

# AASHTO Transportation GHG Calculator User Documentation

This document is designed to guide users through the process of predicting base and future year Greenhouse Gas (GHG) emissions using the methodology specified by the Federal Highway Administration. The spreadsheet tool is intended to help state DOTs predict changes in GHG emissions based on predicted changes in various parameters, such as traffic growth and electric vehicle (EV) usage.

## Introduction: What the Spreadsheet Does

This spreadsheet predicts GHG based on fuel consumption. Base year (2022) fuel consumption is provided as an input. Future fuel consumption is assumed to vary based on fleet fuel efficiency, EV adoption, and miles traveled. Miles traveled change based on the specified growth rate and mode shift (between autos, carpooling and other modes).

The default data in the spreadsheet come from public data sources. Comments on the input cells provide reference for the data sources. Default data can be overridden by the user.

This guide is broken down into three sections for each tab of the GHG Spreadsheet. Each tab has associated steps to help with understanding of the tool.

- Using the Summary tab of the spreadsheet
  - **Step 1.** Edit Base Year Data
  - **Step 2.** Edit Other Parameters
  - **Step 3.** Edit Journey to Work Data
  - **Step 4.** Edit Fuel Consumption Data by Vehicle Type Data
  - **Step 5.** View Result outputs
- Using the Sensitivity tab of the spreadsheet
  - **Step 1.** Step 1: Editing “Test Value”
  - **Step 2.** Results and Graph Output
- Using the Trends tab of the spreadsheet
  - **Step 1.** Selecting “State” Data
  - **Step 2.** Step 2: Selecting Data Series

## GHG Prediction Spreadsheet: Summary Tab

This tab calculates state-level transportation GHG emissions in a base year and future year, as well as the percentage change in emissions. Base year data is provided, but can be manually overridden. The base year and future parameters specified here are used on both the Summary and Sensitivity tabs.

## Summary Step 1: Editing “Base Year Data”

Navigate to the “Summary” worksheet tab using the bottom navigation bar. Scroll up to the “Base Year Data” Section.

**AASHTO State-Level Transportation GHG Calculator**  
Inputs and Summary Results last modified: 1/12/24

**Base Year Data**

Description	Default	Override	Notes
State or Territory		Alabama	
VTM (millions)	71,631		
NHS VMT (millions)	31,568		
Gasoline Consumption (000 gallons)	3,022,118		
Special Fuels Consumption (000 gallons)	947,097		

**Other Parameters**

Description	Default	Override	Notes
Analysis Period (years)	4		
Annual VMT Growth	1.06%		
Vehicle Occupancy, Carpools	2.4		
Gasoline CO2 Content (kg/gallon)	8.10		
Special Fuels CO2 Content (kg/gallon)	10.19		
Percent of VMT, Autos	88.4%		
Percent of VMT, Single Unit Trucks and Buses	4.7%		
Percent of VMT, Combo Trucks	6.2%		
Percent of VMT, Motorcycles	0.6%		
Percent of Auto VMT for Work Trips	19.0%		

**Journey to Work Data**

Description	Default	Base Year	Future
Percent of Work Trips Driving Alone	80.50%		
Percent of Work Trips Carpooling	7.90%		

**Fuel Consumption Data by Vehicle Type**

Description	Default	Base Year				Future			
		Autos	Single Unit Trucks	Combo Trucks	Motorcycles	Autos	Light Trucks/Buses	Combo Trucks	Motorcycles
Fuel Efficiency, Non-EV (mpg)	23.1	7.5	6.2	44.0					
EV Percent of Fleet	1%	0%	0%	0%					

Summary Sensitivity Trends +

Select your state from the dropdown menu at cell F8 to populate selected data items. After you choose your state, base year data (VTM, NHS VMT, Gasoline Consumption, and Special Fuel Consumption) will be populated using 2022 data.

Input override data as desired in the blue-shaded cells in the “Override” column (Column F).

**AASHTO State-Level Transportation GHG Calculator**  
Inputs and Summary Results

**Base Year Data**

Description	Default	Override
State or Territory		Alabama
VTM (millions)	71,631	
NHS VMT (millions)	31,568	
Gasoline Consumption (000 gallons)	3,022,118	
Special Fuels Consumption (000 gallons)	947,097	

## Summary Step 2: Editing “Other Parameters” Data

Scroll to the “Other Parameters” section of the “Summary” tab, located directly underneath the “Base Year Data.” These parameters are populated with national defaults. View the source and description for each metric by hovering over the appropriate cell in the “Description” column.

AASHTO State-Level Transportation GHG Calculator

Inputs and Summary Results

last modified: 1/12/24

Base Year Data

Description	Default	Override	Notes
State or Territory		Alabama	
VMT (millions)	71,631		
NHS VMT (millions)	31,568		
Gasoline Consumption (000 gallons)	3,022,118		
Special Fuels Consumption (000 gallons)	947,097		

Other Parameters

Description	Default	Override	Notes
Analysis Period (years)	4		
Annual VMT Growth	1.06%		
Vehicle Occupancy, Carpools	2.4		
Gasoline CO2 Content (kg/gallon)	8.10		
Special Fuels CO2 Content (kg/gallon)	10.19		
Percent of VMT, Autos	88.4%		
Percent of VMT, Single Unit Trucks and Buses	4.7%		
Percent of VMT, Combo Trucks	6.2%		
Percent of VMT, Motorcycles	0.6%		
Percent of Auto VMT for Work Trips	19.0%		

Journey to Work Data

Description	Default	Baseline	Future
Percent of Work Trips Driving Alone	80.50%		
Percent of Work Trips Carpooling	7.90%		

Fuel Consumption Data by Vehicle Type

Description	Default	Baseline				Future			
		Autos	Single Unit Trucks	Combo Trucks	Motorcycles	Autos	Light Trucks/Buses	Combo Trucks	Motorcycles
Fuel Efficiency, Non-EV (mpg)	23.1	7.5	6.2	44.0					
EV Percent of Fleet	1%	0%	0%	0%					

Summary

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+

Input override data as desired in the blue-shaded cells in the “Override” column (Column F).

Other Parameters

Description	Default	Override
Analysis Period (years)	4	
Annual VMT Growth	1.06%	
Vehicle Occupancy, Carpools	2.4	
Gasoline CO2 Content (kg/gallon)	8.10	
Special Fuels CO2 Content (kg/gallon)	10.19	
Percent of VMT, Autos	88.4%	
Percent of VMT, Single Unit Trucks and Buses	4.7%	
Percent of VMT, Combo Trucks	6.2%	
Percent of VMT, Motorcycles	0.6%	
Percent of Auto VMT for Work Trips	19.0%	

### Summary Step 3: Editing “Journey to Work” Data

Scroll to the “Journey to Work” section of the “Summary” tab, located directly underneath the “Other Parameters.” The default parameters are populated based on the selected state (Step 1), from Journey to Work data by state estimates for 2022 from the ACS.

Input override data as desired in the blue-shaded cells in the “Base Year” column (Column F). Input the projected values or goals as desired in the blue-shaded cells in the “Future” column (Column G).

### Journey to Work Data

Description	Default	Base Year	Future
Percent of Work Trips Driving Alone	80.50%		
Percent of Work Trips Carpooling	7.90%		

## Summary Step 4: Editing “Future Consumption Data by Vehicle Type”

Scroll to the “Future Consumption Data by Vehicle Type” section of the “Summary” tab, located directly underneath the “Journey to Work Data.” These parameters are populated with national defaults. View the source and description for each metric by hovering over the appropriate cell in the “Description” column.

AASHTO State-Level Transportation GHG Calculator

Inputs and Summary Results

last modified: 1/12/24

Base Year Data

Description	Default	Override	Notes
State or Territory		Alabama	
VMT (millions)	71,631		
NHS VMT (millions)	31,568		
Gasoline Consumption (000 gallons)	3,022,118		
Special Fuels Consumption (000 gallons)	947,097		

Other Parameters

Description	Default	Override	Notes
Analysis Period (years)	4		
Annual VMT Growth	1.06%		
Vehicle Occupancy, Carpools	2.4		
Gasoline CO2 Content (kg/gallon)	8.10		
Special Fuels CO2 Content (kg/gallon)	10.19		
Percent of VMT, Autos	88.4%		
Percent of VMT, Single Unit Trucks and Buses	4.7%		
Percent of VMT, Combo Trucks	6.2%		
Percent of VMT, Motorcycles	0.6%		
Percent of Auto VMT for Work Trips	19.0%		

Journey to Work Data

Description	Default	Base Year	Future
Percent of Work Trips Driving Alone	80.50%		
Percent of Work Trips Carpooling	7.90%		

Fuel Consumption Data by Vehicle Type

Description	Default	Base Year				Future			
		Autos	Single Unit Trucks	Combo Trucks	Motorcycles	Autos	Light Trucks/Buses	Combo Trucks	Motorcycles
Fuel Efficiency, Non-EV (mpg)	23.1	7.5	6.2	44					
EV Percent of Fleet	1%	0%	0%	0%					
Percent of Non-EVs Using Gasoline	98%	28%	13%	100%					

Results

Description	Base Year	Future	% Change
Total GHG (metric tons)	34,130,074	35,600,362	4.3%
Total, NHS GHG (metric tons)	15,041,228	15,689,188	4.3%

Summary

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Input override data as desired in the blue-shaded cells in the “Base Year” section (Cells I46:L50). Input the projected values or goals as desired in the blue-shaded cells in the “Future” section (Cells M46:P50).

## Summary Step 5: Results

Scroll to the “Results” section of the “Summary” tab, located directly underneath the “Future Consumption Data by Vehicle Type.”

AASHTO State-Level Transportation GHG Calculator

Inputs and Summary Results

last modified: 1/12/24

Base Year Data

Description	Default	Override	Notes
State or Territory		Alabama	
VMT (millions)	71,631		
NHS VMT (millions)	31,568		
Gasoline Co (millions)	3,022,118		
Special Fuels Co (millions)	947,097		

Other Parameters

Description	Default	Override	Notes
Analysis Period (years)	4		
Annual VMT Growth	1.06%		
Vehicle Occupancy, Carpools	2.4		
Gasoline CO2 Content (kg/gallon)	8.10		
Special Fuels CO2 Content (kg/gallon)	10.19		
Percent of VMT, Autos	88.4%		
Percent of VMT, Single Unit Trucks and Buses	4.7%		
Percent of VMT, Combo Trucks	6.2%		
Percent of VMT, Motorcycles	0.6%		
Percent of Auto VMT for Work Trips	19.0%		

Journey to Work Data

Description	Default	Base Year	Future
Percent of Work Trips Driving Alone	80.50%		
Percent of Work Trips Carpooling	7.90%		

Fuel Consumption Data by Vehicle Type

Description	Default	Base Year				Future			
		Autos	Single Unit Trucks	Combo Trucks	Motorcycles	Autos	Light Trucks/Buses	Combo Trucks	Motorcycles
Fuel Efficiency, Non-EV (mpg)	23.1	7.5	6.2	44.0					
EV Percent of Fleet	1%	0%	0%	0%					
Percent of Non-EVs Using Gasoline	98%	28%	13%	100%					

Results

Description	Base Year		% Change
	Base Year	Future	
Total GHG (metric tons)	34,130,074	35,600,362	4.3%
Total, NHS GHG (metric tons)	15,041,228	15,689,188	4.3%

Summary

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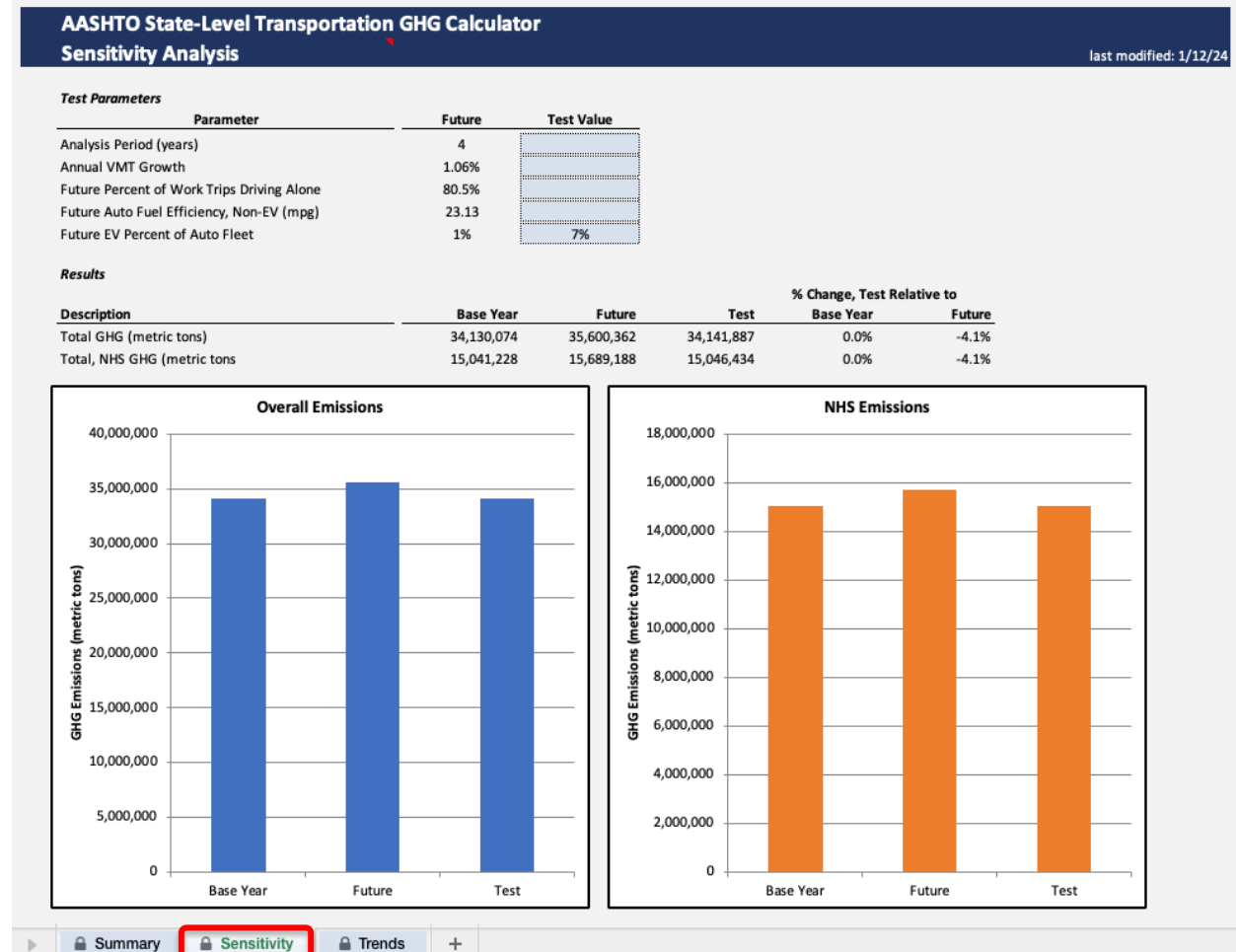
This table shows Base Year GHG, Future GHG and the percentage change. Values are shown for all travel and for the National Highway System (NHS) only.

## GHG Prediction Spreadsheet: Sensitivity Tab

This tab of the spreadsheet is used to test the sensitivity of the calculation of GHG emissions to changes in selected key parameters. This sheet reproduces the Base Year and Future results from the previous “Summary” tab, and allows alternative parameter values to be added as a “Test” future result.

## Sensitivity Step 1: Editing “Test Value”

Navigate to the “Sensitivity” worksheet tab using the bottom navigation bar.



To use this tab first review the assumptions regarding “Base Year” and “Future” year calculations in the Summary tab. The results from that tab are reproduced here.

Scroll up to the “Test Parameters” section of the “Sensitivity” tab. Enter alternative parameter values as desired in the blue-shaded cells in the “Test Value” column (Column F). The test values entered are used to produce an alternative calculation of future year GHG emissions.

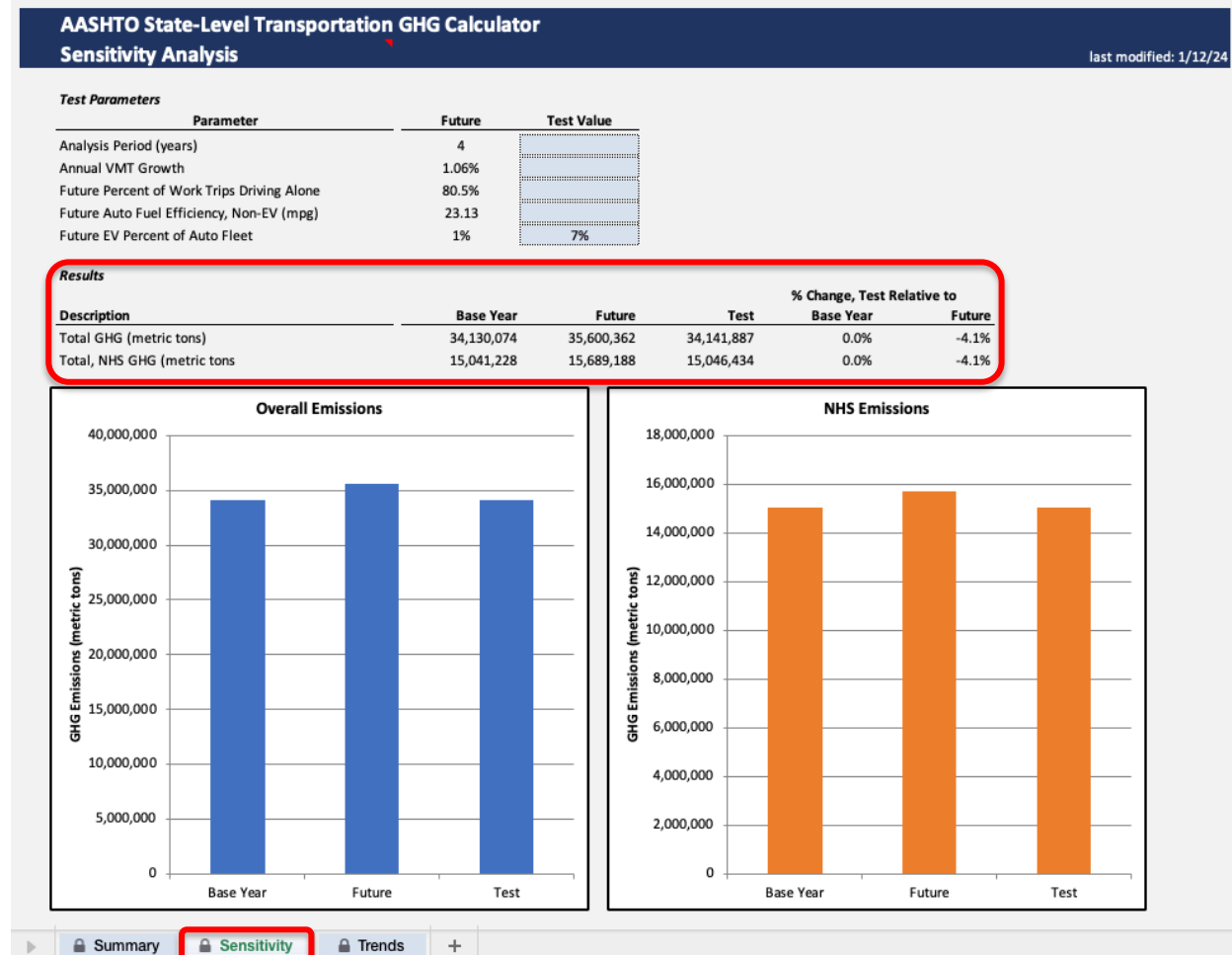
**Test Parameters**

Parameter	Future	Test Value
Analysis Period (years)	4	
Annual VMT Growth	1.06%	
Future Percent of Work Trips Driving Alone	80.5%	
Future Auto Fuel Efficiency, Non-EV (mpg)	23.13	
Future EV Percent of Auto Fleet	1%	7%

**Sensitivity Step 2: Results and Graph Output**

Scroll to the “Results” section of the “Sensitivity” tab, located directly underneath the “Future Consumption Data by Vehicle Type.” The results labeled “Test” are an alternative calculation of future year GHG emissions made using the test values entered. The total emissions for the “Test” values can be

compared to the total emissions for the “Base Year” and “Future” sets of values. The results show the percentage change in emissions for the test relative to the base year and previous future calculations.



Examine the graphs produced at the bottom of the “Sensitivity” tab, which display the data shown in the “Results” table above. These graphs allow you to visually compare the overall emissions for the “Base Year,” “Future,” and “Test” values. By going back to the “Test Value” input (Step 1), it is possible to try different values in each parameter to see how the total emissions will change.

## GHG Prediction Spreadsheet: Trends Tab

This tab of the GHG spreadsheet is used to view trends in metrics related to GHG emissions. Data shown here were obtained from FHWA's Highway Statistics for 2011 to 2022. The calculation of GHG emissions is made based on reported fuel data using the parameters shown in the Summary tab. Graph 1 and Graph 2 are independent from one another, and can show two data series for a state.



## Trends Step 1: Selecting “State” Data

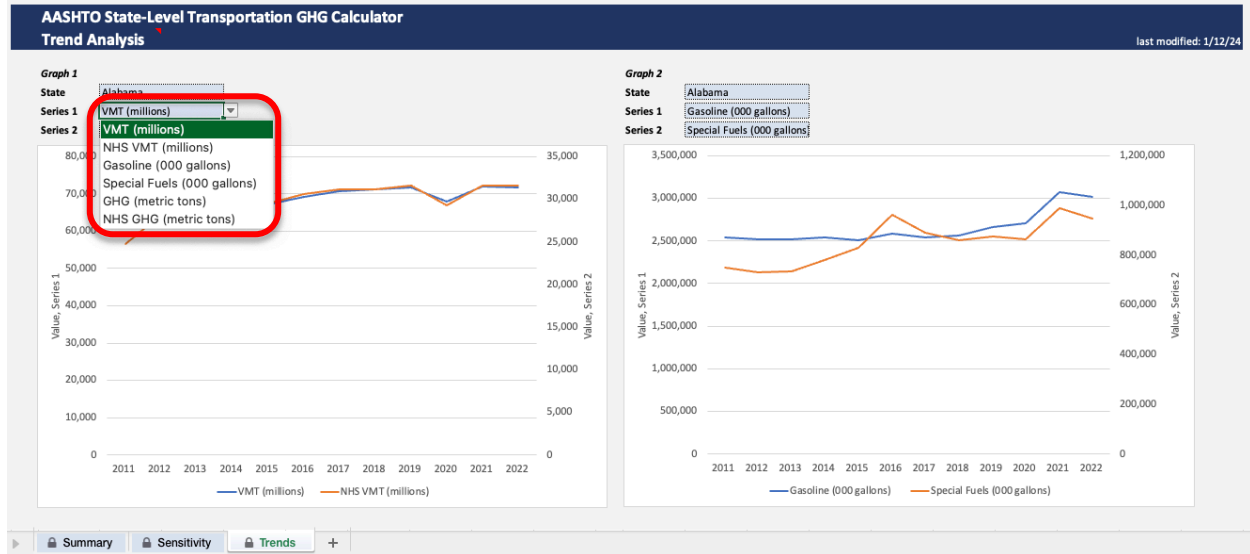
Navigate to the “Trends” worksheet tab using the bottom navigation bar.

Select the desired state from the dropdown menu at (Cell D/E7 for Graph 1, Cell N/O7 for Graph 2) to populate selected data items. After you choose your state, data series for that state will automatically fill.



## Trends Step 2: Selecting Data Series

Select the desired data series from the dropdown menu. This data series will display on the associated graph.



## Need Help?

If you have questions or need help with the tool, feel free to email [contact@tpm-portal.com](mailto:contact@tpm-portal.com).