

Appendix F. Caveats and Limitations

This appendix outlines the caveats and limitations of models or approaches used to quantify GHG emission reductions outlined in Appendix E.

1.1. Models

1.1.1. Alternative Fuels Data Centers Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite

EVI-Pro Lite is an online tool for projecting consumer demand for electric vehicle (EV) charging infrastructure. The EVI-Pro Lite tool uses simulations to predict the type and quantity of charging infrastructure required to support different levels of EV adoption. Simulations use data on charging station characteristics, EV attributes, and personal vehicle travel patterns. The EVI-Pro Lite tool gives users the option to change assumptions about vehicle mix and electricity needs and provides planners with suggested infrastructure priorities. The tool includes projections for home charging versus public charging. EVI-Pro Lite is a simplified version of the Electric Vehicle Infrastructure Projection Tool (EVI-Pro) housed in the Alternative Fuel Toolkit¹. EVI-Pro was developed in collaboration between the National Renewable Energy Laboratory and the California Energy Commission, with additional support from the U.S. Department of Energy's Vehicle Technologies Office. The Alternative Fuel Toolkit is an online platform designed to help state Departments of Transportation (DOTs) learn more about alternative fuels, plan alternative fuel vehicle infrastructure and explore funding sources, and take action to deploy alternative fuels and vehicles using an online action guide, set of facilitation materials, and other resources. The website² is the result of an effort led by the Oregon DOT and FHWA and supported by nine other state DOTs.

Limitations to Consider:

- EVI-Pro Lite is useful for basic estimations, it may not be suitable for comprehensive assessments of electric vehicle infrastructure needs.
- EV hardware and installation cost parameters have been developed purely based on historic observations compiled from literature.³
- EVI-Pro Lite is best used for estimating daily charging needs in urban planning.
- EV-Pro lite also does not allow for custom travel behavior modeling because a user cannot input local travel survey data or customize trip patterns.
- EV-Pro Lite is also not suitable for fleet operations, medium- or heavy-duty EVs, and depot charging estimates.
- The model assumes most drivers will charge at home.

¹ Alternative Fuel Toolkit <https://www.nrel.gov/transportation/evi-pro.html>

² Link: <http://altfueltoolkit.org/>

³ <https://docs.nrel.gov/docs/fy23osti/85654.pdf>

1.1.2. AFLEET CFI Emissions Tool

The AFLEET CFI Emissions Tool estimates well-to-wheel GHG emissions and vehicle operation air pollutant emissions for the FHWA Charging and Fueling Infrastructure Discretionary Grant Program (CFI Program). The CFI Program covers EVs charging, as well as hydrogen, propane, and natural gas fueling infrastructure. This tool was developed with the support of the Joint Office of Energy and Transportation, using the AFLEET Tool.⁴ The AFLEET Tool uses emissions data from both the EPA's MOVES (Motor Vehicle Emission Simulator) and Argonne's GREET (Greenhouse gases, Regulated Emissions, and Energy use in Technologies) models.

These limitations highlight the need for users to consider the tool's limitations when using it for detailed assessments and to ensure the results are as accurate as possible.

Limitations to Consider:

- **Simplistic Inputs:** The tool requires simple inputs, which may not fully capture the complexity of vehicle and fuel choices.
- **Limited Data for Off-Road Vehicles:** The tool does not provide detailed data for off-road vehicles, which may be necessary for comprehensive assessments.
- **Exclusion of Idle Reduction:** The tool does not account for idle reduction strategies, which can significantly impact fuel efficiency and emissions.
- **Limited Customization:** The tool's customization options are limited, which may not accommodate all user-specific needs.
- **Potential for Bias:** The tool's reliance on user input may introduce potential biases, affecting the accuracy of the results.

1.1.3. The Federal Highway Administration (FHWA) Office of Natural Environment developed the Congestion Mitigation and Air Quality Improvement (CMAQ) Emissions Calculator Toolkit

The purpose of the Congestion Mitigation and Air Quality Improvement Program Emissions Calculator Toolkit (CMAQ Toolkit)⁵ is to provide users a standardized approach to estimating emissions reductions from the implementation of a CMAQ-funded project. The CMAQ Toolkit uses emissions rates based on national-scale runs of the Motor Vehicle Emission Simulator (MOVES) as well as other data sources. For each tool in the toolkit, the

⁴ AFLEET Tool <https://greet.es.anl.gov/afleet>

⁵ <https://rosap.ntl.bts.gov/view/dot/35982>

inputs and methodology are described in user guides along with some example cases. Information regarding the development of default emissions rates and guidance on incorporating user-supplied emissions rates can be found in the accompanying Emissions Data documentation.

The FHWA has developed a CMAQ Emissions Calculator Toolkit which is located on the FHWA CMAQ Website.⁶ This collection of spreadsheet-based tools allows users to estimate emission reduction for many CMAQ project types. It is offered as an additional resource to assist DOTs, MPOs and project sponsors in the project justification and reporting process.

Limitations to Consider:

- Emissions estimates from the CMAQ Toolkit are not intended to meet specific requirements for State Implementation Plans (SIPs) or transportation conformity analyses.
- The toolkit uses default emission rates based on MOVES (Motor Vehicle Emission Simulator) runs which provides county-level results, therefore, they may not reflect local conditions unless users input custom data.
- Each module (e.g., Intersection Improvements, Diesel Retrofit) is designed for specific project types. Applying a module outside its intended scope can lead to inaccurate results.
- Emissions are typically calculated for peak and off-peak hours on a typical weekday, which may not capture seasonal or long-term variations.
- CMAQ relies on pre-processed traffic data rather than real-time traffic flow. It does not account for dynamic traffic conditions (accidents, construction) unless those are reflected in the emissions inventory. CMAQ allows the user to receive emissions data on an hourly, daily, monthly, and annual basis. Currently, the most recent emissions inventory for CMAQ dates to 2019. While there are separate cost-effectiveness tables, the toolkit itself does not integrate cost analysis directly into its emissions estimates.
- The tool relies on various input data (emissions, meteorological data, etc.) thus the quality, availability, accuracy, and up-to-date nature of the data may be a limitation. CMAQ's accuracy heavily depends on the quality of emissions data. Inaccuracies in inventories (underreporting of mobile or industrial sources) can lead to biased results. The tool is updated by the EPA every 1-2 years; however, these updates rely on receiving accurate and current data from sources. Furthermore, peer reviews have noted that model evaluation is often limited to specific time periods or regions, which may not fully capture seasonal or interannual variability

⁶ <https://rosap.ntl.bts.gov/view/dot/35982>

1.1.4. NREL's PVWatts calculator

The PVWatts⁷ calculator estimates the energy production and energy cost of grid-connected photovoltaic (PV) energy systems worldwide. It allows homeowners, small building owners, installers, and manufacturers to easily develop estimations of the performance of potential PV installations. The tool is available free of charge and without a prior registration.

Limitations to Consider:

- It is not possible to run PVWatts® using your own solar resource data file or a data from a source other than those discussed here. The online version of PVWatts® (hosted by NREL) is designed for ease of use, but it limits users to predefined solar resource datasets like TMY2 or TMY3, where TMY stands for typical meteorological year. As a result, this tool is not appropriate for individual residential estimates due to un-customizable load profiles and generic weather data and simplified system input. If you want to run PVWatts® simulations with your own solar resource data file, you can use the version of PVWatts® in NREL's System Advisor Model (SAM). SAM allows the user to upload their own solar resource data.
- Solar resource data sources for locations not covered by the National Solar Radiation Database (NSRDB) include:
 - Solar and Wind Energy Resource Assessment Programme (SWERA)
 - The ASHRAE International Weather for Energy Calculations Version 1.1 (IWECC)
 - Canadian Weather for Energy Calculations (CWECC)
- The NSRDB for PVWatts is a special set of files from the NSRDB. These files were collected from the following NSRDB datasets:
 - PSM V3 TMY (tmy-2020)
 - Himarawi PSM V3 TMY (tmy-2020)
 - Meteosat Prime Meridian V1.0.0 TMY (PSM V4, tmy-2022)
- PVWatts does not account for complex shading scenarios (e.g., trees, buildings, terrain). It assumes uniform irradiance across the array, which can lead to overestimation of energy production and costs in shaded environments.
- The model cannot model multiple array orientations or tilt angles. Only supports basic system types (fixed, single-axis tracking, roof-mounted).
- The model Uses an average default system loss of 14%, which may not reflect real-world conditions. High-performance systems might have losses closer to 10–12%, while poorly maintained or complex systems could exceed 16–20%.

⁷ <https://pvwatts.nrel.gov/>

- The model Lacks capabilities for modeling financial incentives, depreciation, or detailed cash flow. For in-depth financial analysis, tools like SAM (System Advisor Model) or PVsyst are recommended.
- While recent versions use improved weather data (e.g., NSRDB PSM V3 with 4 km resolution), microclimate effects and local anomalies may still be missed. The tool does not differentiate between high-efficiency and lower-performing PV modules. The model treats all modules as having similar performance characteristics. Typical accuracy ranges are $\pm 10\%$ annually for well-matched systems, but results can vary significantly based on site-specific factors like shading, soiling, and microclimate conditions that aren't captured in the standard modeling. The 14% default system loss may not reflect your installation – premium systems with excellent maintenance might see 10-12% losses, while challenging installations could experience 16-20% losses, requiring input adjustments for accurate estimates
- For more advanced modeling, especially for commercial-scale or complex residential systems, PVWatts should be complemented with tools like SAM or PVsyst.

1.1.5. EPA's eGrid

The Emissions & Generation Resource Integrated Database (eGRID)⁸ is a comprehensive source of data from [EPA's Clean Air Power Sector Programs](#) on the environmental characteristics of almost all electric power generated in the United States.

The data includes emissions, emission rates, generation, heat input, resource mix, and many other attributes. eGRID is typically used for greenhouse gas registries and inventories, carbon footprints for electricity purchases, consumer information disclosure, emission inventories and standards, power market changes, and avoided emission estimates.

Limitations to Consider:

- Data Aggregation Levels: eGRID reports data at various levels of aggregation, which may limit the granularity of the data for specific analyses.
- Data Source Limitations: There can be outliers in output emission rates, which may not reflect the typical behavior of the data. The eGRID tool relies on data from EPA's Clean Air Markets Division (CAMD) and EIA Forms 860 and 923, which may have: incomplete or inconsistent reporting, differences in reporting thresholds and methodologies, and gaps for smaller or non-grid-connected generators.

⁸ <https://www.epa.gov/eGRID>

- Methodological Changes: The methodology for assigning electricity generating plants to eGRID subregions has changed, which may affect how data is interpreted and used. Emissions are attributed based on plant-level averages, not real-time dispatch or marginal generation, which can misrepresent emissions from specific electricity usage.
- Limited Historical Data: The dataset may not cover all years or may have limitations in terms of data availability. The tool only provides annual data, hourly data cannot be provided. eGRID includes data for the following years:
 - 1996 through 2000
 - 2004, 2005, 2007, 2009, 2010, 2012, 2014, 2016
 - Annually from 2018 through 2023
 - eGRID is typically released annually, but the data reflects conditions two years prior to the release year. For example, eGRID2023 (with 2023 data) was released in January and June 2025. The next planned release(eGRID2024) is scheduled for January 2026

1.1.6. EPA Simplified GHG Emissions Calculator

The EPA Simplified GHG Emissions Calculator ("the Calculator")⁹ is a free tool that is designed as a simplified calculation tool to help organizations estimate annual greenhouse gas (GHG) emissions. The Calculator quantifies direct and indirect emissions based on user input for a specific source. All methodologies and default values provided are based on the most current Center for Corporate Climate Leadership Greenhouse Gas Inventory Guidance Documents and the Emission Factors Hub.

Limitations to Consider:

- The tool is intended for small to medium sized organizations who are in the early stages of GHG management.
- The calculator provides *approximate estimates* and is not suitable for official emission inventories or rigorous carbon accounting. It's designed for communication and educational purposes, not regulatory compliance.
- Not all energy units are provided in the calculator. As a result, if energy data is in units not used in the EPA's calculator, prior unit conversion to units provided in the calculator will need to be completed before using the tool to calculate GHG emission reductions. For example, BTU units are not included in the calculator and thereby must be converted to therms (or the desired unit utilized in the EPA's GHG Emissions Calculator) before the model can be used.

⁹ <https://www.epa.gov/climateleadership/simplified-ghg-emissions-calculator>

- The calculator uses average emission factors for electricity, which may not reflect real-world variations in energy sources or grid mix. As a result, this may lead to over or underestimates of GHG emissions. While the tool allows users to select subregions, it still generalizes emissions across that area. Local utilities with cleaner portfolios (e.g., hydro-heavy or nuclear) may have much lower emissions than the regional average.
- The calculator focuses on a narrow set of inputs—like gasoline, electricity, and natural gas—and may not accommodate more complex or diverse energy/emissions scenarios.
- The calculator assumes fixed values for things like vehicle emissions or energy consumption, which may not reflect technological changes, behavioral shifts, or policy updates.

1.1.7. EPA's Waste Reduction Model (WARM)

The Waste Reduction Model (WARM)¹⁰ is a tool created by the U.S. Environmental Protection Agency (EPA) to help solid waste planners and organizations estimate greenhouse gas (GHG) emission reductions and economic impacts from several different waste management practices. The tool calculates and totals the GHG emissions, energy savings and economic impacts of baseline and alternative waste management practices, including source reduction, recycling, combustion, composting, anaerobic digestion and landfilling.

Limitations to Consider:

- WARM is a screening level tool, best used for providing site managers data on how to reduce GHG emissions that may inform management decisions. It is not a comprehensive tool for developing a GHG inventory.
- Lack of Variation in Transportation Distances: The model does not account for variations in transportation distances, which can lead to inaccurate emissions estimates for decentralized operations. The default transportation distances in WARM are listed below:
 - Landfilling:
 - Default distance: **20 miles**
 - Assumes waste is transported by **diesel truck**
 - Combustion (Waste-to-Energy):
 - Default distance: **20 miles**
 - Also assumes diesel truck transport

¹⁰ <https://www.epa.gov/waste-reduction-model>

- Recycling:
 - Default distance: **500 miles**
 - Reflects longer hauls to regional or national recycling facilities
- Composting:
 - Default distance: **20 miles**
- Anaerobic Digestion:
 - Default distance: **20 miles**
- Static Emission Factors: Relies on national averages and static lifecycle data, which may not reflect regional variations, technological advancements, or local waste management practices.
- Limited Material Scope: While WARM covers many common materials (e.g., paper, plastics, metals, organics), it doesn't include all waste types (especially niche or emerging materials like textiles, hazardous waste, or electronics in detail).
- Need for Site-Specific Information: The model requires site-specific information to provide more accurate results, which may not always be readily available.
- Limitations in GHG Inventory Development: WARM is not designed for developing GHG inventories.

1.1.8. Diesel Emission Quantifier (DEQ)

EPA's Diesel Emissions Quantifier¹¹ is a tool to help fleet owners, school districts, municipalities, contractors, port authorities, and others estimate cost effectiveness and environmental impact of emission reduction technologies that have been added to medium- and heavy-duty diesel vehicles and equipment. Estimates are made using specific information about a fleet, such as miles driven, miles per gallon, and others. Also included are health benefits cost analysis for reduced emissions and alternative options for vehicle replacement or upgrades.

Limitations to Consider:

- Vehicle Type: The Diesel Emissions Quantifier primarily calculates emission reductions for medium- and heavy- -duty vehicles, not for light-duty vehicles.
- Default Values: The Diesel Emissions Quantifier uses default values for certain data affecting emissions, such as temperature and humidity, which may not account for all factors in real-world scenarios.
- Fuel Savings: The Diesel Emissions Quantifier does not provide information on fuel savings or estimates, focusing solely on CO₂ emission reductions.

¹¹ <https://cfpub.epa.gov/quantifier/index.cfm?action=main.home>

- Technology Entry: The Diesel Emissions Quantifier may not be suitable for all technology options, as it is designed for specific retrofit projects and does not support all types of emissions reduction technologies.

1.1.9. Baseline Resilience Indicators for Communities (BRIC)

The Baseline Resilience Indicators for Communities (BRIC)¹² describes the differences in community resilience among counties within the state and within the nation through a comparative community resilience score. BRIC is comprised of six broad categories of community disaster resilience. Used as an initial baseline for monitoring existing attributes of resilience to natural hazards, BRIC can be used to compare places to one another, to determine the specific drivers of resilience for counties, and to monitor improvements in resilience over time. BRIC helps communities: assess their baseline resilience to natural hazards, identify strengths and vulnerabilities across key domains, compare resilience across counties and track changes over time (2010, 2015, 2020). It's especially useful for emergency planners, public health officials, and policy makers allocating resources and preparing for disasters.

BRIC considers six broad categories of community disaster resilience: Cultural/Social, Economic/Financial, Built Environment/Housing, Institutional/Governance, Community Capacity, Environmental/Natural.

Limitations to Consider:

- This index utilizes uniform formulas and variables across the coverage area; it does not consider community-specific variables. The interpretation is limited to the variable included in the analysis.
- BRIC provides a baseline view, often based on data from specific years (e.g., 2010, 2015, 2020). It doesn't capture real-time changes or dynamic shifts in resilience due to recent events or policy changes.
- Relies heavily on publicly available federal datasets, which may be outdated or incomplete. Many of data sets utilized include: OpenFEMA Hazard Mitigation Assistance (HMA) Datasets, FEMA's National Risk Index (NRI), Social Vulnerability Index (SoVI), Expected Annual Loss (EAL), FEMA Data Hub, and the American Community Survey.
- Some indicators may not be uniformly reported across all counties, affecting comparability. Certain counties may lack reliable data for certain indicators due to limited resources, outdated reporting systems, or small population sizes. For

¹² <https://experience.arcgis.com/experience/376770c1113943b6b5f6b58ff1c2fb5c/page/BRIC/>

example, rural counties might not report detailed health or infrastructure metrics, skewing their resilience scores.

- Aggregates data at the county level, potentially masking intra-county disparities. BRIC may overlook hyper-local factors like neighborhood-level social cohesion or informal networks.
- Uses a “capitals” approach (social, economic, institutional, infrastructural, environmental, and community capital), but the weighting of indicators can be subjective.
- Principal component analysis or other statistical methods may not reflect community priorities or lived experiences.
- BRIC is better at describing existing conditions than predicting future resilience or outcomes. It doesn’t directly measure how communities respond to actual disasters or recover over time.
- Environmental indicators may not fully capture climate change vulnerabilities or ecological resilience. Some natural hazard risks (e.g., wildfire, drought) are underrepresented depending on the region.

1.1.10. Communities Advancing Resilience Toolkit (CART)

The Communities Advancing Resilience Toolkit (CART)¹³ is a tool that uses surveys to determine the strengths and weaknesses of a community regarding their involvement in disaster prevention, mitigation, and recovery. The surveys can help establish a baseline about a specific community thereby informing public health professionals of resources that will be required to help the community recover. Public health professionals seeking tools to assess community demographics and resilience can use this resource. It helps evaluate strengths and weaknesses, focusing on community involvement for disaster prevention, mitigation, and recovery. CART surveys may be used to obtain baseline information about a community in order to identify its strengths and challenges, and to evaluate a community after a disruptive event or post intervention.

- CART allows users to create an assessment survey of a community’s response to disaster by:
 - Measuring resilience across five key domains:
 - Connection and Caring
 - Resources

¹³ <https://www.atsdr.cdc.gov/community-stress-resource-center/php/resources/cart-integrated-system.html#:~:text=Public%20health%20professionals%20seeking%20tools%20to%20assess%20community,community%20involvement%20for%20disaster%20prevention%2C%20mitigation%2C%20and%20recovery.>

- Transformative Potential
- Disaster Management
- Information and Communication
- Using a 5-point Likert scale to gauge community perceptions and experiences.
- Organizations can add questions tailored to local concerns or specific populations.
- Encouraging community participation in both design and interpretation of results.
- Combining survey data with demographic and contextual information to provide a holistic snapshot of community resilience.
- Supporting long-term planning, community engagement, and informal outreach mechanisms.

Limitations to Consider:

- The tool measures the perceptions of community members, it does not provide an externally-based, objective measure of a community's resilience.
- No Hazard-Specific Metrics: Focuses on general resilience capacity, not specific risks like floods, wildfires, or pandemics.
- Surveyor and Responder Bias: The questionnaire was administered via interviews. The toolkit relies heavily on self-reported survey responses, which can introduce bias or inaccuracies depending on participants' perceptions, literacy levels, or willingness to respond honestly. While interviewer and/or responder bias cannot be ruled out, trained interviewers were considered by the sponsoring organization to be sufficiently qualified that they were used to conduct structured interviews for subsequent neighborhood surveys.
- Implementing CART effectively requires time, trained personnel, and community engagement. Disadvantaged communities may struggle with these demands, limiting the toolkit's reach and impact.¹⁴

1.1.11. EPA Landfill Methane Outreach Program (LMOP) Tool

The EPA's Landfill Methane Outreach Program (LMOP)¹⁵ is a voluntary initiative that promotes the reduction of methane emissions from landfills by encouraging the recovery

¹⁴ Citation: Pfefferbaum RL, Pfefferbaum B, Zhao YD, Van Horn RL, McCarter GS, Leonard MB. Assessing community resilience: A CART survey application in an impoverished urban community. *Disaster Health*. 2016 May 13;3(2):45-56. doi: 10.1080/21665044.2016.1189068. PMID: 28229014; PMCID: PMC5314893

¹⁵ <https://www.epa.gov/lmop/list-tools-related-landfill-gas-and-waste-management>

and beneficial use of landfill gas (LFG). LMOP provides a suite of tools and resources to support project development, feasibility analysis, and stakeholder collaboration.

LMOP forms partnerships with communities, landfill owners and operators, utilities, power marketers, states, project developers, Tribes and nonprofit organizations to overcome barriers to project development. LMOP focuses on LFG energy project development at MSW landfills, the largest source of methane emissions from the waste sector.

LMOP activities include:

- Providing technical assistance, guidance materials and software to assess the potential economic feasibility of an LFG energy project.
- Developing informational materials about the benefits of renewable energy from biogas generated from MSW, as well as opportunities to reduce emissions from existing MSW landfills.
- Fostering partnerships and identifying financing for biogas projects.
- Creating networking opportunities with peers and renewable energy experts

Key Tools and Capabilities of the LMOP Toolset

1. LFGcost-Web
 - A Microsoft Excel-based tool that estimates the economic feasibility, environmental benefits, and job creation potential of landfill gas energy project
2. LFG Energy Benefits Calculator
 - Estimates methane reductions, avoided CO₂ emissions, and energy benefits (e.g., homes powered) from LFG projects
3. RNG Flow Rate Estimation Tool
 - Helps estimate adjusted flow rates and heat content of LFG for renewable natural gas (RNG) projects, especially when nitrogen specifications must be met.
4. Interactive Conversion Tool
 - Converts units (e.g., SCFM to MMSCFD) and estimates LFG energy potential from waste-in-place data
5. LandGEM (Landfill Gas Emissions Model)
 - Estimates total LFG and methane generation, as well as emissions of CO₂, NMOCs, and other pollutants. Useful for regulatory compliance and project planning
6. LMOP Database and Locator
 - A searchable database of candidate landfills and potential end users of LFG. Helps match landfills with nearby facilities that could use the gas

7. Project Development Handbook
 - Offers guidance on the technical, economic, and regulatory aspects of LFG energy project development
8. National Map of LFG Energy Projects
 - An interactive map showing operational LFG energy projects across the U.S., including electricity generation, direct use, and RNG applications

Limitations to Consider:

- Not a Regulatory Tool
 - LMOP is a voluntary program, and its tools are not designed for regulatory compliance or permitting. Users must consult local, state, and federal regulations separately.
- Simplified Economic Modeling
 - Tools like LFGcost-Web provide preliminary financial estimates but may not capture:
 - Site-specific capital and O&M costs
 - Local utility rates or incentives
 - Financing structures or tax implications
- Limited Technical Customization
 - Tools such as the LFG Energy Benefits Calculator and LandGEM use default assumptions for gas generation, energy conversion, and emissions, which may not reflect actual site conditions.
- No Real-Time Data Integration
 - LMOP tools do not integrate with real-time monitoring systems or GIS-based landfill operations, limiting their use for ongoing project management.
- Static Emission Factors
 - Emission reductions are based on standardized factors, not dynamic modeling of methane capture efficiency or combustion technology performance.
- Limited Scope for RNG Projects
 - While LMOP has expanded to include renewable natural gas (RNG), tools like the RNG Flow Rate Estimation Tool are still evolving and may not fully support complex RNG project modeling.
- LandGEM Model Limitations
 - LandGEM, used for estimating LFG generation, assumes first-order decay and may not accurately model:
 - Seasonal variations
 - Site-specific waste composition
 - Operational practices like leachate recirculation
- No Lifecycle or Co-Benefit Analysis

- LMOP tools focus on methane and CO₂ reductions, but do not account for:
 - Lifecycle emissions
 - Air quality co-benefits
 - Public health or economic development impacts

1.1.12. The EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT)

The EPA Facility Level Information on Greenhouse Gases Tool (FLIGHT)¹⁶ is an interactive, web-based platform that allows users to explore greenhouse gas (GHG) emissions data reported under the Greenhouse Gas Reporting Program (GHGRP). It is designed to enhance transparency and public access to emissions data from large facilities across the United States.

The FLIGHT tool can be used for:

- Policy and Planning: Support climate action planning and emissions reduction strategies.
- Public Transparency: Enable communities to understand local industrial emissions.
- Academic Research: Provide data for environmental studies and modeling.
- Corporate Benchmarking: Compare emissions performance across facilities or sectors.

Key Features of the FLIGHT Tool:

- Facility-Level Emissions Data
 - View GHG emissions from over 8,000 facilities in sectors like power generation, manufacturing, oil and gas, and waste.
 - Data includes CO₂, CH₄, N₂O, and fluorinated gases.
- Interactive Mapping and Visualization
 - Search by location, facility name, industry type, or NAICS code.
 - Visualize emissions data using maps, pie charts, bar graphs, and trend lines.
- Custom Filtering
 - Filter by:
 - Data year
 - GHG type
 - Emission range
 - Fuel type
 - Facility or parent company
- Downloadable Reports

¹⁶ <https://www.epa.gov/qhgreporting>

- Export data tables, charts, and facility lists for further analysis or reporting.
- Trend Analysis
 - View emissions trends over multiple years for individual facilities or sectors.
- Cross-Referencing
 - Crosswalks available to link GHGRP data with other federal datasets (e.g., EIA, SO₂/NO_x programs).

Limitations to Consider:

- Covers Only Large Emitters
 - FLIGHT includes data only from facilities that emit 25,000 metric tons or more of CO₂-equivalent GHGs per year.
 - This excludes many small- and medium-sized emitters, meaning the tool does not represent total U.S. emissions
- No Scope 2 or Scope 3 Emissions
 - The tool focuses on direct (Scope 1) emissions only.
 - It does not include indirect emissions from purchased electricity (Scope 2) or supply chain and product use (Scope 3).
- Limited Sector Coverage
 - While it covers major sectors like power plants, refineries, and manufacturing, some sectors (e.g., agriculture, small businesses, and residential) are not included.
- Annual Reporting Only
 - FLIGHT provides annual emissions data, with no sub-annual (e.g., monthly or quarterly) resolution.
 - This limits its usefulness for real-time monitoring or seasonal analysis.
- No Emissions Forecasting
 - The tool is retrospective only—it does not model or forecast future emissions trends or impacts of mitigation strategies.
- No Lifecycle or Co-Benefit Analysis
 - FLIGHT does not include lifecycle emissions, health impacts, or economic co-benefits of emissions reductions.
- Data Lag
 - There is typically a 1–2 year delay between the reporting year and data availability in FLIGHT.
 - Start Year of Data Availability: 2010
 - Most Recent Year of Data Availability: Typically, data is available up to two years prior to the current year due to the reporting and verification process. As of 2025, the most recent data is likely from 2023.
- No Custom Scenario Modeling
 - Users cannot simulate “what-if” scenarios or policy impacts within the tool.