: Implement transportation demand management (TDM) solutions.

Table 27: CN Transportation Targets

CAP Measures and Sub Actions	2025 CN	2035 CN
TM-1	Achieve a mode shift of 20% from SOV to zero emission public transit and active transit by 2028.	Achieve a mode share of 50% of all trips made by zero emission public transit and active transport.
TM-2	Achieve 35% sales target for EV/ZEV vehicles and 8% EV stock. Achieve 25% zero emission city-operated bus fleet.	Achieve 100% sales target for EV/ZEV vehicles and 50% EV stock. Achieve 100% zero emission city-operated bus fleet.
TM-3	Achieve 35% EV ready spaces for new construction and major renovations (large multifamily and non-residential buildings) to facilitate future conversations.	Achieve 50% EV ready spaces for new construction (large multifamily and non-residential buildings) to facilitate future conversations.

TM-4		Achieve 75% of identified range for VMT and trip reduction (for actions not already included in other measures).

Table 28: Transportation CN Summary

Parameter	Units	2008	2018	2025	2035
Passenger Vehicle Emissions	MTCO2e	84,442	62,089	52,809	37,189
Daily Miles	Miles	966,596	1,010,330	761,301	515,372
Daily VMT Per Capita	Vehicle Miles	27.9	27.4	20.0	12.7
EV/ZEV Passenger Cars	Percent	0%	3%	11%	42%
Bus and Municipal Fleet Emissions	MTCO2e	5,002	4,105	3,646	1,888
Metro Emissions	MTCO2e	5,002	3,818	3,406	1,888
City Bus Emissions	MTCO2e	0	282	240	0
TOTAL	MTCO2e	89,443	66,194	56,455	39,078

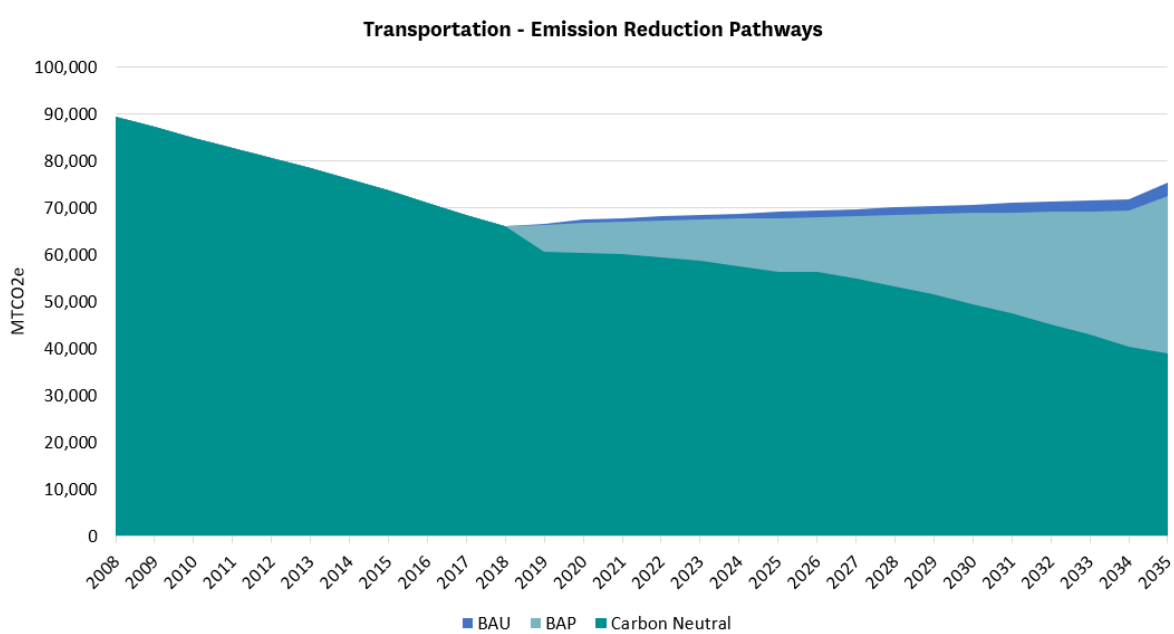


Figure 11: Transportation Emission Projections and Pathways

Stationary Energy

The CN scenario for stationary energy is based on population growth, climate projections, state regulations and standards (SB 350 and Title 24), as well as proposed CAAP measures. Since CPA enrollment guarantees 100% renewable energy, natural gas is the only remaining source of emissions from residential and non-residential buildings. Sector-specific CAAP measures are assumed to reduce emissions through building electrification (shifting from natural gas to electric systems), energy efficiency improvements, and increases in electricity supplied from renewable sources. Building electrification also doubles as an efficiency improvement measure, as electric heat pumps (for space and water heating and clothes drying) and cooking appliances are nearly twice as efficient as their natural gas counterparts.

The following CAAP sub-actions apply to the stationary energy CN scenario:

- EN-1: Improve energy performance, decarbonize and improve energy resilience of the existing building stock.
- EN-3: Decarbonize the future building stock and implement best practices in sustainable and resilient new construction.

Through efficiency improvements, building electrification, and grid electricity supplied by 100% renewable sources, it is assumed that emissions from stationary sources can be reduced by 94% by 2035. Under this pathway, natural gas consumption drops from around 10 million therms in 2018 to about 1.4 million therms in 2035. As a result of building electrification, electricity consumption increases from 320.5 GWh in 2018 to 437.2 GWh in 2035 – a 36.4% increase from baseline.

Table 29: Stationary Energy Targets

CAP Measures and Sub Actions	2025 CN	2035 CN
EN-1	Achieve 20% electrification for residential and non-residential buildings. Reduce residential EUI by 15% and non-residential EUI by 20% compared to 2008 baseline. Reach 99.5% CPA enrollment.	Achieve 80% electrification for residential and non-residential buildings. Reduce residential EUI by 35% and non-residential EUI by 40% compared to 2008 baseline. Reach 100% CPA enrollment.
EN-3	Meet or exceed CALGreen Standards	Meet or exceed CALGreen Standards

Table 30: Stationary Energy Emission Pathways

CAP Measures and Sub Actions	Units	2025 CN	2035 CN
Residential Emissions	MTCO2e	21,334	4,816
Electricity	kWh	124,994,658	165,861,460
Natural Gas	therms	3,994,103	906,854
Electrification	%	20%	80%
EUI Reduction	%	15%	35%
Non-Residential Emissions	MTCO2e	12,139	2,512
Electricity	kWh	237,737,768	271,344,049
Natural Gas	therms	2,241,294	472,963
Electrification	%	20%	80%
EUI Reduction	%	15%	45%
Total Emissions	MTCO2e	33,474	7,327

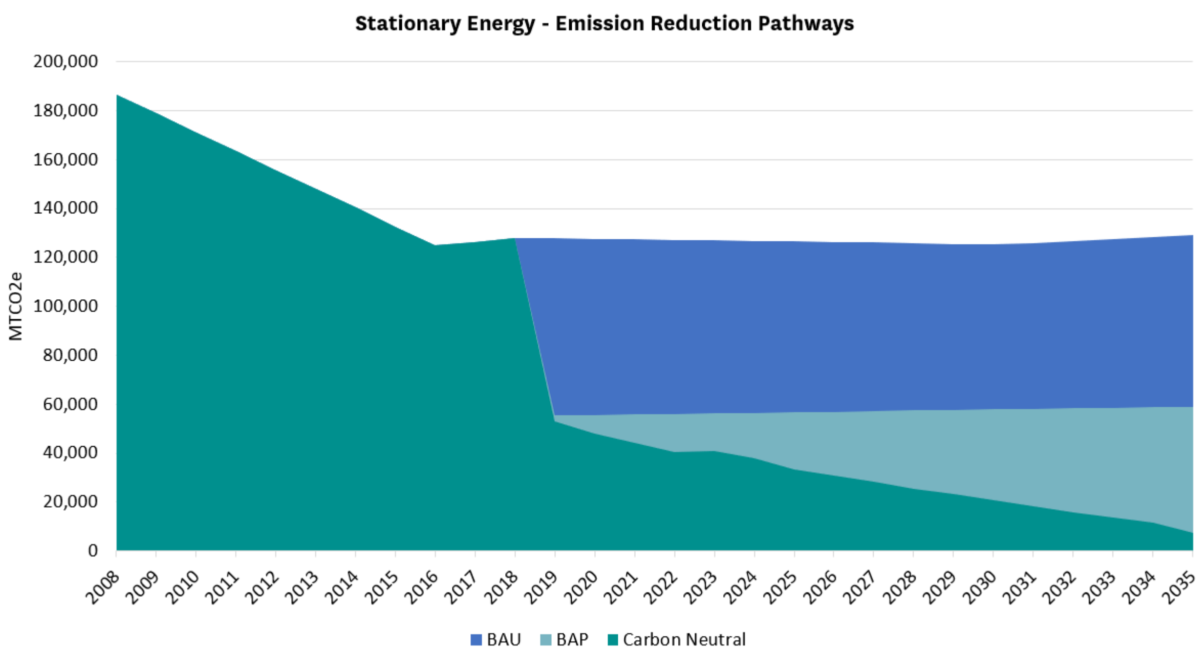


Figure 12: Stationary Energy Emission Projections and Pathways

Waste and Wastewater

While there are several State-level waste mandates, the basis for the modelling assumption are Assembly Bill 341 and SB 1383. AB 341 sets a target for a diversion rate of at least 75% of solid waste generated be source reduced, recycled, or composted by the year 2020.[54] Senate Bill 1383 establishes targets to achieve a 50% reduction in the level of state-wide landfill disposal of organic waste from the 2014 level by 2020 and a 75% reduction by 2025.[55] Organic waste accounts for the vast majority of waste sector emissions and organic waste diversion is a key greenhouse gas mitigation strategy.

The CN scenario provides a pathway for the City to reach the state-wide target of carbon neutrality by 2035. The pathway is largely based on state targets outlined in AB 341 and SB 1383, with additional hauler diversion rate commitments from Athens (outlined in their Integrated Solid Waste Management Services Agreement). These relevant and ambitious targets are sufficient to achieve significant reductions in emissions from the waste sector.

The CN scenario makes necessary assumptions such that West Hollywood can meet carbon neutrality by 2035 given the target diversion rates and wastewater generation reduction levels identified in the CAAP measures. The key levers for the waste and wastewater sector emissions are primarily driven by population growth forecasts, solid waste diversion rate, organics diversion rate, and wastewater generation rates. Under the CN scenario, waste generation increases by 10% by 2035 from 2018 baseline levels. Over this same period, the total mass of disposed waste is assumed to drop by 78% and the amount of compost is assumed to increase by 53%.

The following CAAP measures apply to the waste and wastewater CN scenario:

- ZW-2: Divert organic waste.
- NE-3: Improve water management.

Table 31: Waste and Wastewater Targets

CAP Measures and Sub Actions	2025 CN	2035 CN
ZW-2	Achieve 60% diversion rate for organics and 65% diversion rate for total solid waste from 2014 baseline.	Achieve 80% diversion rate for organics and 90% diversion rate for total solid waste from 2014 baseline.
NE-3	Reduce wastewater generation by 10% compared to 2018 baseline.	Reduce wastewater generation by 20% compared to 2018 baseline.

Table 32: Waste and Wastewater Emission Pathways

CAP Measures and Sub Actions	Unit	2025 CN	2035 CN
Solid Waste Generated	tons	49,429	52,677

Organic Waste Generated	tons	8,057	8,586
Composted	tons	4,834	6,869
Disposed	tons	17,300	5,268
Diversion Rate, Solid Waste	%	65%	90%
Diversion Rate, Organics	%	60%	80%
Solid Waste Emissions	MTCO2e	4,497	1,369
Composting Emissions	MTCO2e	198	282
Wastewater Emissions	MTCO2e	602	535
Total Emissions	MTCO2e	5,297	2,186
Percent Change from 2018 Levels	-	-31%	-72%

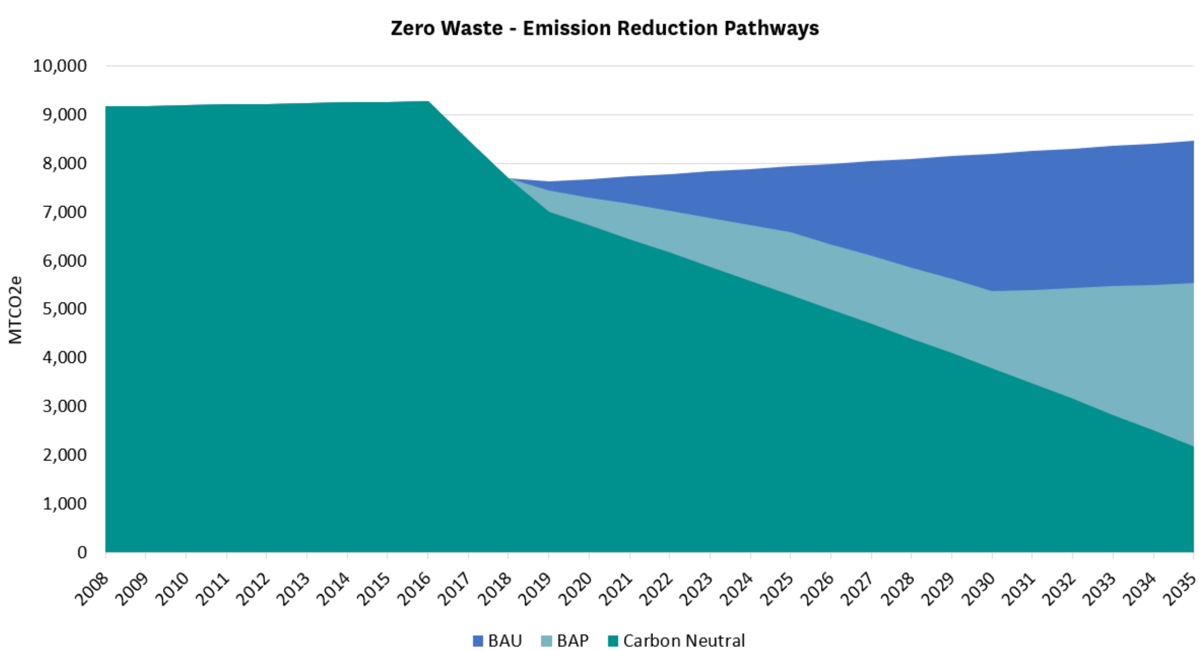


Figure 13: Waste and Wastewater Emission Projections and Pathways

Urban Trees

Sequestration from urban trees in the City of West Hollywood is currently estimated at -255 $MTCO_2e$ annually. The City's tree canopy has been shrinking in recent years, due to the impacts of development and disease. Relevant CAAP measures outline targets for maintaining the urban forest tree canopy at levels through 2025. This is followed by a gradual increase in urban tree canopy cover which increases sequestration rates by 2.5% by 2035.

The following CAAP measure applies to the urban trees CN scenario:

- NE-1: Protect and expand the urban tree canopy.

Table 33: Urban Trees Emissions/Sequestration Targets

CAP Measures and Sub Actions	2025 CN	2035 CN
NE-1	Maintain urban forest tree canopy at 2016 levels	Increase urban forest tree canopy coverage by 2.5%, compared to 2016 levels.

Table 34: Urban Trees Emissions/Sequestration Emission Pathways

CAP Measures and Sub Actions	Unit	2025 CN	2035 CN
Change in Tree Canopy Cover	%	0%	2.5%
Estimated Total Trees	Count	8,629	8,845
Estimated Additional Trees	Count	0	216
Total Emissions (Sequestration)	MTCO2e	-255	-261
Emissions Reductions	%	0%	2%
Percent Change from 2018 Levels	%	0%	2.5%

Urban Forestry - Emission Reduction Pathways

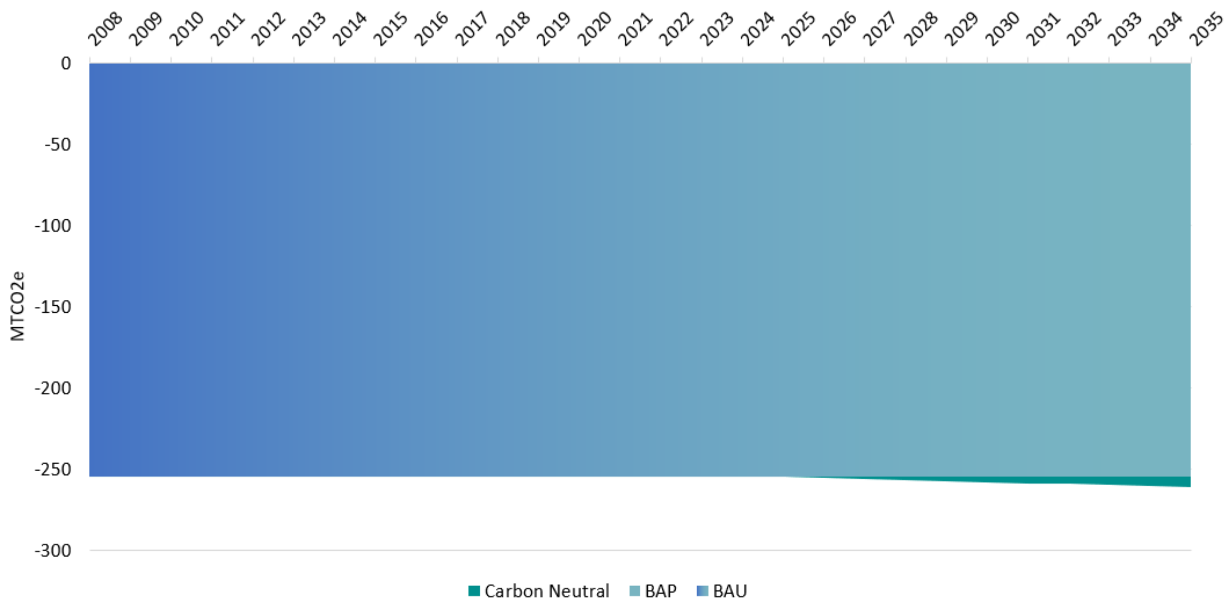


Figure 14: Urban Trees Emissions/Sequestration Projections and Pathways

Other Scope 3 Emissions

The CN scenario builds upon assumptions made in the BAP and BAU scenarios by applying wastewater generation reduction targets identified in the CAAP measures. Based on these assumptions, emissions from wastewater treatment decrease by 70% and emissions from water supply and treatment decrease by 63% by 2035 (compared to 2018).

The following CAAP measure applies to the Other Scope 3 emissions sector within the CN scenario:

- NE-3: Improve water management.

Table 35: Other Scope 3 Emission Targets

CAP Measures and Sub Actions	2025 CN	2035 CN
NE-3	Reduce wastewater generation by 10% compared to 2018 baseline.	Reduce wastewater generation by 20% compared to 2018 baseline.

Table 36: Other Scope 3 Emission Pathways

CAP Measures and Sub Actions	Unit	2025 CN	2035 CN
Wastewater Generated	HCF/year	1,626	1,445
Wastewater Generation Reduction	%	10%	20.0%
Wastewater Treatment	MTCO2e	456	203
Water Supply and Treatment	MTCO2e	4,537	2,269
Total Emissions	MTCO2e	5,994	2,471
Percent Change from 2018 Levels	%	-27%	-64%

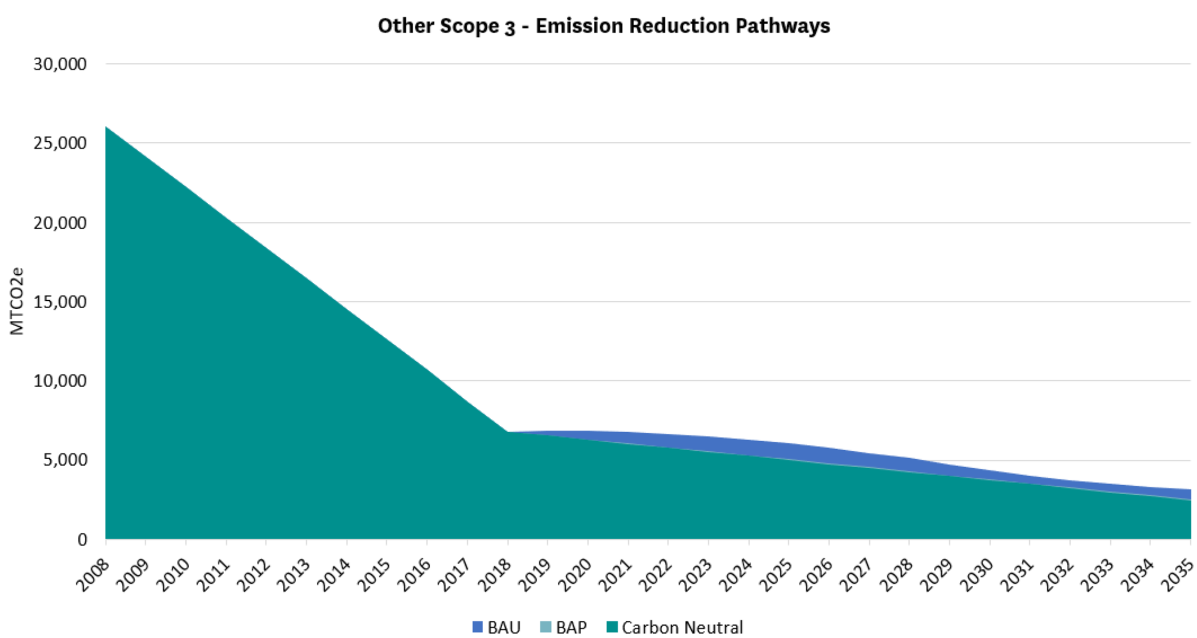


Figure 15: Other Scope 3 Projections and Pathways

CN Summary

By implementing the CAAP measures and sub-actions outlined above, it is assumed that community wide GHG emissions are reduced by 68.4% by 2035 compared to 2018 levels. This percent change from 2018 levels corresponds to a total reduction of 151,467 MTCO2e, bringing the total residual emissions to 69,894 MTCO2e by 2035.

The main sources of remaining or residual emissions include transportation, product use, and waste. Transportation accounts for nearly 56% of the residual emissions, with approximately 57.5% of vehicles estimated to be gasoline or diesel powered by 2035. Stationary energy is responsible for 10.5% of the residual emissions, with 20% of buildings still using natural gas and other fossil fuels. Waste makes up 3.1% of residual emissions, as a small fraction of food and green waste is expected to end up in landfills, and biogenic processing of compost emits greenhouse gases. Product use accounts for 27.3% of the residual emissions. Emissions from refrigerant use are expected to increase due to electrification and population growth. Lastly, urban forestry contributes a small amount (-261 MTCO2e) of carbon sequestration.

Table 37: Carbon Neutrality Pathways by Sector

CAP Measures and Sub Actions	Units	2018 Baseline	2025 CN	2035 CN
Transportation and Mobility	MTCO2e	66,194	56,455	39,078
Stationary Energy	MTCO2e	127,824	33,474	7,327
Product Use	MTCO2e	13,090	16,210	19,093
Waste and Wastewater	MTCO2e	7,697	5,297	2,186
Other Scope 3 Emissions	MTCO2e	6,810	4,994	2,471
Urban Forest (AFOLU)	MTCO2e	-255	-255	-261
Total Emissions	MTCO2e	221,361	116,173	69,894
Percent Change from 2018 Levels	%	-	-47.5%	-68.4%

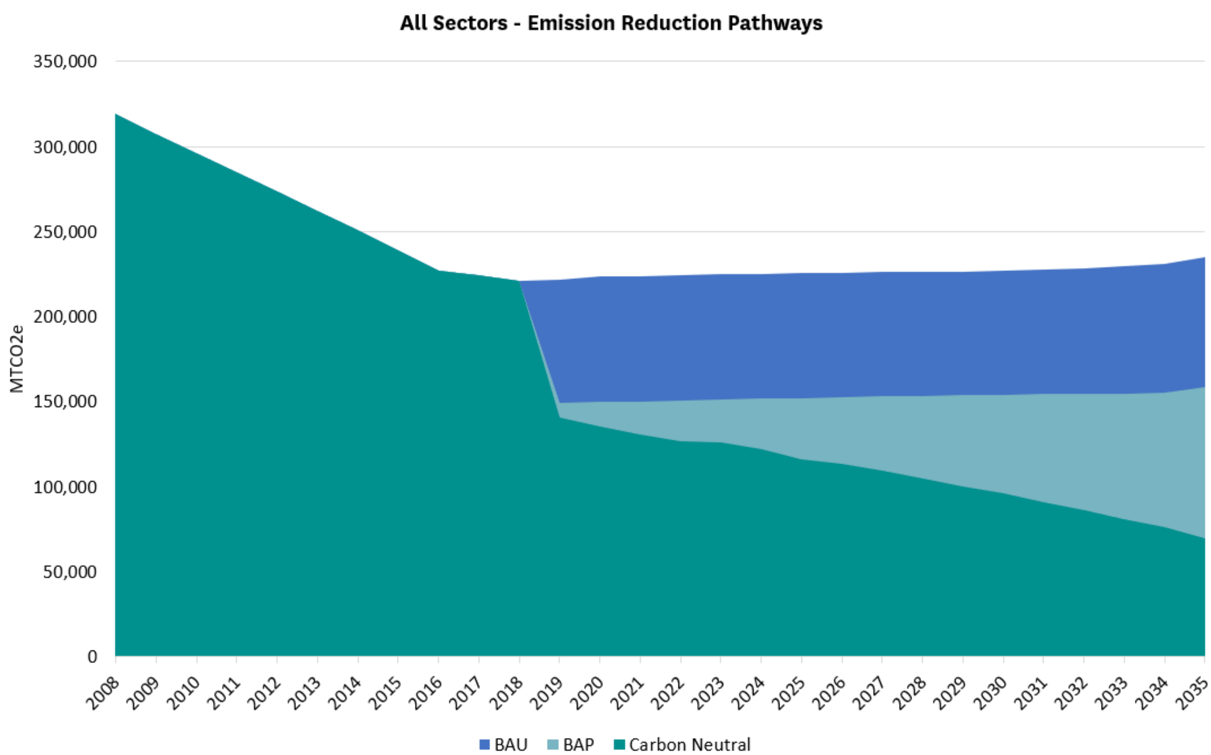


Figure 16: Carbon Neutrality Pathways

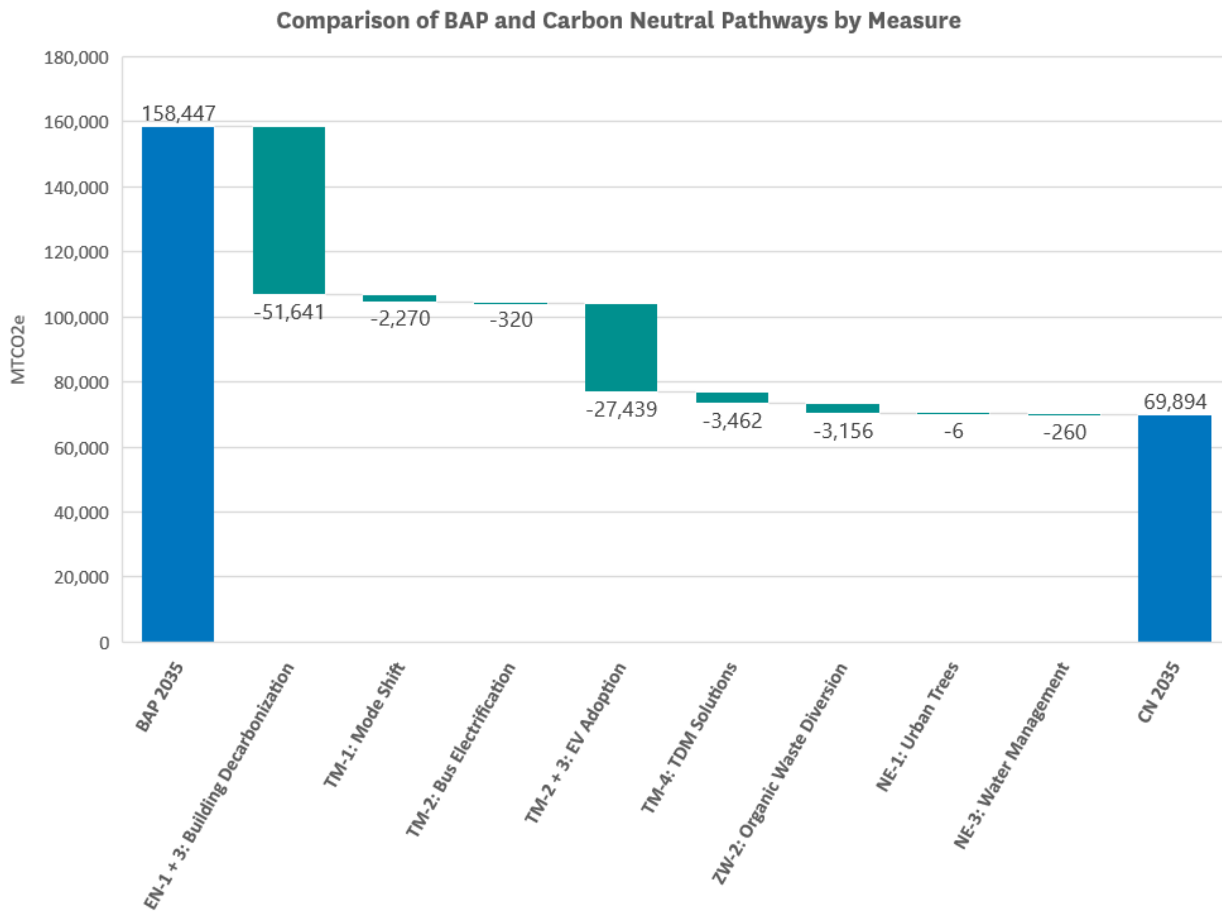


Figure 17: Comparison of business-as-planned (BAP) and carbon neutral (CN) pathways in 2035. Gap in emissions is represented by measure specific GHG reductions compared to BAP.

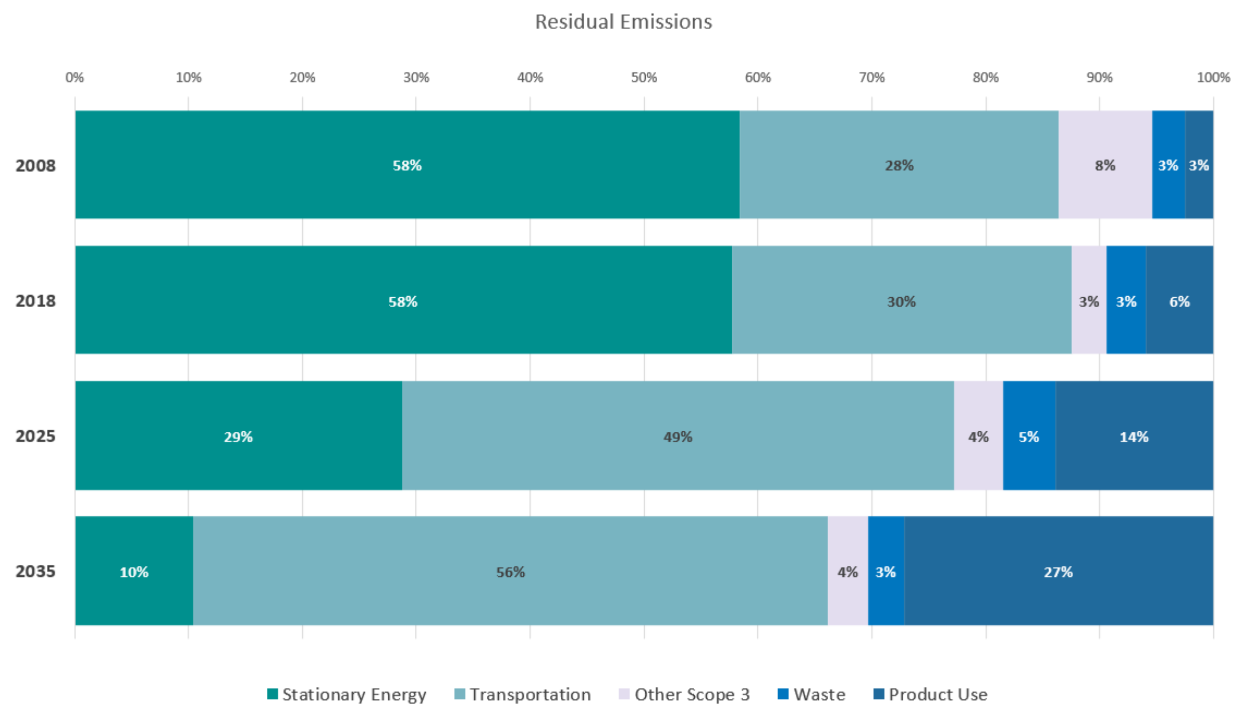


Figure 18: Residual Emissions by Proportion

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8 2018 eGRID WECC.
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18 Athens Services Data.
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