NYC Buildings

Local Law 97

REQUIREMENTS FOR REPORTING ANNUAL GREENHOUSE GAS (GHG) EMISSIONS IN COVERED BUILDINGS

Biofuels Info Guide

Version 1.0, 02/18/2025

Biofuels

Code language

§28-320.3 Building emissions limits. (…)

§28-320.3.1 Annual building emissions limits 2024-2029. (…)

§28-320.3.1.1 Greenhouse gas coefficient of energy consumption for calendar years 2024 through 2029. (…)

(…)

7. The amount of greenhouse gas emissions attributable to other energy sources…shall be determined by the commissioner and promulgated into rules of the department.

1 RCNY §103-14

(a) Definitions. (…)

(…)

Biofuel. Biofuel means biodiesel and renewable diesel.

(…)

(d) Calculations. (…)

(…)

(*3*) *Greenhouse gas coefficients of energy consumption.* Greenhouse gas coefficients for energy consumption shall be determined in accordance with this paragraph (3):

(i) Greenhouse gas coefficients for certain fuels combusted or consumed on premises for calendar years 2024 - 2034. (…)

a. For the following fuel types combusted or consumed on premises, greenhouse gas emissions must be calculated as generating the following amounts of tCO_2e per kBtu:

[refer to Rule for list of emissions coefficients, including those for “diesel” and “biofuel”]

(…)

c. For any fuel type that is combusted or consumed on site, not listed in this subparagraph or section 28-320.3.1.1 of the Administrative Code and not prohibited by applicable rule or law, the owner must propose a carbon coefficient, in tCO_2e per kBtu, that serves the public interest of reducing GHG emissions…

Biofuels – summary

Applicants that have made use of biofuels as an energy source may calculate Local Law 97 ("LL97") emissions in three ways:

1. Use the default Biofuel coefficient in 1 RCNY §103-14;
2. Determine a semi-custom Biofuel coefficient using the charts in this *Biofuels Info Guide*; or
3. Submit a Construction Codes Determination ("CCD1") to the Department.

LL97's approach to accounting for emissions from biofuel combustion aligns with international, national, state, and local standards. The law treats direct emissions from biofuel combustion as biogenic, in accordance with the US Environmental Protection Agency (EPA) definition. This includes emissions related to the natural carbon cycle, as well as those from the combustion, harvest, digestion, fermentation, decomposition, or processing of biologically based materials. The goal is to allow building owners to report emissions accurately by providing a coefficient that reflects biofuels used in buildings, based on life-cycle emissions data from the EPA's Renewable Fuel Standard Program. This methodology captures net emissions from the full life-cycle of biofuels, including feedstock production, transportation, fuel production, distribution, and fuel use. Published life cycle emissions studies have been supplemented by California's LCFS Pathway Certified Carbon Intensities.

In line with the Intergovernmental Panel on Climate Change ("IPCC") guidelines and federal standards, biogenic emissions are allocated to the land use change sector at the national level rather than the energy sector. While plants sequester carbon, removing carbon dioxide (CO2) from the atmosphere, there are no corresponding sinks for methane (CH4) or nitrous oxide (N2O). There are also uncertainties regarding assumptions related to biofuel supply and transportation.

The EPA defines biogenic CO2 emissions as those tied to the natural carbon cycle. For biofuel, the EPA uses a combustion factor of 0.00007384 tCO2e/kBtu (73.84 kG-CO2e/MMBtu), representing the net change in biomass and uptake of CO2 in biodiesel feedstock. The GHG protocol recommends excluding CO2 emissions from renewable fuel but acknowledges the need to account for emissions from fuel production and transportation. The EPA further quantifies non-CO2 emissions from biofuel combustion based on feedstock (e.g., soybean, rapeseed, animal-based) and fuel pathway.

The 2024 New York State (NYS) Emissions Report includes accounting for biogenic emissions, consistent with the accounting used for New York State's Climate Leadership and Community Protection Act (CLCPA). This report includes both United Nations Framework Convention on Climate Change (UNFCCC) net emissions (without biogenic emissions) and gross total emissions. In the net emissions approach, biogenic carbon sinks offset gross CO2 combustion-related emissions, whereas. the gross approach includes all emissions without accounting for carbon sinks.

The New York State Energy Research and Development Authority (NYSERDA) further clarifies that the gross accounting method is used for evaluating state GHG emissions reduction targets, while the net method is used for monetizing GHG emissions reductions. Since Local Law 97 both sets emission reduction limits and monetizes avoided emissions, it applies a life-cycle net emissions approach to quantify net avoided emissions.

Biofuels – definitions

Definitions for biofuels are defined in the EPA Regulations and Volume Standards for Renewable Fuel Standards, which references the Code of Federal Regulations. Title 40 Chapter I Subchapter C Part 80 Subpart M defines biodiesel, cellulosic diesel, and renewable diesel.

Biodiesel

A mono-alkyl ester that meets ASTM D6751 (incorporated by reference, see § 80.12). Note: Biodiesel and Renewable Diesel are both examples of biofuels, with similar feedstocks. The two differ slightly in how they are produced and their

end-use applications. Biodiesel is produced through a process known as transesterification, which converts organic fats and oils into fatty acid alkyl esters by reacting them with alcohols and catalysts. Inputs include the feedstock, methanol, a catalyst, and a heat source (typically a boiler). This process results in biodiesel production and sellable glycerin.

Cellulosic diesel

Any renewable fuel which meets both the definitions of cellulosic biofuel and biomass-based diesel. Cellulosic diesel includes heating oil and jet fuel produced from cellulosic feedstocks. Note: Cellulosic diesel is typically produced using the Fischer-Tropsch process.

Biomass-based diesel

A renewable fuel that has lifecycle greenhouse gas emissions that are at least 50 percent less than baseline lifecycle greenhouse gas emissions and meets all of the requirements of paragraph (1) of this definition: (...)

Note: Renewable diesel is typically generated through hydroprocessing or hydrotreating. In this process, inputs include the feedstock, Hydrogen, and heat. The outputs include renewable diesel, water, and other distilled biofuels. Renewable diesel meets ASTM D975 specifications, allowing it to be a drop-in fuel replacement for diesel with a mixture ratio up to 100%. Biodiesel, by contrast, is typically only blended with regular diesel up to 30% due to slight differences in chemical composition. In the production of renewable diesel, hydrogen may be sourced from fossil fuel combustion (grey hydrogen), fossil fuel combustion with carbon sequestration (blue), or through the electrolysis of water (green). As a result, only renewable diesel generated from green hydrogen should be considered as a biogenic fuel source for the purpose of this analysis.

Other definitions:

Biofuels

The Department of Energy defines biofuels as “liquid fuels produced from renewable biological sources, including plants and algae.” Such fuels are derived from renewable biomass, typically sourced from plant, algae, and/or animal

waste. Biofuels sequester their associated emissions through photosynthesis when biomass sources are cultivated. In other words, the total flux of CO2 to and from the atmosphere is equal to the changes in carbon stocks in the existing biomass and soils.

Biogenic emissions

All emissions associated with biofuels are considered to be "biogenic". The EPA defines biogenic emissions as those "related to the natural carbon cycle, as well as those resulting from the combustion, harvest, combustion, digestion, fermentation, decomposition, or processing of biologically based materials." The sequestration of carbon emissions through biomass is significant, removing nearly 12% of total GHG emissions in the United States. The Intergovernmental Panel on Climate Change (IPCC) states that biomass can contribute 1.8 – 4.1 GtCO2e per year of emissions reductions.

Note: While some biofuels may achieve significant emissions reductions, CO_2 sequestration claims that differ from EPA's Renewable Fuel Standard (RFS) program and associated LCA methodologies must be supported by documented land-use impacts, agricultural practices, and indirect emissions factors.

Biofuels – overview

When a biofuel is combusted, it releases 0.00007384 tCO2e/kBtu (73.84 kG-CO2e/MMBtu) of CO2 emissions at the point of combustion. However, federal life-cycle analyses show that a portion of these emissions are sequestered by existing biomass, resulting in lower net emissions from biofuels compared to fossil fuels. These life-cycle analyses consider emissions across several stages: agricultural production, land use changes, feedstock transportation, fuel production, and fuel distribution. The total net emissions from biofuels are then compared to those from baseline diesel fuel, which includes emissions from fuel production and distribution.

To calculate the life-cycle emissions for biofuels, the EPA identifies three fuel pathways: a) Biomass-based diesel / Advanced biofuel; b) Cellulosic biofuel; and c) Renewable fuel.

When information on feedstocks is unknown:

In line with EPA standards, these three (3) fuel pathways are recognized, with a distinct net life-cycle emissions coefficient. If specific information about the biofuel is unavailable, the emissions coefficient for renewable diesel is used as a default.

	Default	*Default*	*Default*
Fuel	**Peak % Reduction**	**Peak tCO2e/kBtu**	**Peak kG/MMBtu**
Diesel	*N/A*	*0.00007421*	*74.21*
Biodiesel	52.2%	0.00003549	35.49
Cellulosic diesel	57.4%	0.00003158	31.58
Renewable diesel	46.4%	0.00003977	39.77
Default Biofuel	46.4%	0.00003977	39.77

Emissions reductions from biofuels can vary significantly depending on the feedstock used. To account for these variations, average emissions reductions are calculated for each common feedstock by fuel pathway. The EPA's Monthly Biodiesel Production Report is used to determine typically feedstock blends, which allows for a composite emissions reduction value to be assigned to each fuel pathway. This approach also enables the adjustment of the emissions coefficient if more specific feedstock data is known.

When information on (only) feedstocks is known:

The table below provides an overview of common biofuel feedstocks, fuel pathways, production requirements, average emissions reductions, and typical feedstock compositions, based on compiled life-cycle analyses. Cells highlighted green indicate additional life-cycle analyses that align with California's section 95488.8(d) of the LCFS Regulation:

Feedstock	Fuel	Production Process Requirements	% Reduction (Mean)
Algal oil	Biodiesel	Transesterification	60%
Canola oil	Biodiesel	Transesterification	49%
Palm oil	Biodiesel	Transesterification	17%
Soybean oil	Biodiesel	Transesterification	53%
Distillers sorghum oil	Biodiesel	Transesterification	60%
Yellow grease	Biodiesel	Transesterification	78%
Biogenic waste	Biodiesel	Any	60%
Sativa oil	Biodiesel	Any	50%
Rapeseed oil	Biodiesel	Any	50%
Cellulose from corn stover	Cellulosic diesel	Fischer-Tropsch process	91%
Switchgrass	Cellulosic diesel	Fischer-Tropsch process	71%
Corn Stover	Cellulosic diesel	Cellulosic biomass to fuel	68%
Similar to Switchgrass	Cellulosic diesel	Cellulosic biomass to fuel	60%
Biogenic waste	Cellulosic diesel	Any	50%
Soybean/Sativa oil	Cellulosic diesel	Any	50%
Canola/Rapeseed oil	Cellulosic diesel	Any	50%
Municipal Solid Waste	Cellulosic Diesel	Any	85%
Canola oil	Renewable diesel	Hydrotreating	56%

Palm oil	Renewable diesel	Hydrotreating	11%
Distillers sorghum oil	Renewable diesel	Hydrotreating	64%
Biogenic waste	Renewable diesel	Any	63%
Soybean/Sativa oil	Renewable diesel	Any	45%
Rapeseed oil	Renewable diesel	Any	50%
Waste Digesters	Biogas	Any	50%
All others	Biogas	Any	60%

When specific **feedstock** information is known for a biofuel, the corresponding emissions reductions for those feedstock blends can be applied to the given fuel. If feedstock details are unavailable, aggregated emissions reductions should be referenced from table 1.

When information on feedstocks, production, and transportation is known:

If detailed information is available on the **production and transportation** of biofuels, in line with EPA requirements, an adjusted emissions coefficient may be proposed based on the feedstock and fuel pathway. If such information is not available, the tables above should be used to determine emissions reductions. In such cases, the following information must be provided in alignment with the audit measures put in place by the EPA Renewable Fuel Standard (RFDS):

- Fuel feedstock(s), production processes, and end-uses
- Collection records: listing pertinent information about used cooking oil collection events. Relevant information includes date, name and address of establishment producing the waste, quantity.
- End Use Affidavit: notarized affidavit from the end user stating the quantity and date of fuel received, the purpose of the fuel, the vendor who sold the fuel to the consumer.
- RFS2 Quarterly Reports: RFS qualified producers should share copies of their EPA standard production reports.

The following items may be requested from the renewable fuel manufacturer upon an audit of the provided documentation:

- Fuel sales invoices
- Signed fuel BOL with fuel analysis
- UCO collection data and customer service agreements
- RFS2 qualified facility engineering review
- RFS2 quarterly fuel production reports
- End user notarized affidavit
- Annual RIN generation attestation: annual audit by a qualified auditor in the form of a report
- Production facility energy bills, for validating processing technique and fuel production quantities

Threshold for blend rate:

Credit will only be given for blend rates that exceed the minimum 2030 requirements outlined in NY State Senate Bill 2021-S9014A, which mandates biofuel blends of at least 20% by 2030 (or 10% by 2025). For instance, if a biofuel blend rate is 50% (B50), credit can be applied to the 30% that exceeds the requirement. The table below specifies the default emissions coefficient (tCO2e/kBtu) and the emissions reductions (as a percentage compared to diesel) based on the blend rate. As noted, this table may be updated if more specific feedstock information becomes available.

	Default Biofuel		**Biodiesel**		**Cellulosic diesel**		**Renewable diesel**	
0%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%
5%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%
10%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%
15%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%
20%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%	0.00007421	0.0%
25%	0.00007249	-2.3%	0.00007227	-2.6%	0.00007208	-2.9%	0.00007249	-2.3%

30%	0.00007077	-4.6%	0.00007034	-5.2%	0.00006995	-5.7%	0.00007077	-4.6%
35%	0.00006904	-7.0%	0.00006840	-7.8%	0.00006782	-8.6%	0.00006904	-7.0%
40%	0.00006732	-9.3%	0.00006647	-10.4%	0.00006568	-11.5%	0.00006732	-9.3%
45%	0.00006560	-11.6%	0.00006453	-13.0%	0.00006355	-14.4%	0.00006560	-11.6%
50%	0.00006388	-13.9%	0.00006259	-15.7%	0.00006142	-17.2%	0.00006388	-13.9%
55%	0.00006216	-16.2%	0.00006066	-18.3%	0.00005929	-20.1%	0.00006216	-16.2%
60%	0.00006044	-18.6%	0.00005872	-20.9%	0.00005716	-23.0%	0.00006044	-18.6%
65%	0.00005871	-20.9%	0.00005679	-23.5%	0.00005503	-25.8%	0.00005871	-20.9%
70%	0.00005699	-23.2%	0.00005485	-26.1%	0.00005290	-28.7%	0.00005699	-23.2%
75%	0.00005527	-25.5%	0.00005291	-28.7%	0.00005077	-31.6%	0.00005527	-25.5%
80%	0.00005355	-27.8%	0.00005098	-31.3%	0.00004863	-34.5%	0.00005355	-27.8%
85%	0.00005183	-30.2%	0.00004904	-33.9%	0.00004650	-37.3%	0.00005183	-30.2%
90%	0.00005011	-32.5%	0.00004711	-36.5%	0.00004437	-40.2%	0.00005011	-32.5%
95%	0.00004838	-34.8%	0.00004517	-39.1%	0.00004224	-43.1%	0.00004838	-34.8%
100%	0.00004666	-37.1%	0.00004323	-41.7%	0.00004011	-46.0%	0.00004666	-37.1%

Biofuels – examples

Scenario 1- Building owner is interested in considering the potential reductions associated with burning biofuels in their building. No information is known yet on the fuel pathway to be selected. The owner is interested in B30 biofuel.

- Building owner shall use the default coefficients for Renewable diesel when information on the fuel pathway is not known.
- For B30 Renewable diesel, the default emissions coefficient from the table above is 0.00007077 tCO2e/kBtu, reducing overall emissions relative to the combustion of diesel fuel by 4.6%.

Scenario 2- Building owner is using a B99 blend of Cellulosic diesel, and has made the necessary modifications to combust high biofuel blend rates in their equipment. No information on feedstocks is available from the biofuels manufacturer.

- For B99 Cellulosic diesel, a default emissions coefficient of 0.00004011 tCO2e/kBtu is provided by the table above, reducing overall emissions relative to the combustion of diesel fuel by 46%.

Scenario 3- A biofuels manufacturer is interested in demonstrating the emissions reduction potential for various blend rates of their fuel using the LL97 methodology. The manufacturer has demonstrated that the fuel pathway is Biodiesel and the feedstock is most similar to 'Yellow Grease'.

- From Table 2 above, the mean emissions reduction for Yellow Grease-based Biodiesel is 77.5%.
- Credit is applied only for blend rates exceeding 20%. Therefore, for all blend rates 20% and lower, the emissions coefficient shall be equal to typical diesel fuel. This results in a peak emissions reduction compared to diesel with a mandated B20 blend rate is 62%.
- Therefore, the following example adjusted coefficients table may be used:

	Biodiesel	
0%	0.00007421	0.0%

5%	0.00007421	0.0%
10%	0.00007421	0.0%
15%	0.00007421	0.0%
20%	0.00007421	0.0%
25%	0.00007133	-3.9%
30%	0.00006846	-7.8%
35%	0.00006558	-11.6%
40%	0.00006270	-15.5%
45%	0.00005983	-19.4%
50%	0.00005695	-23.3%
55%	0.00005407	-27.1%
60%	0.00005120	-31.0%
65%	0.00004832	-34.9%
70%	0.00004544	-38.8%
75%	0.00004257	-42.6%
80%	0.00003969	-46.5%
85%	0.00003682	-50.4%
90%	0.00003394	-54.3%
95%	0.00003106	-58.1%
100%	0.00002819	-62.0%

Scenario 4- A biofuels manufacturer is interested in demonstrating a unique biofuel emissions coefficient for the given feedstock. The following information must be provided, in alignment with EPA requirements:

- Agricultural Impacts
- Land Use Change
- Feedstock Transport
- Fuel Production
- Fuel Distribution and Use

- Net Emissions
- Percent Reduction

Biofuels – required documentation

Building owners must report the total quantity of biofuels and fuel oil combusted within the building. If these are provided separately, the blend rate (percentage of biofuel compared to total fuel) should be calculated. For example, a blend rate of 20% biofuel is denoted B20, 30% as B30, 99% as B99, and so on.

To receive credit for a specific fuel pathway, such as cellulosic diesel or biodiesel, the manufacturer must provide supporting documentation to the building owner. This documentation should confirm that the correct fuel pathway has been selected.
To receive credit for a specific feedstock, the manufacturer must provide details on all feedstocks used in the production of the fuel. The building owner must have a **registered design professional** attest to the accuracy of this information.

For credit on a unique life cycle analyses, all information required by the EPA's Renewable Fuel Standard Program must be demonstrated by the manufacturer, and a **registered design professional** must attest to the accuracy and use by the building owner.

Note: Biofuel emissions coefficients will be applied to reported fuel usage in the LL97 reporting platform to calculate adjusted LL97 emissions totals. Building owners must demonstrate blend rates that exceed state mandates (B20 by 2030) to receive credit. LL97 prioritizes emissions reductions from energy efficiency and electrification, and biofuels should not be considered a primary compliance pathway unless validated through detailed life-cycle analysis.

Biofuels – additional information

MODIFICATIONS TO EQUIPMENT

The 'SCA New Technology R+D Application of Biofuel in NYC Schools' report from April 12, 2023, identifies the following potential issues with the introduction of biofuels, as well as remediation options:

- Compatibility with Existing Equipment
- Cold Weather Considerations
- Storage and Transport
- Piping and Pumps

INTERNATIONAL GUIDANCE

Federal reporting requirements are derived from the standards of the Intergovernmental Panel on Climate Change ("IPCC"). The IPCC clarifies that all biogenic emissions should be calculated at the national level rather than counted as energy sector emissions. As a result, associated CO2 emissions are not assigned to the stationary source, but rather to the landowners that supplied the feedstocks. Each nation reports these emissions annually to the United Nations Framework Convention on Climate Change (UNFCC).

The IPCC states that "Biomass fuels are included in the national energy and emissions account for completeness only. The resultant CO2 emissions should not be included in national CO2 emissions from fuel combustion. The release of carbon due to biomass used as energy should be accounted in the LULUCF sector. Non-CO2 emissions from biomass combustion, however, should be reported under the Energy sector." The LULUCF sector represents Land-Use Change and Forestry1. This information is summarized in the U.S. Greenhouse Gas Emissions and Sinks (Inventory) report.

The IPCC's accounting system thereby measures the changes in land-based carbon stocks for biomass systems and the flows of carbon for fossil-fuel systems in a different sector (e.g., Energy Sector). Using this approach, countries have been able to communicate the contribution of their land areas to the global build-up of GHG concentrations in a consistent manner. To maintain consistency and to prevent double counting, the IPCC's approach for countries to estimate emissions from their Energy Sectors requires that CO2 emissions resulting from biologically based fuels not be included in Energy Sector totals.

The IPCC accounting system provides an accurate reflection of global GHG emissions because countries are required to account for all anthropogenic emissions, and to account for them only once. This is clarified by stating that "biomass fuels are included in the national energy and emissions accounts for completeness. These emissions should not be included in national CO2 emissions from fuel combustion. If energy use, or any other factor, is causing a long term decline in the total carbon embodied in standing biomass (e.g., forests), this net release of carbon should be evident in the calculation of CO2 emissions described in the Land-Use Change and Forestry chapter."

Note that the IPCC does not make any value judgments about whether—within a given country—the producer or the consumer of biomass bears responsibility for the CO2 emitted from use of the biomass. In addition, the IPCC recognizes that "Biomass burning for energy cannot be automatically considered carbon neutral even if the biomass is harvested sustainably, there still may be significant emissions from processing and transportation etc. of the biomass. While CO2 emissions from biomass burnt for energy are reported as zero in the Energy Sector, the net CO2 emissions are covered in the AFOLU Sector" (Agriculture, Forestry, and Other Land Use.

NATIONAL GUIDANCE

The US EPA established the Framework for Assessing Biogenic CO2 Emissions from Stationary Sources based on the methodology used by the IPCC. This information is collected in the EPA's National Inventory of Greenhouse Gas Emissions and Sinks. The U.S. EPA Center for Corporate Climate Leadership's (The Center) Greenhouse Gas guidance is based on The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol) developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). The Center's GHG guidance is meant to extend upon the GHG Protocol to align more closely with EPA-specific GHG calculation methodologies and emission factors, and to support the Center's GHG management tools and its Climate Leadership Awards initiative.

Note: Local Law 97 prioritizes emissions reductions through energy efficiency retrofits and building electrification. While biofuels can provide transitional emissions reductions, they should not be considered a substitute for long-term electrification strategies aligned with New York City's decarbonization goals.