Express Terms

6 NYCRR Part 496 Statewide Greenhouse Gas Emission Limits

(Statutory authority: Environmental Conservation Law, §§ 75-0107)

§ 496.1 Purpose

This Part adopts limits on the emissions of greenhouse gases from across the State and all sectors of the State economy for the years 2030 and 2050, as a percentage of 1990 emission levels of 60 percent and 15 percent, respectively, as established in the Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019.

§ 496.2 Applicability

This Part applies to all parts of the State and to all State agencies, offices, authorities, and divisions in the context of programs, regulations, decisions, and planning documents specified in the Climate Leadership and Community Protection Act.

§ 496.3 Definitions

For the purposes of this Part, the following definitions apply:

(a) 'Anthropogenic greenhouse gases.' Greenhouse gas emissions resulting from or produced by human activities.

(b) 'Carbon Dioxide Equivalent.' The amount of carbon dioxide by mass that would produce the same global warming impact as the given mass of another greenhouse gas over a specific time frame, as determined by the IPCC, and as provided in Section 496.5 of this Part.

(c) ‘Greenhouse Gas.’ Gaseous constituents of the atmosphere that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth’s surface, the atmosphere itself, and by clouds. For the purposes of the Part, this includes substances provided in Section 496.5 of this Part.

(d) ‘GWP20.’ An assessment of the Global Warming Potential of greenhouse gases over an integrated twenty-year time frame.

(e) ‘IPCC.’ Intergovernmental Panel on Climate Change.

(f) ‘Statewide Greenhouse Gas Emission Limit.’ The maximum allowable level of gross statewide greenhouse gas emissions in a specified year.

(g) ‘Statewide Greenhouse Gas Emissions.’ Total annual emissions of greenhouse gases produced within the state from anthropogenic sources and greenhouse gases produced outside of the state that are associated with the generation of electricity imported into the state and the extraction and transmission of fossil fuels imported into the state, expressed in tons of carbon dioxide equivalents.

§ 496.4 Statewide Greenhouse Gas Emission Limits

(a) For the purposes of this Part, the estimated level of statewide greenhouse gas emissions in 1990 is 409.78 million metric tons of carbon dioxide equivalent, using a GWP20 as provided in Section 496.5 of this Part.

(b) For the purposes of this Part, the table below establishes statewide emission limits for the year specified, as a percentage of estimated 1990 statewide greenhouse gas emissions of 60 percent and 15 percent, respectively, measured in millions of metric tons of carbon dioxide equivalent gas using a GWP20 as provided in Section 496.5 of this Part.

Year	Statewide greenhouse gas emission limit (in million metric tons of carbon dioxide equivalent)

2030	245.87
2050	61.47

§ 496.5 Greenhouse Gases

For the purposes of this Part, the table below provides a carbon dioxide equivalent value for each greenhouse gas as provided by the IPCC using GWP20.

Greenhouse Gas	Carbon dioxide equivalent value
Carbon dioxide	1
Methane	84
Nitrous oxide	264
HFC-23	10,800
HFC-32	2430
HFC-41	427
HFC-125	6090
HFC-134	3580
HFC-134a	3710
HFC-143	1200
HFC-143a	6940
HFC-152	60
HFC-152a	506
HFC-161	13
HFC-227ca	5080

HFC-227ea	5360
HFC-236cb	3480
HFC-236ea	4110
HFC-236fa	6940
HFC-245ca	2510
HFC-245cb	6680
HFC-245ea	863
HFC-245eb	1070
HFC-245fa	2920
HFC-263fb	278
HFC-272ca	530
HFC-329p	4510
HFC-365mfc	2660
HFC-43-10mee	4310
HFC-1132a	<1
HFC-1141	<1
(Z)-HFC-1225ye	<1
(E)-HFC-1225ye	<1
(Z)-HFC-1234ze	1
HFC-1234yf	1
(E)-HFC-1234ze	4
(Z)-HFC-1336	6
HFC-1243zf	1

HFC-1345zfc	<1
3,3,4,4,5,5,6,6,6-Nonafluorohex-1-ene	<1
3,3,4,4,5,5,6,6,7,7,8,8,8-Tridecafluorooct-1-ene	<1
3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,10-Heptadecafluorodec-1-ene	<1
Nitrogen trifluoride	12,800
Sulphur hexafluoride	17,500
PFC-14	4880
PFC-116	8210
PFC-c216	6850
PFC-218	6640
PFC-318	7110
PFC-31-10	6870
Perfluorocyclopentene	7
PFC-41-12	6350
PFC-51-14	5890
PFC-61-16	5830
PFC-71-18	5680
PFC-91-18	5390
Perfluorodecalin (cis)	5430

Perfluorodecalin (trans)	4720
PFC-1114	<1
PFC-1216	<1
Perfluorobuta-1,3-diene	<1
Perfluorobut-1-ene	<1
Perfluorobut-2-ene	6

Regulatory Impact Statement Summary

6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits

On July 18, 2019 Governor Cuomo signed into law the Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019 (CLCPA). Among other requirements, the CLCPA adds a new Article 75 to the Environmental Conservation Law (ECL), including ECL Section 75-0107. This section directs the Department of Environmental Conservation (the Department) to adopt regulations establishing statewide emission limits. Therefore, the Department is proposing 6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits (the "proposed rule" or "Part 496"). As called for in ECL Section 75-0107, the proposed rule will establish the two statewide greenhouse gas emission limits called for in the CLCPA: a limit for 2030 that is equal to 60% of 1990 greenhouse gas emission levels and a limit for 2050 that is equal to 15% of 1990 emission levels.[1] Part 496 will translate the statewide percentage emission reduction requirements, as set forth in the CLCPA, into tonnage limits based on carbon dioxide equivalents.

The statewide emission limits established by the proposed rule will be the foundation for multiple components of the CLCPA and are critically important for the successful implementation of the CLCPA. For example, the Scoping Plan to be developed by the Climate Action Council must outline recommendations regarding regulatory measures and other State actions to ensure attainment of the statewide greenhouse gas emission limits. Similarly, the statewide greenhouse gas emission limits established in Part 496 will serve as the baseline for the promulgation of future regulations by the Department under the CLCPA, which the CLCPA requires to ensure compliance with the statewide emission reduction limits. ECL § 75-0109.

[1] The CLCPA also establishes a net zero emission reduction goal, which while not part of the proposed rule will be addressed by the Climate Action Council as part of its Scoping Plan. ECL Section 75-0103(11).

1. Statutory Authority

The statutory authority to promulgate this rulemaking is derived from ECL Section 75-0107, as added by the CLCPA. This section of the ECL directs the Department to promulgate a regulation that establishes statewide greenhouse gas emission limits as specified percentages of estimated 1990 emissions, expressed in tons of carbon dioxide equivalents. The adoption of Part 496 will fulfill this statutory directive.

2. Legislative Objectives

The CLCPA, as provided in ECL Section 75-0107, directs the Department to establish a statewide greenhouse gas emissions limit for the years 2030 and 2050 equal to sixty (60) percent and fifteen (15) percent of 1990 emissions, respectively. The proposed rule seeks to implement this requirement by establishing an estimate of total statewide greenhouse gas emissions in 1990, or a baseline, and then establishing emission limits as a percent of that baseline. Both the 1990 baseline and the emission limits for 2030 and 2050 are expressed in millions of metric tons of carbon dioxide equivalent.

In determining the scope of the emission sources and gases to be included in the estimation of 1990 emissions, the Department followed the requirements in Section 75-0107 and other related provisions of the CLCPA. The Department generally used protocols established by the Intergovernmental Panel on Climate Change (IPCC), which is a scientific body convened to support the United Nations Framework Convention on Climate Change (UNFCCC). To the extent the CLCPA establishes requirements that differ from the IPCC protocol, the Department followed the CLCPA provisions. Overall, the Department's objective in developing the proposed rule was to estimate 1990 emission levels using the best and most reliable information available.

In addition to this proposed rule, which is based on an estimate of 1990 emission levels, the CLCPA requires the Department to issue an annual statewide greenhouse emissions report. ECL § 75-0105. The

Department will continue to incorporate appropriate new information regarding all relevant sources as part of the annual emissions reports.

The CLCPA directs the Department to set greenhouse gases on a common scale using the carbon dioxide equivalence metric (CO_2e) and the 20-year Global Warming Potential (GWP20) of each gas, which the Department derived from the IPCC Fifth Assessment Report (AR5).[2] In addition, the CLCPA establishes that the statewide emission limit, and therein the emission reduction requirements of the CLCPA, include certain emission sources that are located outside of the State borders. ECL § 75-0101(13) defines statewide greenhouse gas emissions as including emissions associated with imported electricity and fossil fuels. The proposed rule is consistent with these statutory objectives.

Finally, the CLCPA's 100 percent emission reduction goal,[3] or a goal of attaining net zero emissions, is not part of the Legislature's direction to the Department for promulgating the statewide emission limits.[4] Hence, the proposed rule includes anthropogenic emissions, but not removals of these emissions, such as through carbon sequestration and storage in plants. A more through assessment of removals and net emissions from land use in New York will be included in the annual emissions reporting required by the CLCPA. The proposed rule establishes regulatory limits based on a percentage of gross 1990 emissions as opposed to net emissions, as required by the CLCPA.

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[2] IPCC. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., et al. eds] Cambridge University Press. 1585pp.
[3] CLCPA §1.4 states that "it shall therefore be the goal of the state of New York to reduce greenhouse gas emissions from all anthropogenic sources 100% over 1990 levels by the year 2050." See also ECL 75-0103(11).
[4] e.g., ECL §75-0107(1) and ECL §75-0103(11) separates these components and directs the climate action council to prepare a scoping plan for meeting "the statewide greenhouse gas emission limits…and for the reduction of emissions beyond eighty-five percent, net zero emissions in all sectors of the economy."

3. Needs and Benefits

The CLCPA includes multiple actions that reference the statewide greenhouse gas emission limits established by this rule and therefore will rely on the data and content herein. This includes, but is not limited to, the development of a scoping plan by the Climate Action Council, the issuance of an annual statewide greenhouse gas emissions report, the promulgation of regulations, and the publishing of an implementation report by the Department. ECL §§ 75-0103, 75-0105, 75-0109, and 75-0119. The CLCPA also requires that all State agencies, offices, authorities, and divisions consider the attainment of the statewide greenhouse gas emission limits established in ECL Article 75 in considering and issuing permits, licenses, and other administrative approvals and decisions. CLCPA § 7(2).

Description of Sectoral Methods and Results

The New York State Energy Research and Development Authority (NYSERDA) has provided a regularly-updated inventory of greenhouse gas emissions in the state that follows standard IPCC protocol.[5] As discussed, the CLCPA established certain key requirements that differ from the IPCC protocol. Hence, the Department worked with NYSERDA in 2020 to evaluate the 1990 baseline and conduct new analyses as needed for this rulemaking. New analyses were not required in all cases, as the new requirements of the CLCPA do not completely differ from the methodology historically used by NYSERDA. As such, many components of the estimates provided here are the same or similar to the previous State inventory.

[5] NYSERDA. 2019a. New York State Greenhouse Gas Inventory: 1990-2016.

Analytic methods, data sources, and results are described for each of four major IPCC sectors[6]: Energy, Industrial Processes and Product Use (IPPU), Agriculture Forestry and Other Land Use (AFOLU), and Waste. Each section below represents a separate set of analyses and results that together form the 1990 baseline summarized in Table 1, which is used to establish the statewide greenhouse gas emission limits.

Table 1. Total Statewide Greenhouse Gas Emissions in 1990 by IPCC Sector and Gas, in GWP20. Totals may not sum due to independent rounding.

Sector	MMTCO$_2$e (AR5 - 20 year GWP)								
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF_3		Total
Energy	259.96	71.76	1.32	-	-	4.00	-		337.04
IPPU	1.76	0.00	0.00	0.90	0.05	0.01	0.00		2.72
AFOLU	0.05	13.07	4.01	-	-	-	-		17.13
Waste	3.03	49.35	0.50	-	-	-	-		52.88
Total	264.80	134.19	5.83	0.90	0.05	4.01	0.00		409.78

1. Energy

The Energy sector includes five (5) main categories: (a) Fuel Combustion, (b) Fugitive Emissions, (c) Electricity Transmission, (d) Imported Fuels, and (e) Imported Electricity. The latter two categories are not included in IPCC protocol or other governmental greenhouse gas inventories, but as described above are two key distinct requirements of the CLCPA for this rulemaking. These two categories represent an estimate of what may

[6] IPCC. 2019. op. cit.

be referred to as the lifecycle, fuel cycle, or out-of-state upstream emissions associated with in-state energy demand and consumption.

2. Industrial Processes and Product Use (IPPU)

The Industrial Process and Product Use (IPPU) sources assessed for the 1990 baseline are organized into five (5) categories: Mineral Industry, Chemical Industry, Metal Industry, Electronics Industry, and Product Uses.

3. Agriculture Forestry and Other Land Use (AFOLU)

Under the IPCC protocol, the Agriculture Forestry and Other Land Use sector includes emission sources and removals associated with land management in four (4) categories: Livestock, Land Use, Aggregated Sources, and Other. As discussed, because the emission limit in the proposed rule is a gross rather than net limit, anthropogenic emissions are included in the proposed rulemaking, but not removals.

4. Waste

The Waste sector includes four (4) categories of emission sources: Solid Waste Disposal, Biological Treatment of Solid Waste, Waste Combustion, and Wastewater.

Stakeholder Outreach

The Department conducted pre-proposal, stakeholder outreach starting the date on which the CLCPA went into effect, or January 1, 2020, through May 2020. This included two public webinars held on February 14 and 28, 2020 to discuss the scope and key considerations of this rulemaking as well as other presentations and meetings with various stakeholders, including members of the Climate Action Council, by request. The Department also consulted with other State agencies and authorities, including NYSERDA, the Department of

Transportation, the Department of Public Service, and the Department of Agriculture and Markets. The Department reviewed the feedback received in this stakeholder outreach as part of further developing Part 496.

4. Costs

The proposed rule does not impose a compliance requirement on any entity, and therefore does not directly impose any costs on any regulated entities. As explained above, the proposed rule establishes a tonnage limit on statewide greenhouse gas emissions from across the New York economy, consistent with the statutory percentage reduction limits set forth in the CLCPA. Other regulatory and non-regulatory policies will be required to ensure that these emission limits are met, as contemplated in the CLCPA. As such, while this rule does not itself impose a cost on any entity, future actions by the Department and other State agencies to implement the CLCPA will consider costs as necessary and appropriate. This includes as part of any Department rulemaking actions pursuant to the State Administrative Procedure Act.

5. Paperwork

The proposed rule does not itself impose any paperwork or reporting requirements. However, additional and separate policies may be adopted at a later date that are related to this rule. Any paperwork or reporting requirements will be assessed as part of any such future actions.

6. Local Government Mandates

The proposed rule will not create any mandates for local governments as compared to other entities.

7. Duplication

This proposal does not duplicate, overlap, or conflict with any other existing federal or State regulations or statutes. Instead, as described above, Part 496 places into regulation requirements of the CLCPA by translating the statewide emission reduction requirements into tonnage limits for 2030 and 2050.

8. Alternatives

The Department is required to adopt statewide greenhouse gas limits in regulation per the CLCPA as set forth in ECL Section 75-0107, so it is not viable to take a no-action alternative. Alternatives to the specific methodology for estimating 1990 greenhouse gas emission levels for particular sectors, categories, or subcategories were considered by the Department on a case-by-case basis.

9. Federal Standards

There are no enforced federal rules or other restrictions for the adoption of statewide limits on greenhouse gases, regardless of whether such statewide emission limit also includes certain out-of-state emissions associated with in-state consumption. Therefore, this proposal does not result in the imposition of requirements that exceed any minimum standards of the federal government for the same or similar subject areas.

10. Compliance Schedule

The proposed rule will be effective immediately upon publication of the final rule in the State Register. However, there is no compliance schedule required by the establishment of the proposed rule because, as discussed above, the rule does not itself impose any compliance obligations on any entity. Finally, the 2030 and 2050 dates for the applicable statewide greenhouse gas emission limits in the rule are specifically set forth in the CLCPA.

Regulatory Impact Statement

6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits

Table of Contents

On July 18, 2019 Governor Cuomo signed into law the Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019 (CLCPA). The CLCPA is intended to "create a comprehensive regulatory program to reduce greenhouse gas emissions that corresponds with emission reduction goals as set forth in Executive Order 24, the State Energy Plan, and the [United States Global Change Research Program] and [Intergovernmental Panel on Climate Change] projections." CLCPA §1. Among other requirements, the CLCPA adds a new Article 75 to the Environmental Conservation Law (ECL), including ECL Section 75-0107. This section directs the Department of Environmental Conservation (the Department) to adopt regulations establishing statewide emission limits. Therefore, the Department is proposing 6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits (the "proposed rule" or "Part 496"). As called for in ECL Section 75-0107, the proposed

rule will establish the two statewide greenhouse gas emission limits called for in the CLCPA: a limit for 2030 that is equal to 60% of 1990 greenhouse gas emission levels and a limit for 2050 that is equal to 15% of 1990 emission levels.[1] Part 496 will translate the statewide percentage emission reduction requirements, as set forth in the CLCPA, into tonnage limits based on carbon dioxide equivalents.

The statewide emission limits established by the proposed rule will be the foundation for multiple components of the CLCPA and are critically important for the successful implementation of the CLCPA. For example, the Scoping Plan to be developed by the Climate Action Council must outline recommendations regarding regulatory measures and other State actions to ensure attainment of the statewide greenhouse gas emission limits. Similarly, the statewide greenhouse gas emission limits established in Part 496 will serve as the baseline for the promulgation of future regulations by the Department under the CLCPA, which the CLCPA requires to ensure compliance with the statewide emission reduction limits. ECL § 75-0109.

1. Statutory Authority

The statutory authority to promulgate this rulemaking is derived from ECL Section 75-0107, as added by the CLCPA. This section of the ECL directs the Department to promulgate a regulation that establishes statewide greenhouse gas emission limits as specified percentages of estimated 1990 emissions, expressed in tons of carbon dioxide equivalents. The adoption of Part 496 will fulfill this statutory directive.

Under the CLCPA, statewide greenhouse gas emissions include both greenhouse gas emissions from all sources located within the state and certain sources that are located outside of the state that are associated with in-state energy consumption. In particular, the statute requires that statewide greenhouse emissions include both:

[1] The CLCPA also establishes a net zero emission reduction goal, which while not part of the proposed rule will be addressed by the Climate Action Council as part of its Scoping Plan. ECL Section 75-0103(11).

(1) “the total annual emissions of greenhouse gases produced within the state from anthropogenic sources,” and (2) “greenhouse gases produced outside of the state that are associated with [a] the generation of electricity imported into the state and [b] the extraction and transmission of fossil fuels imported into the state.” ECL § 75-0101(13). Moreover, the CLCPA defines “carbon dioxide equivalent” as a measurement of global warming potential based on a twenty-year timeframe. ECL § 75-0101(2).

2. Legislative Objectives

The CLCPA, as provided in ECL Section 75-0107, directs the Department to establish a statewide greenhouse gas emissions limit for the years 2030 and 2050 equal to sixty (60) percent and fifteen (15) percent of gross 1990 emissions, respectively. The proposed rule seeks to implement this requirement by establishing an estimate of total statewide greenhouse gas emissions in 1990, or a baseline, and then establishing emission limits as a percent of that baseline. Both the 1990 baseline and the emission limits for 2030 and 2050 are expressed in millions of metric tons of carbon dioxide equivalent.

In determining the scope of the emission sources and gases to be included in the estimation of 1990 emissions, the Department followed the requirements in Section 75-0107 and other related provisions of the CLCPA. This includes other referenced sections of the ECL, specifically Sections 75-0101 (Definitions) and 75-0105 (statewide greenhouse gas emissions report), and other guiding language in the CLCPA. As an example, Section 1 of the CLCPA (Legislative findings and declaration) references the Intergovernmental Panel on Climate Change (IPCC), which is a scientific body convened to support the United Nations Framework Convention on Climate Change (UNFCCC). The Department used the IPCC protocol[2] for greenhouse gas accounting as foundational guidance, provided such protocols did not conflict with the requirements provided in the CLCPA. To the extent the CLCPA establishes requirements that differ from the IPCC protocol, the Department followed

[2] e.g., IPCC 2019. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

the CLCPA provisions, as discussed further below. Overall, the Department's objective in developing the proposed rule was to estimate 1990 emission levels using the best and most reliable information available.

Continued Improvements

The CLCPA directs the Department to provide "the most accurate determination possible" by "utiliz[ing] the best available scientific, technological, and economic information on greenhouse gas emissions and consult[ing] with the council, stakeholders, and the public." ECL § 75-0107(3). The UNFCCC and IPCC establish a similar requirement for national governments. To enable the use of the best-available science, the IPCC protocol provides guidance as to how to make improvements over time and to prioritize "key categories" of emissions. As in the case of the U.S. national greenhouse gas inventory[3], which is conducted in accordance with the IPCC protocol, the Department strives for the highest possible accuracy and intends to reduce uncertainty and improve accuracy through continued improvements. This will include through the statewide greenhouse emissions report that the Department will be required to issue annually. ECL § 75-0105. Additionally, although the statewide greenhouse gas emission limits proposed in this rule are based on an estimate of 1990 emission levels, under the CLCPA the statewide emission limits for 2030 and 2050 are not limited to the scope of sources and emissions that existed in 1990 that are the focus of this document. The statewide greenhouse gas limits encompass all emission sources described in the CLCPA. For purposes of the forthcoming annual statewide greenhouse gas emission reports and future regulations required by the CLCPA, the Department will continue to incorporate appropriate new information regarding all relevant sources, which may include additional or different methods for the accounting of net greenhouse gas emissions, sequestration, and removals.

[3] USEPA. 2020a. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018.

Key Requirements of the 1990 Emission Baseline

The proposed rule applies certain key requirements specified in the CLCPA in the estimation of the statewide 1990 emission baseline. The first requirement is that the greenhouse gases subject to the statewide emission limit include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFC), hydrofluorocarbons (HFC), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). As the CLCPA references the IPCC, the IPCC protocol for national greenhouse gas inventories is used as a foundation for determining which sources of these gases are included in the 1990 baseline. That protocol applies a sectoral inventory, or a categorization of emission sources based on the broad economic sectors of energy, industry, waste, agriculture, and other land use.

The second key requirement of the CLCPA relevant to this proposed rule is that it directs the Department to set greenhouse gases on a common scale using the carbon dioxide equivalence metric (CO_2e) and the 20-year Global Warming Potential (GWP20) of each gas, which the Department derived from the IPCC Fifth Assessment Report (AR5).[4] The IPCC protocol requires national governments apply a 100-year Global Warming Potential metric (GWP100) from the IPCC Fourth Assessment Report (AR4),[5] and thus other government inventories more frequently utilize the GWP100 metric rather than GWP20 metric set forth in the CLCPA. While Part 496 uses the GWP20 metric derived from AR5, the Department provides an estimate of the 1990 baseline using both metrics below. This is for the purposes of comparing 1990 emission estimates with those of the previous State inventory, the inventory reports of other governments, and other references that use the more standard GWP100 metrics.

The final two key requirements of the CLCPA set New York State apart from other governments in a way that makes it challenging to directly compare the statewide emission limits with the goals from other jurisdictions.

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[4] IPCC. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., et al. eds] Cambridge University Press. 1585pp.
[5] IPCC. 2007. Climate Change 2007: The Physical Science Basis: Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S.et al. eds] Cambridge University Press. 996 pp.

For the third requirement, the CLCPA establishes that the statewide emission limit, and therein the emission reduction requirements of the CLCPA, include certain emission sources that are located outside of the State borders. As mentioned above, ECL § 75-0101(13) defines statewide greenhouse gas emissions as including emissions associated with imported electricity and fossil fuels. The IPCC protocol for national governments do not include similar requirements to incorporate emissions produced outside of the relevant jurisdiction associated with energy imported into the jurisdiction. If comparing the 1990 baseline to other jurisdictions' emission reports, the imported fuels and electricity sectors should be excluded. However, the statutory emission reduction requirements of the CLCPA include these sectors.

The fourth and final key component of the CLCPA for purposes of this rulemaking is that the 100 percent net emission reduction goal,[6] or a goal of attaining net zero emissions, is not part of the Legislature's direction to the Department for promulgating the statewide emission limits. The directives to reduce statewide greenhouse gas emissions (1) 40 percent from 1990 levels by 2030, and (2) 85 percent from 1990 levels by 2050 (40x30 and 85x50) are set forth in ECL § 75-0107, which further directs the Department to establish these statewide greenhouse gas limits as a percentage of estimated 1990 emissions. The CLCPA includes specified definitions for multiple terms relevant to this requirement, including "greenhouse gas emission limit," "greenhouse gas emission source," "statewide greenhouse gas emissions," and "statewide greenhouse gas emission limit." [7]

Separate from the proposed rule, a third overall Statewide greenhouse gas emission reduction goal in the CLCPA is the requirement that the State also seek to achieve net zero emissions in all sectors of the economy by 2050. In addition to expressing the 100% emission reduction goal in Section 1.4, a separate provision in the ECL distinct from that which directs the Department to establish the 40x30 and 85x50 emission limit through this

[6] CLCPA §1.4 states that "it shall therefore be the goal of the State of New York to reduce greenhouse gas emissions from all anthropogenic sources 100% over 1990 levels by the year 2050." See also ECL § 75-0103(11).
[7] ECL §§ 75-0101(8), (11), (13), and (14).

proposed rule – directs the Climate Action Council to prepare a Scoping Plan for meeting both "the statewide greenhouse gas emission limits . . . and for the reduction of emissions beyond eighty-five percent, net zero emissions in all sectors of the economy." ECL § 75-0103(11). In other words, the Scoping Plan to be developed by the Climate Action Council will need to achieve net zero emissions, in addition to reducing emissions 85% by 2050 from the 1990 estimated baseline provided in the proposed rule.

Additional statutory provisions in the CLCPA provide further support for this distinction between (1) the 40x30 and 85x50 requirements, as established in this proposed rule; and (2) the net zero emission goal to be addressed separately in the Scoping Plan. For example, the CLCPA provides that "the department may establish an alternative compliance mechanism to be used by sources subject to greenhouse gas emissions limits to achieve net zero emissions." ECL § 75-0109(4)(a). Furthermore, "the use of such mechanism shall account for not greater than fifteen percent of statewide greenhouse gas emissions estimated as a percentage of" 1990 emissions. ECL § 75-0109(4)(b). Any greenhouse emission offsets approved by the Department pursuant to the alternative compliance mechanism provision must meet certain requirements, and are defined as "a deduction representing one metric ton of carbon dioxide equivalent emissions, reduced, avoided, or sequestered by a greenhouse gas emission offset project from a measured baseline of emissions." ECL § 75-0101(9).[8] Taken together, these provisions of the CLCPA provide that the 40x30 and 85x50 emission limits are to be measured based on an estimated baseline of gross 1990 statewide emissions, while the remaining 15 percent of emissions to achieve net zero may be accounted for on a net basis.

Given these statutory directives and definitions, the proposed rule includes statewide emission limits based on percentage reductions from estimated 1990 gross emissions, but does not directly address either the separate

[8] "Greenhouse gas emission offset projects" are further defined as including natural carbon sinks, carbon capture and sequestration, and other types of projects. ECL § 75-0101(10).

net zero emission requirement or other net accounting methods that may be updated through future annual reporting or otherwise. Hence, the proposed rule includes anthropogenic emissions, but not removals of these emissions, such as through carbon sequestration and storage in plants. In contrast, the IPCC protocol for national reporting is designed to include all anthropogenic emissions and removals. This has two implications for the 1990 baseline. First, this means that sources that represent net removals for New York State, such as land cover, are not considered in the proposed statewide emission limits, although they may be relevant to annual emissions reporting required by the CLCPA. ECL §75-0105. Specifically, due to the substantial amount of forest cover in the State, the land use sector in New York is a net sink of greenhouse gas emissions (See AFOLU, below).

The second implication of focusing on emissions to the exclusion of removals is that some sources of carbon dioxide are treated differently in the IPCC protocol to avoid double-counting across sources and sinks for carbon dioxide. This is the case for CO_2 associated with any organic materials, such as biomass and organic waste. These emissions are anthropogenic, but the IPCC protocol does not require that they be included in national totals because a global net emission inventory would count both the release of carbon dioxide at the location where the material was combusted (the emission source) and removal of carbon dioxide at the location where the plant was grown. To address this, the IPCC protocol does not require that CO_2 emissions be addressed by the country where the plant material was used (e.g., combusted for energy), but instead by the country where the plant material was harvested. In this way, if the demand for these materials was unsustainable, the result would be a loss of removals and an increase in net emissions. According to the IPCC:

"Carbon dioxide (CO_2) emissions from the combustion of biomass or biomass-based products are captured within the CO_2 emissions in the [Agriculture Forestry and Other Land Use] AFOLU sector through the estimated changes in carbon stocks from biomass harvest, even in cases where the emissions physically take place in other sectors (e.g., energy). This approach to estimate and report all CO_2 emissions from biomass or biomass-based products in the AFOLU sector was introduced in the first IPCC guidelines for national greenhouse gas emissions

(IPCC 1995), reflecting close linkages with data on biomass harvesting, and for the pragmatic reason to avoid double counting. In the Energy sector, CO_2, methane (CH_4) and nitrous oxide (N_2O) emissions from combustion of biomass or biomass-based products for energy are estimated, but the CO_2 emissions are recorded as an information item that is not included in the sectoral total emissions for the Energy sector, as they are already included in AFOLU."[9]

As with biomass combustion for energy production, the IPCC considers it best practice for CO_2 emissions from the combustion of organic waste to be reported in the Energy sector, but not included in national totals. The other sources of CO_2 associated with waste management are neither reported nor included in national totals, including composting. "The CO_2 emissions from combustion of biomass materials (e.g., paper, food, and wood waste) contained in the waste are biogenic[10] emissions and should not be included in national total emission estimates. However, if incineration of waste is used for energy purposes, both fossil and biogenic CO_2 emissions should be estimated."[11] The United States reports CO_2 emissions from biomass combustion as a memo item to the UNFCCC, but does not report CO_2 emissions associated with organic waste in the Energy or Waste sectors.[12]

To meet the requirement of the CLCPA with respect to ECL § 75-0107, which is to establish regulatory limits based on a percentage of gross 1990 emissions as opposed to net emissions, the Department is proposing the approach described in the following paragraphs. As described above, in the proposed rule, "anthropogenic" is defined following the IPCC protocol as emissions resulting from human activity and "statewide greenhouse gas emission limit*"* is defined narrowly as a percentage of gross anthropogenic emissions from 1990. As such, the

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[9] IPCC. 2019. "2.3.3.4 Treatment of Biomass" in IPCC 2019 op. cit.
[10] The term "biogenic" refers to emissions from materials with a biological origin (versus of fossil or geologic origin), including crops and waste derived from crops. However, it is also commonly used as a counterpoint to "anthropogenic", which would not be consistent with the IPCC. In the IPCC framework almost all biogenic emissions are also anthropogenic. To avoid confusion, the term "biogenic" is not used in this rulemaking except in reference to the IPCC protocol.
[11] IPCC. 2019. "5.1 Introduction" in IPCC 2019 op. cit.
[12] UNFCCC. 2020. National Inventory Submissions. https://unfccc.int/ghg-inventories-annex-i-parties/2020

anthropogenic CO_2 emissions resulting from the combustion of biomass and biofuels are included in the 1990 baseline that defines the proposed rule. However, as the CLCPA also separately requires that the State achieve net zero emissions, the accounting of such emissions may be revaluated as part of net statewide greenhouse gas emissions in the annual report (ECL §75-0105) to avoid double-counting. The Department is specifically interested in evaluating the role of products grown within the State in support of maintaining net carbon sequestration, which is key to achieving the CLCPA net zero emissions goal, versus imported products that will not contribute to that goal. Notably, the annual rate at which the land use sector "removes" emissions has been declining in the United States since 1990, while CO_2 emissions from biomass combustion have increased, suggesting that land use has not been sustainable nationwide. However, the sustainable use of New York's agricultural and forested lands is necessary both to achieve the goals of the CLCPA and to support landowners, communities, and the environment. The Department anticipates working with stakeholders in a separate process from this proposed rulemaking to establish a net accounting framework that benefits long-term, sustainable land management in the state and informs future regulatory and policy action by the Department and the State.

For waste emissions, the Department proposes a separate approach to the issue of accounting for gross and net emissions and a separate approach for anthropogenic versus non-anthropogenic emissions. First, the Department's waste management strategy includes all emission sources associated with waste, including for energy production. As such, all organic waste emissions will be included in the Waste sector of the proposed rule and subsequent reporting under the CLCPA, rather than split between Energy and Waste. Organic waste is usually managed by either incineration, which would release the CO_2 more quickly than natural decomposition, or through storage in a landfill, which places the waste in an anaerobic environment that will generate additional anthropogenic methane. The Department proposes treating emissions from waste combustion and methane combustion the same as for bioenergy. That is, in Part 496 both forms of combustion emissions are included in the 1990 baseline as gross emissions. But, because of the distinction described above between considering gross

emissions in the proposed rule and net emissions to achieve the separate net zero emissions goal, accounting for such emissions on a net basis may be reconsidered in annual reporting or subsequent Department rulemaking to avoid double counting both in terms of land use and net emissions in the waste management system. In accordance with IPCC protocol, the Department proposes omitting CO_2 released from composting, anaerobic digestion, and methane oxidation at a landfill from the proposed rule baseline, as these are equivalent to natural processes of decomposition. In order to ensure that the emissions of CO_2 in the Waste sector are balanced against total waste emissions, they will be monitored and accounted for as appropriate as an information item in the annual report. Importantly, all other greenhouse gases and other pollutants associated with waste management will continue to be subject to controls as needed to protect public health and the environment.

3. Needs and Benefits

The CLCPA includes multiple actions that reference the statewide greenhouse gas emission limits established by this rule and therefore will rely on the data and content herein. This includes, but is not limited to, the development of a scoping plan by the Climate Action Council, the issuance of an annual statewide greenhouse gas emissions report, the promulgation of regulations, and the publishing of an implementation report by the Department. ECL §§ 75-0103, 75-0105, 75-0109, and 75-0119. The CLCPA also requires that all State agencies, offices, authorities, and divisions consider the attainment of the statewide greenhouse gas emission limits established in ECL Article 75 in considering and issuing permits, licenses, and other administrative approvals and decisions. CLCPA § 7(2).

Description of Sectoral Methods and Results

The New York State Energy Research and Development Authority (NYSERDA) has provided a regularly-updated inventory of greenhouse gas emissions in the state that follows standard IPCC protocol.[13] As discussed, the CLCPA established certain key requirements that differ from the IPCC protocol. Hence, the Department worked with NYSERDA in 2020 to evaluate the 1990 baseline and conduct new analyses as needed for this rulemaking. Some of these analyses were also assisted by a NYSERDA consultant (Eastern Research Group, Inc) and subcontractor (Synapse Energy Economics, Inc) and initial draft analyses were reviewed by subject matter experts from the US Environmental Protection Agency, the US Department of Energy, the Environmental Defense Fund, and university partners. Additional stakeholder input is described later in this document. New analyses were not required in all cases, as the new requirements of the CLCPA do not completely differ from the methodology historically used by NYSERDA. As such, many components of the estimates provided here are the same or similar to the previous State inventory.

Analytic methods, data sources, and results are described below for each of four major IPCC sectors[14]: Energy, Industrial Processes and Product Use (IPPU), Agriculture Forestry and Other Land Use (AFOLU), and Waste. As is typical for an IPCC-based inventory of greenhouse gas emissions, each emission source is estimated using the best-available method and data for that source. As such, each section below represents a separate set of analyses and results that together form the 1990 baseline (summarized in Table 1), which is used to establish the statewide greenhouse gas emission limits. Unless otherwise stated, all emission values provided are shown as millions of metric tons (MMT) of carbon dioxide equivalent (CO_2e), using either the 20-year Global Warming Potential from the IPCC Fifth Assessment Report (GWP20) or the 100-year Global Warming Potential from the

[13] NYSERDA. 2019a. New York State Greenhouse Gas Inventory: 1990-2016.
[14] IPCC. 2019. op. cit.

IPCC Fourth Assessment Report (GWP100), as described above in the Legislative Objectives. Table 2 is provided below for informational purposes, but because it utilizes the IPCC approach of employing the GWP100 metric based on AR4, the values in Table 2 are not included in Part 496.

Table 1. Total Statewide Greenhouse Gas Emissions in 1990 by IPCC Sector and Gas, in GWP20. Totals may not sum due to independent rounding.

Sector	MMTCO$_2$e (AR5 - 20 year GWP)								
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF_3		Total
Energy	259.96	71.76	1.32	-	-	4.00	-		337.04
IPPU	1.76	0.00	0.00	0.90	0.05	0.01	0.00		2.72
AFOLU	0.05	13.07	4.01	-	-	-	-		17.13
Waste	3.03	49.35	0.50	-	-	-	-		52.88
Total	264.80	134.19	5.83	0.90	0.05	4.01	0.00		409.78

Table 2. Total Statewide Greenhouse Gas Emissions in 1990 by IPCC Sector and Gas, in GWP100. Totals may not sum due to independent rounding.

Sector	MMTCO$_2$e (AR4 - 100 year GWP)								
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF3		Total
Energy	259.96	21.36	1.49	-	-	5.22	-		288.02
IPPU	1.76	0.00	0.00	1.36	0.02	0.01	0.00		3.15
AFOLU	0.05	3.89	4.53	-	-	-	-		8.47
Waste	3.03	14.69	0.57	-	-	-	-		18.28
Total	264.80	39.94	6.59	1.36	0.02	5.22	0.00		317.92

1. Energy

The Energy sector includes five (5) main categories: (a) Fuel Combustion, (b) Fugitive Emissions, (c) Electricity Transmission, (d) Imported Fuels, and (e) Imported Electricity. The latter two categories are not included in IPCC protocol or other governmental greenhouse gas inventories, but as described above are two key distinct requirements of the CLCPA for this rulemaking. These two categories represent an estimate of what may be referred to as the lifecycle, fuel cycle, or out-of-state upstream emissions associated with in-state energy demand and consumption. The third category, Electricity Transmission, is categorized by the IPCC under the Industrial Processes and Product Use category. The vast majority of SF_6 in New York State is found in electricity applications. As these emissions are directly linked to energy demand and infrastructure, the Department proposes that they be addressed alongside other energy emissions in the CLCPA. Table 3 below provides a summary of the estimated 1990 emissions in each of these five categories of the energy sector, using the GWP20 metric.

Table 3. Energy Sector Greenhouse Gas Emissions in 1990, by Category and Gas, in GWP 20 (MMT CO_2e). Totals may not sum due to independent rounding.

Energy Sector	MMTCO_2e (AR5 - 20 year GWP)								
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF_3		Total
Fuel Combustion	218.86	2.99	1.19	-	-	-	-		223.04
Fugitive Emissions	0.02	9.22	0.00	-	-	-	-		9.24
Electricity Transmission	-	-	-	-	-	4.00	-		4.00
Imported Electricity	0.91	0.00	0.00	-	-	-	-		0.91
Imported Fuels	40.17	59.56	0.12	-	-	-	-		99.85
Total	259.96	71.76	1.32	-	-	4.00	-		337.04

Fuel Combustion

The Fuel Combustion category encompasses emissions of carbon dioxide, methane, and nitrous oxide that are released when fossil fuels or biomass fuels are combusted at sources within the State to produce energy. Within this category there are six broad subcategories from the IPCC that are relevant to New York State in 1990: fuel combustion in the residential, commercial, and industrial sectors, electricity generation, petroleum refining, and transportation. For the purposes of this assessment, fuel combustion associated with petroleum refining is included within industrial emissions. One petroleum refining facility operated in New York State in 1990 and

1991. Note that other industrial emissions that are not associated with fossil fuel use are covered in the Industrial Process and Product Use (IPPU) sector.

Table 4. Fuel Combustion Greenhouse Gas Emissions in 1990, by Category and Gas, in GWP 20 (MMT CO_2e) . Totals may not sum due to independent rounding.

Fuel Combustion	MMTCO_2e (AR5 - 20 year GWP)								
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF_3		Total
Electricity	63.26	0.06	0.31	-	-	-	-		63.63
Industrial	20.54	0.13	0.06	-	-	-	-		20.74
Transportation	70.55	1.03	0.69	-	-	-	-		72.26
Commercial	26.81	0.38	0.05	-	-	-	-		27.24
Residential	37.70	1.38	0.09	-	-	-	-		39.16
Total	218.86	2.99	1.19	-	-	-	-		223.04

In general, fuel combustion emissions are estimated by multiplying activity data (volume of fuel) by an emission factor (volume of gas released when that fuel is combusted), with exceptions noted below. Fuel combustion emissions in the residential, commercial, and industrial sectors as well as for electricity generation were estimated for the 1990 baseline using standard U.S. Environmental Protection Agency (USEPA) emission factors for each fuel type, and fuel volumes from the U.S. Department of Energy's Energy Information Administration (EIA),[15] the data sources also used in the NYSERDA "Patterns and Trends" report.[16] The fuels

[15] Unless otherwise noted EIA data were collected from the EIA State Energy Data System. http://www.eia.gov/state/seds
[16] NYSERDA's Patterns and Trends report can be accessed on the NYSERDA website. http://www.nyserda.ny.gov

included are coal, distillate fuel oil, residual fuel oil, natural gas, kerosene, asphalt and road oil, lubricants, special naphthas, liquefied petroleum gas (LPG), petroleum coke, waxes, and wood.

Fuel combustion can also be estimated for sources in the transportation sector by applying standard USEPA emission factors and EIA activity data on the volume of fuels sold in the state for use in these sources. In 1990, transportation fuels were gasoline, diesel, compressed natural gas (CNG), residual fuel oil, and jet fuel. This approach was applied to all non-road sources of fuel combustion including aviation, marine, rail, and off-road vehicles such as those used in commercial or industrial applications, lawn care, or personal use. Note, not all EIA data related to distillate fuel sales are published in the state data portal but are published by the EIA as distillate fuel oil and kerosene sales.[17] One adjustment was also made to EIA's published data related to aviation. Based on a review of aviation fuel volumes, NYSERDA has concluded that some amount of New York fuels have been erroneously assigned to New Jersey. As such, NYSERDA has suggested these volumes be re-apportioned based on the revenue passenger miles reported for each state from the earliest year for which data are available, or 2003.[18] Specifically, NYSERDA estimates that New York represented 67% of total aviation miles between the two states in 2003. However, if the EIA data were used, 10% of jet fuel sales in the two states would be attributed to New York. Finally, the IPCC protocol excludes international aviation and maritime transport emissions (otherwise known as international bunker fuels) from national greenhouse gas reduction goals and, hence, the total emissions reported in national inventories. Since the EIA does not disaggregate marine "vessel bunkering" fuels, it's not possible to determine the volume of marine distillate and residual fuel that should be included in the 1990 baseline at this time. Some portion of the emissions from these fuels may be subject to the CLCPA. The Department will seek to estimate these emissions in the future as a part of continued improvements. .

[17] https://www.eia.gov/dnav/pet/pet_cons_821use_dcu_SNY_a.htm
[18] To be provided in an updated Pattern and Trends report.

As in the previous State inventory released by NYSERDA,[19] the estimation of on-road vehicle emissions, including from passenger cars and trucks, commercial light-duty trucks, motorcycles, buses, and heavy-duty trucks, was conducted separately from non-road transportation to include all fuels combusted in the state, rather than just fuels sold within the state. This is primarily because, under the latter approach of only accounting for fuels sold within the state, "fuel tourism" could lead to a significant underestimation of motor vehicle emissions that could otherwise be reduced through State policy. For the estimation of the 1990 baseline, on-road transportation emissions were calculated using the USEPA Motor Vehicle Emission Simulator (MOVES) model,[20] which is used by the Department to comply with federal air quality reporting requirements. Total vehicle miles traveled[21] (VMT) for functional classes of vehicles in New York State in 1990 were disaggregated into vehicle types and then input along with an estimate of vehicle population into the model (Tables 5 and 6). MOVES then provides an estimate of CO_2 based on the carbon content of the fuel, CH_4 as a fraction of hydrocarbon exhaust emissions, and N_2O based on the emission rates for vehicle models and model years as derived from USEPA vehicle testing. Note, if fuel sales rather than VMT were used to estimate emissions, an analysis of the vehicle fleet may still be needed to estimate CH_4 and N_2O as these emissions reflect vehicle emission standards that have changed over time.

[19] NYSERDA 2019a op. cit.
[20] USEPA. 2020b. Latest Version of Motor Vehicle Emission Simulator (MOVES). https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves
[21] Federal Highway Administration's (FHWA) Highway Statistics Table VM-2

Table 5. Vehicle Miles Traveled by Vehicle Type in 1990 (million miles)

Vehicle Type	Millions of miles traveled in 1990
10 - Motorcycles	107
25 - Light Duty Vehicles	102,532
40 - Buses	540
50 - Single Unit Trucks	1,974
60 - Combination Trucks	1,748

Table 6. Vehicle Population by MOVES Source Type in 1990

MOVES Source Type	Number in 1990
11 - Motorcycle	40,167
21 - Passenger Car	7,655,860
31 - Passenger Truck	1,461,418
32 - Light Commercial Truck	522,476
41 - Intercity Bus	3,169
42 - Transit Bus	3,099
43 - School Bus	26,830
51 - Refuse Truck	1,858
52 - Single Unit Short-haul Truck	107,824
53 - Single Unit Long-haul Truck	4,052
54 - Motor Home	25,835
61 - Combination Short-haul Truck	18,945
62 - Combination Long-haul Truck	11,336

Fugitive Emissions

The Fugitive Emissions category in the IPCC protocol includes all releases of methane, as well as some amount of carbon dioxide and nitrous oxide, that are related to the energy system but are not associated with fuel combustion. In New York, this would result from intentional or unintentional releases during the exploration, production, transportation or transmission and distribution, and storage of natural gas and oil as well as at abandoned wells. The basis of the 1990 baseline estimation for the proposed rule is the NYSERDA Oil and Gas

Sector Methane Emissions Inventory,[22] which represents a thorough bottom-up inventory of each component of the system in New York up to customer meters, based on the best available data at this time. One exception is the estimation of fugitive emissions associated with oil refining, which was estimated separately, as described below. The proposal utilizes this bottom-up approach for estimating 1990 levels of fugitive methane emissions, recognizing that a different approach may be more appropriate for estimating such emissions for more recent time periods, as described further below. Carbon dioxide and nitrous oxide emissions were estimated by applying the ratio of each gas to the NYSERDA methane estimates for each of the individual segments of the oil or natural gas system in the national inventory for 1990.[23] One petroleum refining facility operated in New York State in 1990 and 1991. Fugitive emissions and methane flaring at that facility were estimated by scaling US total refinery emissions, as reported in the US national greenhouse gas inventory, to New York State based on the ratio of state to national crude oil distillation capacity, as reported by the EIA.[24]

While Part 496 relies upon a bottom-up inventory approach, there is a growing body of scientific literature based on remote-sensing data (sometimes referred to as top-down) that suggests that standard, bottom-up analyses of methane from oil and natural gas systems, landfills, and livestock operations may be systematically underestimating actual methane emissions. These top-down analyses capture emissions that are not easily incorporated into a bottom-up approach, including emissions from unknown sources, sources for which there is too little data to accurately measure, and events, whether intentional or unintentional, that result in higher-than-average emissions at known sources. For example, individual emission sources with an extremely high emission rate may represent a significant source of methane in all sectors.

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[22] NYSERDA 2019b. New York State Oil and Gas Sector Methane Emissions Inventory.
[23] USEPA. 2020a. op. cit.
[24] EIA. 2019. Annual Refinery Report. Form EIA-820 (1982-2019). https://www.eia.gov/dnav/pet/pet_pnp_cap1_dcu_SNY_a.htm

Currently, there are notable challenges to reconciling bottom-up and top-down estimates, such as the limited number of studies, the small geographic area covered by each analysis, and the lack of data for many types of sources.[25] These challenges are compounded when attempting to estimate and validate a 1990 baseline, as all top-down data were collected very recently. Some top-down analyses address emission sources that are also not relevant to the New York 1990 baseline, such as the unconventional recovery of natural gas from Marcellus Shale formations using high-volume hydraulic fracturing which began in 2003 outside of New York. Other data are not sufficiently resolved to be incorporated at this time. For example, the top-down analysis of Plant et al. (2019)[26] suggests that there are additional emissions in urban areas like New York City that are not yet accounted for in the bottom-up analyses. However, there are multiple components of the transmission and distribution systems that could be the source of these emissions.

Particularly when estimating fugitive methane emissions that occurred 30 years ago, there is uncertainty in both the standard, bottom-up approach (in which there has been no top-down validation) and in the newer alternative approach that would apply recent but limited top-down data to 1990. As the 1990 baseline defines the statewide greenhouse gas emission limits under the CLCPA, inadvertently underestimating or overestimating these emissions is a key consideration, since this would have a corresponding effect on the applicable emission limits. This topic is an example of opportunities for ongoing continued improvement, as described above. While the proposal relies on the standard bottom-up approach, the Department believes validation of various top-down analyses is more likely for recent and future years of emissions. Therefore, this information may be included in the annual reporting that the Department will maintain, per ECL § 75-0105. For the purposes of comparison, Table 7 provides a comparison of methane loss, as a function of emissions per consumption volume, based on the

[25] NYSERDA. 2019b. op. cit.
[26] Plant, G., et al. 2019. Large fugitive methane emissions from urban centers along the U.S. East Coast. Geophysical Research Letters. 46:8500-8507.

bottom-up analyses used in the 1990 baseline with an equivalent estimate based on the top-down analyses summarized in Alvarez et al. (2018)[27] and Plant et al. (2019).[28]

Table 7. Comparison of Methane Loss Rates in the Natural Gas System

Source Category	Description	Bottom-up 1990 Baseline (Proposed Part 496 Approach)		Top-Down Analyses	
		Methane (mt)	% of Gas Consumption	Alvarez (2018) as % Consumption	Plant et al. (2019) as % Consumption
Imported Fuels	Out of state production and transmission emissions	395,600	2.57	2.27	-
Fugitive Emissions	In state production emissions	20,776	0.13		-
	In state midstream emissions (for NY consumption)	41,662	0.27		-
	In state distribution	25,860	0.17	-	0.86
Total Loss Rate			3.14	3.13	

Electricity Transmission

[27] Alvarez, R.A., et al. 2018. Assessment of methane emissions from the U.S. oil and gas supply chain. Science. 361: 186-188.
[28] Plant et al. 2019. op. cit.

The IPCC protocol includes a category under the IPPU sector for "other product manufacture and use," which includes the leakage of sulfur hexafluoride (SF_6) during the manufacture, use, and disposal of equipment used in the transmission and distribution of electricity. The gas is specifically used as an insulating and arc-quenching medium. To estimate the 1990 baseline emissions for this source, the Department refined the method provided in the USEPA State Inventory Tool[29] (SIT), which is commonly used as a guiding framework for states that aligns with the national inventory (see IPPU for more detail). The SIT method for Electricity Transmission allocates total US emissions from the national inventory from this source category to each state based on data for retail sales of electricity in megawatt hours from EIA. However, the USEPA has recommended that the Department first account for reported SF_6 emissions from the Consolidated Edison utility service territory, as the company has been a key participant in a voluntary program to reduce emissions.[30] Recently, Consolidated Edison reported that it had reduced SF_6 from 1999 to 2016 by "about 96 percent."[31] This estimate was confirmed by other public reports[32] and was used to establish the percentage of national SF_6 emissions that could be attributed to Consolidated Edison in the 1990-1999 period (or 20%). The remaining emissions for other regions of New York were estimated using the SIT method, after correcting for the emissions and retail electricity sales of Consolidated Edison.

Imported Electricity

[29] e.g., USEPA. 2019. State Inventory and Projection Tool
[30] e.g., USEPA. 2018. Overview of SF6 Emissions Sources and Reduction Options in Electric Power Systems. EPA 430-R-18-004. https://www.epa.gov/f-gas-partnership-programs/electric-power-systems-partnership
[31] Consolidated Edison. 2016. GHG Emission Reductions. 2016 Sustainability Report. https://www.conedison.com/ehs/2016-sustainability-report/safety-and-environment/gng-emissions-reductions-introduction/
[32] Consolidated Edison. 2006. SF6 Leak Detection and Mitigation Techniques [Slide Presentation] https://www.epa.gov/sites/production/files/2016-02/documents/conf06_di_lillo.pdf

Although not typically included in IPCC-based greenhouse gas inventories, NYSERDA has included estimates of emissions from imported electricity in past versions of the State inventory.[33] As in the previous reports, for Part 496 the net volume of electricity imports for 1990 was estimated by subtracting the amount of electricity generated in the state (from EIA)[34] from the total amount of electricity demand as reported in Patterns and Trends based on archived New York Power Pool data.[35] The source of imported electricity was further apportioned to the adjacent power control areas based on the average ratio across a multiyear period of available data, or the 2005-2009. Rather than apply an average emission factor to all imported electricity, separate emission factors were derived for each region[36] by dividing EIA state-specific CO_2 emissions (or CH_4 and N_2O associated with state-specific fuel consumption) by generation. For Canada, emission factors were those reported for Ontario and Quebec in that national inventory.[37]

Imported Fuels

The most significant difference between the 1990 baseline, as set forth in the CLCPA and developed for the proposed rule, and other governmental greenhouse gas inventories is the inclusion of emissions associated with "the extraction and transmission" of imported fossil fuels. Because of the novel nature of this CLCPA requirement, as compared to other standard governmental inventories following the IPCC protocol, the Department undertook an analysis of these emissions in collaboration with NYSERDA. This analysis considered emissions from extraction and processing (production) through transmission or transportation to the New York border, but did not include emissions from infrastructure construction and maintenance outside of the state or

[33] NYSERDA 2019a op. cit.
[34] https://www.eia.gov/electricity/data/state/annual_generation_state.xls
[35] NYSERDA. 2019. Patterns and Trends - New York State Energy Profiles: 2002-2016.
[36] PJM region included DE, MD, NJ, PA, and Washington D.C.; ISO New England included CT, ME, MA, NH, RI, and VT.
[37] Environment and Climate Change Canada . 2019. National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada.

from the manufacture of equipment or facilities outside of the state. The fuels included are the same as those addressed in the in-state analysis, or coal, natural gas, distillate, diesel, residual fuel, jet fuel, kerosene, LPG, motor gasoline, and other petroleum fuels (lubricants, petroleum coke, and unspecified napthas).

For this analysis, NYSERDA utilized consultant support to run federal life cycle models to derive emission factors that could be applied to EIA fuel data for New York, as modified to address historical emissions. For imported petroleum products, the Argonne National Laboratory's "Greenhouse gases, Regulated Emissions, and Energy use in Transportation" (GREET) model[38] was used with adjustments, for example to include refinery products not included in GREET (waxes and lubricants)[39] and to include state-specific data on the transportation of fuel from EIA.[40] The transport of fuels within New York is not included in the GREET analysis as this is accounted for in the analysis of fuel combustion above. Although potentially relevant in later years, the emissions associated with fuels imported and combusted in New York in 1990 would not include those from unconventional oil sources or biofuels.

For imported coal and natural gas, the National Energy Technology Laboratory (NETL) life cycle models were applied. [41] The NETL model for coal includes extraction and processing and was scaled to 1990 using data from the Federal Energy Regulatory Commission (FERC) regarding the source of coal used by utilities[42] and EIA regarding coal transport modes.[43] Methane emission rates from the national inventory were also used to develop

[38] ANL. 2019. The Greenhouse gases, Regulated Emissions, and Energy use in Transportation Model. https://greet.es.anl.gov
[39] Sun, P. et al (2019) Criteria air pollutant and greenhouse gas emissions from U.S. refineries allocated to refinery products. Environmental Science & Technology 53(11), 6556-6569.
[40] EIA. 2020. Petroleum & Other Liquids. https://www.eia.gov/petroleum. Including PAD District Imports by County of Origin, Movements by Pipeline between PAD Districts, Movements by Tanker and Barge between PAD Districts, Refinery and Blender Net Production.
[41] https://www.netl.doe.gov/LCA
[42] FERC. 2011. Electricity: Historic Form EIA-423 & FERC-423 Detailed Data (1972-2011). https://www.eia.gov/electricity/data/eia423/
[43] EIA. 2019. Annual Coal Distribution Report. https://www.eia.gov/coal/distribution/annual/

emission factors for underground mines in specific basins for 1990. For methane emissions from surface mines as well as CO_2 and N_2O, an average emission factor from the EPA national inventory was applied.

The NETL model for natural gas was used to model the supply chain from the Gulf Coast, East Texas, Anadarko, and Arkoma basins, including production, gathering, and boosting through processing, storage, and transmission up to the state border. The current model was scaled to the 1990 baseline using the U.S. national inventory.[44] However, the NETL model does not have the same level of process granularity considered in the U.S. national inventory. So, rather than adjust individual parameters such as equipment counts, the NETL was adjusted at the stage-level, e.g., emissions from gathering and boosting were compared in 1990 versus 2016 for the same unit of gas produced. For natural gas imported from Canadian sources, emission factors from the U.S. mix were applied to the total imports and adjusted for transmission distance.

The GREET and NETL models are standards for conducting life cycle analyses and, as in the case of all such models, are a bottom-up accounting of emissions. Table 7, as discussed in the Fugitive Emissions section, provides a comparison of the emission or methane loss rate from the 1990 baseline as analyzed using the bottom-up life cycle models with top-down analyses as summarized by Alvarez et al (2018).[45] As in the case of fugitive methane from sources within the state, the top-down analyses were conducted in recent years and provide a more appropriate source of data validation for annual reporting rather than contributing to this 1990 baseline.

2. Industrial Processes and Product Use (IPPU)

The Industrial Process and Product Use (IPPU) sources assessed for the 1990 baseline are organized into five (5) categories: Mineral Industry, Chemical Industry, Metal Industry, Electronics Industry, and Product Uses.

[44] i.e., information as described in Annex 3.6 of EPA 2020a. op cit.
[45] Op. cit.

This sector represents emissions from the manufacturing process or from a manufactured product and are separate from the combustion of fossil fuels by industries, which is accounted for in the Energy sector. One specific difference from the IPCC protocol is that the Department is proposing to categorize emissions associated with Electricity Transmission into the Energy sector instead of IPPU. Additionally, the IPCC includes multiple categories of product use, but these are combined for this analysis.

For almost all categories within this sector, the Department used the USEPA SIT as a foundation for estimating the 1990 baseline.[46] The USEPA SIT applies standard emission factors to activity data, wherever state-level data are available, or scales emissions from the national inventory using factors such as the proportion of U.S. production or sales. However, in some cases, there is not sufficient data available to estimate historical emissions at this time. All IPCC emission categories are covered in Table 8 to indicate the full scope of the statewide greenhouse gas emission limits. Although historical data are limited, recent and future years of reporting may be improved with emissions data from the USEPA Greenhouse Gas Reporting Program GHGRP (for years after 2010) or otherwise.

[46] USEPA 2019. op cit. SIT 2019 version

Table 8. IPPU Sector Greenhouse Gas Emissions in 1990, by Category and Gas, in GWP 20. Totals may not sum due to independent rounding.

IPPU Sector									
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF_3		Total
Mineral Industry	1.01	-	-	-	-	-	-		1.01
Chemical Industry	-	-	-	-	-	-	-		-
Metals Industry	0.75	0.00	-	0.88	-	-	-		1.63
Electronics Industry	-	-	0.00	0.03	0.00	0.01	0.00		0.03
Product Use	-	-	-	-	0.04	-	-		0.04
Total	1.76	0.00	0.00	0.90	0.05	0.01	0.00		2.72

In the Minerals Industry, the predominant emission source is the release of carbon dioxide associated with the use of carbonate minerals (soda ash, limestone and dolomite) in the production processes of cement, glass, and other materials.[47] The U.S. Geological Survey (USGS) National Minerals Information Center provides information on cement as well as limestone and dolomite consumption in New York. For cement, the SIT disaggregates clinker production for New York and Maine, then the New York production total is multiplied by a standard emissions factor, and then this was added to an estimate of kiln dust production. For all other uses of limestone and dolomite, the remaining consumption in New York was apportioned to industrial sources using the ratio of industrial to non-industrial consumption at the national level for the closest year available, or 1989. Soda

[47] For an explanation of applications in the United States; USEPA 2020a. op. cit.

ash is not produced in New York, but it is used to produce other products. The SIT scales national soda ash consumption to states based on population[48] and applies a standard emissions factor.

For the Metals Industry, there is limited public information regarding historical emission drivers. For iron and steel, ferroalloy, and secondary lead production, there are no public data regarding production or capacity in New York in 1990. The 1990 baseline was estimated using the 9-year average of recent emissions data as reported to the GHGRP. In the case of ferroalloys, one of the two facilities in New York was closed shortly after 1990, but the other was in operation until 2018. For aluminum, the USGS provides information on the production capacity for each of the two facilities in New York. Total U.S. production in 1990 was approximately 99% of capacity and this rate was applied to each facility to estimate production. The standard, technology-specific IPCC emission factor for carbon dioxide was then applied to production.[49] For PFCs, the emission rate has declined over time and can fluctuate annually. The SIT provides a fluctuating, annual emission rate in which the two relevant gases are combined. However, in order to transition from a 100-year GWP used in the SIT to a 20-year GWP per the CLCPA, these gases must be disaggregated. As the actual volume of each gas is reported separately in the national inventory, it is possible to determine the average annual emission rate for each gas and this emission rate was applied to New York production.

The last two categories of IPPU emissions are the key sources of fluorinated greenhouse gases. As in the cases above, some of the same electronics manufacturing facilities that exist now also operated in New York in 1990, but detailed information is not available. The USEPA GHGRP requires reporting by these manufacturers, but these data are unlikely to represent either the full scope of emission sources or reflect historical emissions as the manufacturing processes have changed. Some of the HFCs and PFCs that may be subject to the CLCPA did

[48] The Department used the most up-to-date population estimates from the U.S. Census
[49] Alcoa used center-worked prebake; Reynolds used horizontal-stud Soderberg; USEPA 1996. Primary Aluminum Industry: Technical Support Document for Proposed MACT Standards.

not exist in 1990 and some may not be listed in this rule because the IPCC has not yet determined their carbon dioxide equivalence.[50] Similar to the method used in the SIT, the Department scaled national emissions to New York based on semiconductor manufacturing in the U.S. Census, specifically the "value of product shipments" for 1992 as reported in the 1997 economic census.[51] Only the major, known gases are included as these can be disaggregated to estimate both the 20 and 100-year Global Warming Potential. In the final rule, the Department has added NF_3 to this emission category and to the definition of "greenhouse gas" as requested by commenters, but this does not affect the 1990 baseline. According to the US national inventory, nationwide emissions of NF_3 in 1990 were less than 3 metric tons, or equivalent to 0.036mmt CO2e (GWP20). Following the methodology above, estimated state-level emissions would then be less than 0.04mt, or equivalent to 0.0005mmt CO2e (GWP20).

The remaining category, Product Use, may include a variety of manufactured products that are associated with greenhouse gas emissions throughout the life of the product and after disposal. For the purposes of this rulemaking, the sources included in the 1990 baseline are limited to the use of fluorinated greenhouse gases as substitutes for ozone-depleting substances. Other emission sources may include medical uses of nitrous oxide (N_2O) or sulfur hexafluoride (SF_6), but historical data are not available at this time.

The IPCC protocol includes a specific category for products containing refrigerants, aerosol propellants, or foam. Prior to the 1990s, many of these sources used ozone-depleting substances (ODS), or substances made of gases that can deplete the ozone layer. The ODS gases are also powerful greenhouse gases that are not required

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[50] e.g. Facilities have reported using substances that contain the PFC, perfluorotributylamine, which is not yet listed by the IPCC; Hong et al. 2013. Perfluorotributylamine: A novel long-lived greenhouse gas. Geophysical Research Letters. 40: 6010– 6015.

[51] U.S. Census Bureau. 1999. Table 6b Product Class Shipments for Selected States: 1997 and 1992. In "Semiconductor and Related Device Manufacturing". 1997 Economic Census. EC97M-3344C. Note: The 1992 census is not directly comparable to later reports as it used the Standard Industrial Classification (SIC) system, which was replaced by the North American Industry Classification System (NAICS) in 1997. Only NAICS # 3344131 is used. Unlike the "value of shipments" used in the SIT, the "value of product shipments" is focused on the primary product, rather than all activities conducted by the relevant industry.

to be reported in governmental greenhouse gas inventories.[52] ODS gases were already subject to the Montreal Protocol prior to the adoption of the UNFCCC treaty. As such, the IPCC protocol focuses instead on the greenhouse gases that replaced the gases prohibited by the Montreal Protocol. The IPCC and USEPA refer to these as "ozone depleting substance substitutes," or ODS substitutes, and they are the primary source of HFCs and a nominal amount of PFCs. Importantly, as the Montreal Protocol went into effect in 1987, the transition to ODS substitutes had just begun in 1990 and so HFC emissions in this category were much lower in the United States compared to current levels. For the 1990 baseline, the Department scaled national emissions of aerosol propellants to the state level based on population, which is a primary driver of product use. For refrigerants, emissions were reassessed using information about equipment stocks. In both cases, the Department has reconsidered its assessment of HFC emissions in 1990 and now considers these to be entirely comprised of HFC-134a as other substances were not yet in use.

3. Agriculture Forestry and Other Land Use (AFOLU)

Under the IPCC protocol, the Agriculture Forestry and Other Land Use sector includes emission sources and removals associated with land management in four (4) categories: Livestock, Land Use, Aggregated Sources, and Other. As discussed in the Legislative Objectives, anthropogenic emissions are included in the proposed rulemaking, but not removals. Removals in New York are associated with the net sink categories of Land Use and the Harvested Wood Products categorized as Other, so these categories are not included in the 1990 baseline. Information on these categories will be included in annual reporting per ECL §75-0105. Note, the US Forest Service provides estimates of net removals in forest-related Land Use at the state-level (Domke et al. 2020)[53]; net

[52] U.S. emissions are reported in the national inventory, but not included in total emissions. Annex 6.2 USEPA 2020a. op. cit.
[53] Domke, G.M., et al. 2020. "Appendix 1. National Scale Estimates for Individual States, 1990-2018." Greenhouse gas emissions and removals from forest land, woodlands, and urban trees in the United States, 1990-2018. Resource Update FS-227. Madison, WI: U.S. Department of Agriculture, Forest Service, Northern Research Station. https://www.nrs.fs.fed.us/pubs/59852

CO_2 removals in 1990 were roughly equivalent to thirty million metric tons of carbon dioxide in New York according to that assessment.

Table 9. AFOLU Sector Greenhouse Gas Emissions in 1990, by Category and Gas, in GWP 20 (MMT CO_2e). Totals may not sum due to independent rounding.

AFOLU									
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6	NF3		Total
Livestock	-	13.07	0.39	-	-	-	-		13.46
Land	-	-	-	-	-	-	-		-
Aggregated Sources	0.05	-	3.63	-	-	-	-		3.67
Other	-	-	-	-	-	-	-		-
Total	0.05	13.07	4.01	-	-	-	-		17.13

The emissions estimates used for the 1990 baseline are the same as those previously provided in the annual greenhouse gas inventories for New York issued by NYSERDA,[54] with the exception of additional sources included under Aggregated Sources. These estimates were calculated using the methods and data established by the USEPA as part of the national greenhouse gases inventory.[55] The two Livestock emission sources are Enteric Fermentation, or the production of methane as a result of feed management, and Manure Management, which represents the production of methane in a manure storage system. Information to estimate both sources are derived

[54] NYSERDA 2019a op. cit.
[55] USEPA. Annex 3 Part B: Methodological Descriptions for Additional Source or Sink Categories. USEPA 2020 op. cit.

from the US Department of Agriculture Natural Resources Conservation Service (NRCS). The USEPA applies standard emission factors to these data based on animal numbers, climatic information, and information regarding management practices. State governments are able to access recent state-level emission estimates in the appendices to the national greenhouse gas inventory for recent years. For historical years, the USEPA SIT applies the methods from the national inventory to data accessed directly from the NRCS.

The IPCC Aggregated Sources category assesses emissions associated with the use of soil amendments. The primary sources within this category are also the largest sources of N_2O globally, or the use of nitrogen-based fertilizers on agricultural soils and settlement soils. The most recent version of the State inventory issued by NYSERDA[56] reported emissions from agricultural soil management as provided by the USEPA, and the same estimates are included in the 1990 baseline as proposed here. Importantly, the USEPA revised the methodology for this source in recent years and currently employs a proprietary model,[57] rather than emission factors. As such, it is not possible to use the SIT to calculate emissions from this source that will match the national inventory.

Although not included in the previous State inventory, the SIT was used to estimate emissions for the remaining sources in the Aggregated Sources category that are relevant to New York: urea fertilization, agricultural liming (or the use of carbonates as a soil amendment; see IPPU above for industrial uses of carbonates), and settlement soil management. Urea fertilization is estimated in the SIT using activity data (fertilizer sales) from the Tennessee Valley Authority for the earliest year available, or 1991. Agricultural liming, or the application of limestone and dolomite to agricultural soils, was estimated using the SIT method and using data from the USGS regarding uses by states for agricultural purposes for the closest year available, or 1989.[58]

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[56] NYSERDA 2019a op. cit.
[57] Ibid.
[58] The Department found errors in the data as applied in the SIT and used the original report from the US Bureau of Mines. The SIT also assigns each state an additional and proportional share of the remaining, unassigned uses of limestone and dolomite, but this has been omitted here.

The Department plans to make continued improvements to the estimation of emissions in AFOLU over time for purposes of its annual reporting and to inform subsequent rulemaking, as discussed above, particularly to validate estimates for recent years and in the monitoring of emissions in future years. One area of focus will be the emission factors applied to livestock emissions, to ensure that the improvements made in management are captured accurately for New York, and to more closely align with greenhouse gas accounting at the farm level. Another area of focus will be to identify alternative approaches for measuring emissions from fertilizer use so to better inform, and reflect, patterns of usage and their impacts in New York.

4. Waste

The Waste sector includes four (4) categories of emission sources: Solid Waste Disposal, Biological Treatment of Solid Waste, Waste Combustion, and Wastewater. As discussed in the Legislative Objectives section, the Department has taken special consideration in the treatment of organic materials. The IPCC protocol does not require that national inventories report CO_2 associated with the treatment of solid waste derived from organic waste as it is assumed that the emission impact is already observable in the AFOLU sector. However, the IPCC approach would only be appropriate for net accounting across all regions where such material had been produced. The statewide greenhouse gas emissions limits as described in the CLCPA are neither intended to be a net accounting (i.e., emissions and removals) or to apply to land management practices outside of New York. Additionally, the IPCC also excludes emissions associated with respiration, decomposition, or natural disturbances. In applying the IPCC framework to the requirements of the CLCPA, for purposes of this rulemaking to establish the 1990 baseline, the Department is proposing to exclude CO_2 associated with organic waste except in the case of combustion. Additionally, these emissions may also be reconsidered in the net accounting framework applied in annual reporting, per ECL §75-0105.

Table 10. Waste Sector Greenhouse Gas Emissions in 1990, by Category and Gas, in GWP 20. Totals may not sum due to independent rounding.

Waste Sector	MMTCO$_2$e (AR5 - 20 year GWP)							
	CO_2	CH_4	N_2O	PFCs	HFCs	SF_6		Total
Solid Waste Disposal	0.05	43.32	-	-	-	-		43.38
Biological Treatment of Solid Waste	-	-	-	-	-	-		-
Waste Combustion	2.98	0.09	0.04	-	-	-		3.10
Wastewater	-	5.94	0.47	-	-	-		6.40
Total	3.03	49.35	0.50	-	-	-		52.88

The IPCC protocol refers to managed and unmanaged solid waste disposal, however all solid waste disposal in the United States is managed within municipal solid waste landfills or industrial landfills, if it is not otherwise diverted. Landfilled waste has the potential to produce greenhouse gases as the organic component of the waste decomposes over time in an anaerobic environment (i.e., lacking available oxygen). The preferred method for estimating these emissions in the IPCC protocol is to apply a model of decomposition, which estimates the gases generated over multiple decades based on the volume and composition of waste placed into the landfill. If the resulting methane is oxidized, flared, or used to produce energy at the site, the resulting carbon dioxide is included in the estimated emissions total. In applying the requirements of the CLCPA, the Department is proposing that the CO_2 released from the combustion of methane be included as an anthropogenic source of emissions. At this time, there is not sufficient data to estimate emissions from industrial waste. The USEPA SIT provides a means for states to apply the decay model to state-level municipal waste tonnage data (1960-1990).

The SIT also uses vendor-supplied EPA data on the rate of methane flaring in 1990 to estimate CO_2 production, which is included in the 1990 baseline.[59] The CO_2 associated with decay in the landfill or with the Biological Treatment of Solid Waste, or as a result of solid waste diverted to a compost or anaerobic digestion facility, is omitted. Anaerobic digestion is also a potential source of additional methane, however neither source of biological treatment was used commonly for solid waste management in 1990. Finally, organic waste may also be incinerated, or combusted, in lieu of disposal in a landfill. As it is also used to produce energy, waste combustion is also referred to as waste-to-energy and commonly treated as an energy-related emission source. As the SIT omits CO_2 from the combustion of organic waste, it cannot be used to estimate waste combustion emissions for the 1990 baseline. The Department instead applied the USEPA standard emission factor for municipal solid waste,[60] which accounts for the average composition of such waste, to the volume of waste combusted.

Wastewater management systems include inputs from households as well as potential commercial or industrial sources. However, there are no publicly available sources of information regarding these sources in 1990. The Department used the method established in the USEPA SIT, which estimates state-level emissions from wastewater by applying standard emission factors to the volume of waste generated by the state population not on a septic system. A separate emissions factor derived from the U.S. national greenhouse gas inventory[61] was applied to the state population that utilize septic systems.

Stakeholder Outreach

The Department conducted pre-proposal, stakeholder outreach starting the date on which the CLCPA went into effect, or January 1, 2020, through May 2020. This included two public webinars held on February 14 and

[59] This rate was increased in recent versions, but no longer matches expectations as it is assumed that most landfills in 1990 passively vented the methane that was generated at the facility. The SIT version 2017 was used to access this rate instead.
[60] EPA. 2020c. op. cit.
[61] USEPA. 2020a. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018.

28, 2020 to discuss the scope and key considerations of this rulemaking as well as other presentations and meetings with various stakeholders, including members of the Climate Action Council, by request. For example, the Department presented to the Manufacturers Association of Central New York and the Air and Water Managers Association in May 2020 and participated in meetings with Covanta, National Fuel Gas, and natural gas transmission pipeline companies[62] in April 2020. The Department also consulted with other State agencies and authorities, including NYSERDA, the Department of Transportation, the Department of Public Service, and the Department of Agriculture and Markets. The Department reviewed the feedback received in this stakeholder outreach as part of further developing Part 496.

4. Costs

The proposed rule does not impose a compliance requirement on any entity, and therefore does not directly impose any costs on any regulated entities. As explained above, the proposed rule establishes a tonnage limit on statewide greenhouse gas emissions from across the New York economy, consistent with the statutory percentage reduction limits set forth in the CLCPA. Moreover, as discussed above, Part 496 is a foundational regulation that will serve as the basis of or inform future regulatory and non-regulatory actions to implement the CLCPA. This includes recommendations to be made by the Climate Action Council as part of the Scoping Plan as well as subsequent rulemaking by the Department or other State agencies. Other regulatory and non-regulatory policies will be required to ensure that these emission limits are met, as contemplated in the CLCPA. As such, while this rule does not itself impose a cost on any entity, future actions by the Department and other State agencies to

[62] Innovative Environmental Solution, Inc requested and facilitated a meeting with Dominion Resources Services, Enbridge, Iroquois Pipeline Operating Company, Kinder Morgan, National Fuel Gas Company, TC Energy, and The Williams Companies

implement the CLCPA will consider costs as necessary and appropriate. This includes as part of any Department rulemaking actions pursuant to the State Administrative Procedure Act.

5. Paperwork

The proposed rule does not itself impose any paperwork or reporting requirements. However, additional and separate policies may be adopted at a later date that are related to this rule. Any paperwork or reporting requirements will be assessed as part of any such future actions.

6. Local Government Mandates

The proposed rule will not create any mandates for local governments as compared to other entities. In fact, as described above, the proposed rule does not itself create any binding or mandatory requirements on either local governments or any other entities.

7. Duplication

This proposal does not duplicate, overlap, or conflict with any other existing federal or State regulations or statutes. Instead, as described above, Part 496 places into regulation requirements of the CLCPA by translating the statewide emission reduction requirements into tonnage limits for 2030 and 2050.

8. Alternatives

The Department is required to adopt statewide greenhouse gas limits in regulation per the CLCPA as set forth in ECL Section 75-0107, so it is not viable to take a no-action alternative. Alternatives to the specific methodology for estimating 1990 greenhouse gas emission levels for particular sectors, categories, or subcategories were considered by the Department on a case-by-case basis. Many of these alternative

methodologies are discussed above in the relevant section, along with the Department's reasons for proposing the chosen methodology. The Department did not consider other alternatives, such as to adopt statewide emission limits for additional years or to expand the scope of the emission sectors or gases beyond those expressly defined in the CLCPA.

9. Federal Standards

There are no enforced federal rules or other restrictions for the adoption of statewide limits on greenhouse gases, regardless of whether such statewide emission limit also includes certain out-of-state emissions associated with in-state consumption. Therefore, this proposal does not result in the imposition of requirements that exceed any minimum standards of the federal government for the same or similar subject areas.

10. Compliance Schedule

The proposed rule will be effective immediately upon publication of the final rule in the State Register. However, there is no compliance schedule required by the establishment of the proposed rule because, as discussed above, the rule does not itself impose any compliance obligations on any entity. Finally, the 2030 and 2050 dates for the applicable statewide greenhouse gas emission limits in the rule are specifically set forth in the CLCPA.

Assessment of Public Comments

6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits

Table of Contents

Summary of public comments received from August 18, 2020 through October 27, 2020

The New York State Department of Environmental Conservation (DEC or Department) proposed Part 496 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (Part 496) in August 2020. The Department proposed Part 496 as required by Environmental Conservation Law (ECL) § 75-0107, as added by the Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019 (CLCPA or Climate Act). DEC held two virtual public comment hearings on October 20, 2020, and accepted comments on the proposed rule through 5 pm on October 27, 2020. The Department received comments from 31 commenters on the proposed rule.

The Department received comments from individuals, elected officials, municipal governments, environmental advocacy groups, community groups, academia, and private businesses and trade groups including those related to electricity generation, fuel production and transmission/distribution, and manufacturing. Most commenters voiced their appreciation of the rule and the difficulties inherent to establishing a 1990 baseline per the requirements of the Climate Act. Many commenters suggested changes that are beyond the scope of this rule and expressed concern regarding unintended consequences of the rule and Climate Act. Some requested specific consideration of impacts to the State economy, specific fuel or technology

providers, disadvantaged communities, and local governments. Several commented directly or implied that DEC is picking "winners and losers" as part of the rulemaking.

DEC appreciates that the Climate Act will require changes to State policy that touch upon the issues raised by commenters. However, as the Department explained in the Regulatory Impact Statement (RIS), while this rule is foundational to the overall implementation of the Climate Act, Part 496 does not itself impose any compliance obligations on any entity. Future actions by the Department and the State will be necessary to ensure the achievement of the statewide greenhouse gas (GHG) emission limits, as required by the Climate Act.

The intent of this rule is limited to establishing a framework for estimating 1990 emissions that is based on a) the requirements of the Climate Act, b) the best available science regarding the impacts of greenhouse gases on global climate change, and that c) encompasses statewide emission sources. Separate policies will be needed to ensure that the myriad goals and requirements of the CLCPA are met. Similarly, separate reporting may be needed to show emissions at larger or smaller spatial scales.

Several commenters expressed confusion or disagreement with DEC's interpretation of the requirements of the Climate Act, primarily with regard to three topics: (1) the definition of "greenhouse gas", (2) setting emission limits for "individual types of gases", and (3) the treatment of gross versus net emissions. In each case, DEC developed its proposal to best reflect the requirements and intent of the Climate Act. Moreover, the Department explained that its approach in Part 496 was to be as consistent as possible with the model provided by United Nations and on which this portion of the law is based ("UN model"). Specifically, the Climate Act requires the use of a 1990 GHG emission baseline and the Global Warming Potential (GWP) metric to calculate the carbon dioxide equivalent value of each GHG, as in the UN model.

With respect to the first issue, commenters stated that this rule must apply the exact same definition of "greenhouse gas" as in the statute, which includes "any substance reasonably anticipated" to affect climate change. The regulatory definition of "greenhouse gas" in Part 496 is consistent with the statutory definition in the Climate Act, and specifically and clearly lists the gases that are within the scope of the regulation. To provide additional clarity regarding the list of GHGs included in the rule, DEC revised the rule to list these gases in an additional table, rather than incorporating a table by reference as had been proposed. Moreover, in response to comments, the Department added nitrogen trifluoride (NF3) to the list of GHGs, but notes that NF3 emissions were virtually nonexistent in 1990 and therefore would not contribute to the 1990 baseline. Other suggested substances either cannot be measured following the UN model (aerosols) or are not included in the UN model because they would undermine it (ozone-depleting substances).

With respect to the second issue, DEC determined that, based on the overall statutory language and structure of the Climate Act, the rule would establish one collective statewide GHG emission limit for all individual GHGs for each relevant year. The Department lists all substances covered by the regulatory definition of "greenhouse gas," as explained above, and the rule has set a limit for all such types of GHGs. A different approach that would establish separate and distinct emission limits for each of up to 200 or more individual gases would conflict with other requirements of the Climate Act, including specified statutory definitions and GHG accounting methodologies.

Moreover, as described in the RIS, the Department's adoption of Part 496 is foundational to multiple components of the overall implementation of the Climate Act. The CLCPA contemplates that the Climate Action Council (Council) will make recommendations as part of

the Scoping Plan regarding measures to achieve the statewide emission limits, including subsequent rulemaking by the Department or other State agencies. At this preliminary stage in the overall implementation of the CLCPA, consistent with this overall structure of the statue, the Department is not seeking through this rulemaking to make significant policy decisions regarding the level of emission reductions required for each type of GHG emission source. If the Department were to establish limits on individual types of greenhouse gases, it would conflict with this statutory objective and structure, because it may prematurely suggest or establish the relative amount of emission reductions necessary from each sector or type of source.

With regard to the third issue of gross versus net emissions, many commenters stated that DEC's approach is incorrect because it is inconsistent with the UN or other models. Moreover, some commenters noted that the word "gross" is not found in the law, or asserted that the intent of the law was to provide for two different definitions of "net". DEC disagrees that the rule is required to be identical to that of the UN model, as the Climate Act itself requires specific deviations from the UN Model, including the requirement that certain GHG emission sources outside of the State must be included in statewide GHG emissions and the use of the 20-year rather than 100-year GWP. Nevertheless, DEC's approach is consistent with that model with regard to gross and net emissions as was explained in the RIS. The term "gross" is commonly reported alongside "net" emissions, such as in the annual U.S. national inventory, which follows the UN model.

DEC applied the term "gross" in this rule primarily because the Climate Act refers to two emission targets for 2050, one of which is referred to as a "net" zero emission goal. This regulation addresses only one of these two statutory emission targets for 2050: the 85x50 emission limit established in ECL § 75-0107. This rule does not directly address the separate net

zero emission goal set forth in ECL § 75-0103(11). As discussed in the RIS, given these two separate statutory directives and the fact that only the former applies directly to this rulemaking, the Department developed the statewide GHG emission limit in this rule as a "gross" limit.

Some commenters suggested that the 2050 net zero goal is meant to include both net emissions as typically defined by the UN (or total emissions minus total removals) and "offsets", which are a compliance mechanism used in certain cap-and-trade or other market-based policies. However, the term "offsets" is only used in the CLCPA to refer to an optional and separate policy measure referred to as the "Alternative Compliance Mechanism." (ECL § 75-0109(4)) This is a mechanism that the Department may choose to adopt; the Department is not required to do so. If the Department chooses to adopt this mechanism in the future, it will be separate from this rulemaking and additional issues will need to be addressed. Some commenters made useful but non-substantive suggestions regarding improvements or corrections that were implemented in the final rule. As noted in the RIS, DEC has the authority to revise this rule when appropriate. In fact, all jurisdictions that maintain a 1990 baseline make continued improvements as new data or methods become available. Finally, a few commenters stated that DEC has failed to properly engage with Council in the development of this rule. As the law states, "the department shall... consult with the council, stakeholders, and the public," which DEC has done. In addition to public meetings and individual meetings with Council members, this rule has been discussed at every Council meeting held since the Council was convened. DEC will continue to invite the Council, as well as every member of the public, to provide feedback on this rule in order to ensure that it is based on "the most accurate determination feasible". This includes in the development of the annual statewide GHG emission report, which is subject to a separate non-regulatory process pursuant to a different provision of the Climate Act. ECL § 75-0105.

Comments received from August 19, 2020 through October 27, 2020

In August 2020, the New York State Department of Environmental Conservation (Department or DEC) proposed regulations pertaining to the establishment of statewide greenhouse gas emission limits, as required by the Environmental Conservation Law (ECL) § 75-0107, as added by the Climate Leadership and Community Protection Act, Chapter 106 of the Laws of 2019 (CLCPA or Climate Act). Notice of the proposed rulemaking appeared in the August 19, 2020 State Register as well as in the DEC's Environmental Notice Bulletin. Public comments were received from August 19, 2020 through 5 pm on October 27, 2020. Virtual public hearings were held on October 20, 2020 at 2:00pm and 6:00pm. This Assessment of Public Comments responds to all substantive comments received during the public comment period, including written comments as well as oral statements made at the two virtual public hearings. Comments were compiled, reviewed, and categorized based on their content.

General Comments

Comment 1: The Commenters noted appreciation for the rule, DEC's efforts in estimating the 1990 baseline as required by the Climate Act, the importance of this baseline for the implementation of the CLCPA, and the inclusion of specific emission sources such as livestock and waste. (Commenters 3, 4, 5, 9, 10, 11, 12, 16, 17, 18, 24, 27, 29).

Response to Comment 1: The Department appreciates these acknowledgements and agrees. As discussed in the Regulatory Impact Statement (RIS) and further in the Assessment of Public Comments below, the Department included gross greenhouse gas (GHG) emissions from all sources, as specified in the CLCPA, in the 1990 estimated emission baseline.

Comment 2: The Climate Act requires consultation with the New York State Climate Action Council. (Commenters 4, 20)

Response to Comment 2: The Climate Act directs the Department to "consult with the council, stakeholders, and the public" and the Department has done so. ECL § 75-0107(3). In addition to its pre-proposal outreach to stakeholders and the general public, the Department held meetings with Council members by request, considered the materials shared by Council members, updated the Council on the status and substance of this rulemaking at every Council meeting, and invited Council members to all public meetings.

Comment 3: The commenter appreciates that DEC applied a Global Warming Potential (GWP) of 86 for methane. (Commenter 4)

Response to Comment 3: To ensure greater clarity, the final rule includes a non-substantive revision to include a new Section 496.5. This new section provides a table of all gases included in the rule and their carbon dioxide equivalent values (CO2e), using the 20-year global warming potential (GWP20) as provided in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report. This does not change the values in the final rule from those in the proposal as, previously, DEC proposed incorporating that same report by reference.

In the proposed rule, DEC applied the GWP20 to all gases, as required by the CLCPA. ECL § 75-0101(2). However, as stated in the RIS, DEC did not apply the metric "with feedbacks" as this is associated with higher uncertainty and is not recommended by the IPCC. DEC also did not use the "fossil methane" value that would double-count carbon dioxide emissions. As such, the GWP for methane applied in this rule is 84.

Definitions

Comment 4: The proposed definition of “greenhouse gas” must be revised. "Regulations of state agencies must faithfully implement the letter and the intent of the statutes that authorize them"… "even if the Department believes that improvements in the statutory definition are needed, its authority is limited to recommending such a change to the Legislature. Until and unless the ECL is amended, the definition in the statute must be restored to any adopted regulations." (Commenter 20)

Comment 5: Additional substances should be included in the rule. Suggestions included ozone-depleting substances, nitrogen trifluoride (NF3), and “solid and liquid aerosols and particulates that can also have indirect effects such as through interactions with cloud microphysics and other properties.” (Commenter 9, 10, 20)

Response to Comments 4 and 5: DEC disagrees with any implication that the regulatory definition of “greenhouse gas” in Part 496 is inconsistent with the statutory definition of “greenhouse gas” set forth in the CLCPA. ECL § 75-0101(7). A regulatory definition that is part of implementing a statutory provision need not exactly match a definition in statute, provided that the regulatory provisions are consistent with the statute and that the intent of the enabling statute is addressed.

In this case, the statutory definition of “greenhouse gas” in the CLCPA lists six specific types of gases that are explicitly part of the definition, and also includes an additional open-ended phrase that captures an indeterminate amount of other substances within the definition. In particular, the phrase “and any other substance emitted into the air that may be reasonably anticipated to cause or contribute to anthropogenic climate change” does not clearly list the substances considered within the statutory definition of “greenhouse gas” subject to the regulation. DEC must

determine the precise meaning of this statutory phrase through regulation in order to effectively implement the Climate Act.

The proposed rule applied the IPCC definition of "greenhouse gas" as it is scientifically accurate, appropriately precise to indicate which substances are subject to this regulation, and reflects the set of gases that are covered by the United Nations Framework Convention on Climate Change (UNFCCC). However, DEC has revised the rule to further clarify the term by specifically listing each individual gas that is subject to this regulation and within the regulatory definition of "greenhouse gas". The rule now includes a new Section 496.5 with a table of all affected substances along with their GWP20 per the IPCC 5th Assessment Report. See also Response to Comment 3. The definition of "greenhouse gas" has been clarified in the final rule to make clear that it includes the six specified gases in the statutory definition, as well as those substances listed in the table in Section 496.5. DEC may consider adding substances as necessary to Section 496.5 as needed and as scientific information is made available.

DEC developed its proposal to reflect the intent of the Climate Act and to be as consistent as possible with the model provided by United Nations (UN), on which this portion of the law is based. Specifically, the law requires a 1990 baseline and reporting in terms of "carbon dioxide equivalent" emissions using a GWP20 metric. These two requirements are directly derived from the IPCC guidance used by parties to the UNFCCC in annual emissions reporting and in establishing their emission reduction commitments. This application of the UN model is consistent with the references to the UNFCCC, IPCC, and Paris Climate Agreement in CLCPA § 1, Legislative findings and declarations. The emission reduction requirements in the CLCPA also closely match the goals that various jurisdictions have adopted to align with commitments to the UNFCCC, such as a 40% reduction by 2030 and 80-85% reduction by 2050, from 1990 levels.

DEC is unaware of any assessment of how such statutory limits would be affected by substances beyond the well-mixed greenhouse gases included in the UNFCCC, included in the regulatory definition in subdivision 496.3(c), and listed in the table in Section 496.5

While it may be appropriate to include NF3 in the definition of "greenhouse gas" and the table described, as NF3 has recently been added to the UNFCCC, these emissions were virtually nonexistent in 1990 and are negligible in New York State today. Therefore, DEC has added NF3 to the definition of "greenhouse gas" in Part 496, but this has no effect on the estimated 1990 GHG emission baseline or the 2030 and 2050 statewide GHG emission limits in the rule given the virtually nonexistent amount of NF3 emissions in 1990. As described in the Revised RIS, estimated NF3 emissions in the State in 1990 would be approximately 0.0005 million metric tons CO2e (GWP20)

The UNFCCC has also considered including other fluorinated GHGs, such as (trifluoromethyl) sulfur pentafluoride and sulphuryl fluoride. The IPCC also provides CO2e values for halogenated alcohols and ethers. DEC may propose including these or other substances in the regulatory definition of "greenhouse gas" in the future, consistent with the statutory definition in the Climate Act.

Finally, DEC does not agree that other substances suggested by commenters should be included in the proposed rule at this time. For purposes of this rulemaking, the rule best serves the intent of the Climate Act if the definition of "greenhouse gas" is consistent with the IPCC guidance to the UNFCCC. The definition of "greenhouse gas" included in Part 496 is consistent with the statutory definition of this term as well as with the overall statewide GHG emission limits established in the Climate Act. Many of the substances that the commenters may wish to have included in the regulatory definition are not included in the IPCC definition of "greenhouse gas,"

and are omitted in UNFCCC agreements, for legitimate and scientific reasons. For example, some substances, such as aerosols, are not well-mixed GHGs and so are not easily measured in units of carbon dioxide-equivalence (as required by the CLCPA). The IPCC 5th Assessment Report does not provide a GWP20 metric for such substances. Given that the sources of these emissions are also covered by policies to address GHGs and air pollution, the Department does not anticipate any meaningful effect or regulatory gap by the exclusion of such substances from the definition of "greenhouse gas." With regard to ozone-depleting substances, their inclusion in this rule would undermine the intent of the statute to reduce GHG emissions in line with the UNFCCC. The UNFCCC has not included these substances because they are subject to a separate, earlier treaty that drove a phase-down in many powerful GHGs. If these gases were added to the 1990 baseline, it would appear that New York State has already achieved a significant reduction in GHG emissions. This apparent reduction would not align with national or international standards and would be inconsistent with the intent and requirements of the Climate Act.

Comment 6: The definition of "statewide greenhouse gas emissions" should be closed with the additional statement, "which may be reduced to account for the greenhouse gas attributes of the upstream electric and fuel supply." (Commenter 3)

Response to Comment 6: This is already accommodated in the structure of the CLCPA, including the statutory definition of "statewide greenhouse gas emissions" in ECL § 75-0101(13), as well as in the regulatory definition of "statewide greenhouse gas emissions" in subdivision 496.3(g). As described in the RIS, the Climate Act defines statewide GHG emissions as including emissions associated with imported electricity and fossil fuels. The estimated 1990

GHG emission level in Part 496 includes GHG emissions from imported electricity and imported fuels. DEC expects that changes in the "attributes" associated with imported fuels and electricity will be further captured in the annual report, which will be subject to a separate non-regulatory process as set forth in a separate section of the Climate Act (ECL § 75-0105).

Emission Limits

Comment 7: The proposed rule does not meet the requirements of the law because limits were not "identified for each individual type of greenhouse gas." (Commenter 17, 20, 21, 22, 29)

Response to Comment 7: DEC determined that, based on the overall statutory language and structure as well as the intent of the Climate Act, the rule would establish one collective statewide GHG emission limit for all GHGs for each relevant year. Because the statewide GHG emission limits in the rule address all individual types of GHGs, the rule meets the requirement of the referenced statutory provision to "identify" limits for each individual type of GHG.

DEC did not otherwise establish separate and distinct limits on individual gases or "types of gases" for several reasons. First, the statutory language does not define the term "types of greenhouse gas" or provide any context as to how this term should be interpreted and implemented. The most recent IPCC Assessment Report lists over 200 GHGs, the majority of which are omitted from UNFCCC commitments referenced in the CLCPA. As explained in Response to Comment 3 and Response to Comments 4 and 5, the Department included a new Section 496.5 in the final rule which lists all substances covered by the regulatory definition of "greenhouse gas." The rule has set a limit for all such types of "greenhouse gas", i.e., the set of gases prioritized by the UNFCCC and included in the table in Section 496.5.

Second, the approach adopted by the Department in the final rule is consistent with the statutory language in the CLCPA. A different approach that would establish separate and distinct emission limits for each of up to 200 or more individual gases would conflict with other requirements of the Climate Act. For example, the statutory definition of "statewide greenhouse gas emissions limit" refers to the "maximum allowable level of statewide greenhouse gas emissions in a specified year . . . . " ECL § 75-0101(14). The term "statewide greenhouse gas emissions" is in turn defined as "the total annual emissions of greenhouse gases produced within the state from anthropogenic sources and greenhouse gases produced outside of the state" that are associated with imported electricity and fossil fuels. ECL § 75-0101(13). This definitional language suggests a collective approach that takes into account all GHGs when identifying the emission limit. The Climate Act further requires that GHGs subject to the statewide emission limits be measured in tons of CO2e and as a percentage of 1990 emission levels. ECL §§ 75-0101(2) and (8) and 75-0107. Taken together, these provisions would be inconsistent with the Department establishing separate and distinct limits for each individual type of greenhouse gas as part of this rulemaking. The CO2e metric compares individual gases to carbon dioxide. The 1990 baseline is only relevant when aligning a goal with the UNFCCC goals. Otherwise, the sources of emissions have changed considerably in the past 30 years.

Third, the establishment of separate and distinct limits for each individual type of gas would be inconsistent with other provisions of the Climate Act and with the overall structure of the statute. The approach adopted by the Department in the final rule most closely aligns with the intent of the Climate Act. For example, as set forth in the Legislative findings and declarations, the legislation is intended to help the State achieve emission reductions that are aligned with what

the United States Global Change Research Program (USGCRP) and IPCC have stated is needed to mitigate climate change (CLCPA § 1 "Legislative findings and declarations").

Finally, as described in the RIS, the Department's adoption of Part 496 is foundational to multiple components of the overall implementation of the Climate Act. As set forth in the RIS, while this rule establishes the baseline limit against which emission reductions under the CLCPA will be measured, it does not impose a compliance requirement on any entity. Similarly, the CLCPA contemplates that the Climate Action Council (Council) will make recommendations as part of the Scoping Plan regarding measures to achieve the statewide emission limits, including subsequent rulemaking by the Department or other State agencies. Both the Council's recommendations in the Scoping Plan and future substantive rulemaking by the Department and other State agencies must include measures that impose enforceable requirements on individual sources of greenhouse gases. At this preliminary stage in the overall implementation of the CLCPA, consistent with this overall structure of the statue, the Department is not seeking through this rulemaking to make significant policy decisions regarding the level of emission reductions required for each type of GHG emission source. If the Department were to establish limits on individual types of greenhouse gases, it would conflict with this statutory objective and structure, because it may prematurely suggest or establish the relative amount of emission reductions necessary from each sector or type of source.

Comment 8: It is necessary to place limits on individual GHGs in order to prioritize efforts to address the different GHGs. Omitting this, "deprives the scientific community, regulated parties and other interested members of the public of the opportunity to evaluate and suggest

improvements to the Department's conception of which types of greenhouse gas emissions should be prioritized in the short-term future." (Commenter 20)

Response to Comment 8: As described above in Response to Comment 7, the Department is not seeking to establish any such prioritization through this rulemaking, as this will be established pursuant to recommendations of the Council, future rulemaking by the Department and other agencies, and other policy decisions. Regardless, the Climate Act itself establishes an initial prioritization by requiring GHGs to be measured using the GWP20 metric, rather than the standard 100-year metric, which demonstrates that the Legislature intended to prioritize certain short-lived GHGs. However, as described above, the GWP metric is intended to combine GHGs so they can be addressed holistically. DEC applied no other prioritization as no other prioritization is mentioned in the CLCPA nor appropriate for purposes of this rulemaking. Emission reduction strategies are developed through policy and are, in practice, based on current emission levels in order to address current emission sources. An emission reduction strategy based solely on emission sources as they existed thirty years ago in 1990, which serves as the basis for the emission limits established in Part 496, would not be sufficient. The separate process under the Climate Act requiring the development of a statewide greenhouse gas emission report, which the Department must complete by the end of 2021 and update annually thereafter, will allow the Department to further consider these issues. Similarly, the statutory structure described in Response to Comment 7, which contemplates the ongoing development and consideration of emission reduction strategies, allows for further prioritization as contemplated by the commenter.

Finally, DEC also questions the value of managing GHGs separately at this point through this rulemaking, since the majority of emission sources are associated with multiple GHGs (e.g., all

fossil fuel combustion sources are associated with carbon dioxide, methane, and nitrous oxide) or are targeted by policies that also affect other GHGs (e.g., electrification strategies affect hydrofluorocarbon (HFC) emissions). Other portions of the CLCPA that are outside of the scope of this rule are better suited for developing this prioritization, including the Scoping Plan to be developed by the Council per ECL § 75-0103. This is how the UNFCCC model and the models of other jurisdictions operate, such as the California "Scoping Plan".

Comment 9: Commenters list examples where other states have either statutory goals for individual pollutants or have recognized the importance of regulations for specific pollutants. (Commenters 17, 22)

Comment 10: Individual limits are needed to prioritize short-lived GHGs and/or short-term policy. (Commenters 20, 22)

Response to Comments 9 and 10: DEC appreciates the information, but the commenters did not explain how targets for individual types of GHGs or strategies for short-term policy action relate to the required 1990 baseline. As described above in Response to Comments 7 and 8, the Climate Act itself establishes an initial prioritization on short-lived GHGs through the use of the GWP20 metric. Moreover, the statewide GHG emission limits in the rule address all individual types of GHGs, meaning that the rule meets the requirement to "identify" limits for each individual type of GHG. The commenters cite goals in other jurisdictions that use a more recent baseline year or that are a part of planning for overall GHG reductions. For example, hydrofluorocarbon (HFCs) are short-lived, man-made GHGs that did not exist or were not in use in 1990, but that are currently used in refrigeration, insulation, flame retardants, and as aerosol propellants. California's statutory goal would reduce HFC emissions 40% from 2013 levels by 2030, leaving

over 9 million metric tons in CO2e emissions (using a 100-year GWP; this would be higher using a 20-year GWP). The California goal reflects an assessment of current GHG emission sources and the time needed to transition to alternatives. DEC agrees that establishing such a goal may help the State of California direct emission reduction strategies, but unlike the CLCPA and the Department's required action through this rulemaking, the California example does not reference a 1990 baseline year. California's HFC goal is used to help the state achieve an overall GHG emission limit for 2030 that is the same as that required by the CLCPA (also 40-by-30; California SB32). Since HFCs represent a significant source of emissions that was added after 1990, California, like New York State, will need to undertake planning across all types of GHGs and emission sources to achieve the overall reductions called for by the USGCRP and IPCC.

Comment 11: Some commenters suggested additional or alternative emission limits, including interim limits to maintain momentum or targets that recognize the long-term impacts of GHGs. Otherwise the law over-emphasizes the role of methane or under-emphasizes the role of carbon dioxide by applying the 20-year rather than the more standard 100-year GWP. (Commenters 1, 5, 29)

Response to Comment 11: DEC appreciates these comments, but is not currently proposing statewide emission limits through this rulemaking other than those required in the CLCPA. The Council may recommend interim emission limits or other measures as part of the Scoping Plan, and the Department may consider enactment of such measures through future regulation. Finally, as described above in Response to Comments 7 and 8, the statue itself established an initial prioritization through the establishment of the GWP20 metric. It is necessary and important to

recognize that no one metric, either the 20- or 100-year GWP, fully depicts the impacts from various GHGs.

Gross or Net Emissions Accounting

Comment 12: The term “gross” is not used in the CLCPA. (Commenters 3, 17)

Comment 13: DEC’s approach, which uses gross accounting, is different from the IPCC guidance used by parties to the UNFCCC, related methods used by other subnational governments or organizations, and State energy planning. Net emissions accounting, such as used by the IPCC in various reports, represents the best available science. (Commenters 3, 8, 15, 16, 27, 31)

Response to Comments 12 and 13: DEC disagrees that the rule is required to apply the IPCC guidance or be identical to accounting required by the UNFCCC as this is not articulated in the Climate Act. In fact, the CLCPA requires specific deviations from that model. These deviations are laid out in the RIS and include the addition of emission sources outside of the State (e.g., emission associated with imported electricity and fuels) and the use of the GWP20 metric. In this way, the CLCPA has established a new framework for emissions accounting that is indeed different from that used in other jurisdictions and in past State energy planning.

Nevertheless, DEC’s approach is consistent with the UN model with regard to gross and net emissions. The term “gross” is commonly reported alongside “net” emissions, such as in the annual United States national inventory, which follows the UN model. As described in the United States national inventory, “The gross emissions total presented in this report for the United States excludes emissions and removals from Land Use, Land-Use Change, and Forestry

(LULUCF).” Similarly, the 1990 baseline used in this rule includes emissions and excludes removals from the IPCC categories referred to as LULUCF.

DEC applied the term “gross” in this rule because the law refers to two emission targets for 2050, one of which is referred to as a “net” zero emission goal. This regulation addresses only one of these two statutory emission targets for 2050: the 85x50 emission limit established in ECL § 75-0107. This rule does not directly address the separate net zero emission goal set forth in ECL § 75-0103(11). As discussed in the RIS, given these two separate statutory directives and the fact that only the former applies directly to this rulemaking, the Department developed the statewide GHG emission limit in this rule as a “gross” limit. Otherwise the rule would inappropriately include two different emission limits for 2050.

Commenters may be referring to the concept of “carbon neutrality” as applied to biogenic fuels, which is discussed in more detail in additional response to comments below. As described in the RIS, carbon dioxide emissions associated with biogenic fuel combustion for energy purposes are reported by parties to the UNFCCC, but they are omitted from national totals to avoid double-counting carbon losses on lands where the feedstocks were harvested. These emission sources are not omitted because they have no effect on climate change or because it is assumed that their impact is neutralized on a net basis.

Comment 14: The CLCPA 2050 net zero goal is meant to include both net emissions as typically defined by the UN (or total emissions minus total removals) and “offsets” through the CLCPA’s Alternative Compliance Mechanism. This allows for more than 15% of emissions in 2050 to be accounted for on a net basis. (Commenters 17, 27)

Response to Comment 14: The term “offsets” is only used in the statute to refer to an optional and separate “Alternative Compliance Mechanism” (or ACM; ECL § 75-0109(4)). The ACM is a mechanism that the Department may choose to adopt; the Department is not required to do so. Only if the Department chooses to adopt an ACM would its various provisions come into play. This use of the term “offsets” in the Climate Act is consistent with the most common use of the term in climate change policy, i.e. as a compliance mechanism in cap-and-trade or other market-based programs. Neither the term offsets nor the ACM are referenced in the requirements established for either the statewide emission limits established in this rulemaking or the separate net zero goal.

As described in the RIS and in Response to Comments 12 and 13, Part 496 establishes statewide GHG emission limits on a gross basis. Neither the rule itself nor the statutory provision it implements – ECL § 75-0107 – directly address net emissions or the ACM. Therefore, this rule is not intended to address certain issues regarding the potential use of an ACM, such as how offsets might be used to address GHG emission sources that remain in 2050 or how the pool of potential offsets differs from sources that are already subject to the emission reduction requirements of the Climate Act. If DEC adopts an ACM, ECL § 75-0109(4) requires that offsets occur in a close geographic area. If statewide emission reductions and sequestration are maximized in 2050 to achieve the limits and net goal, there may be limited opportunities for “additional” in-State offset projects. While these and other issues will need to be addressed if the Department adopts an ACM, they are not directly related to this rulemaking.

Several state and national governments have adopted net zero, or carbon neutrality, goals. DEC is unaware of any jurisdiction that reports offsets as part of its inventories of gross and net emissions. These jurisdictions still follow the UN model.

Comment 15: DEC's approach ignores progress that could be achieved through net emissions, such as through carbon sequestration in forests, which will make it difficult for the State to achieve the CLCPA's goals. If carbon is sequestered faster than it is released, then NY is not contributing to climate change. (Commenters 16, 27)

Response to Comment 15: DEC has not proposed that the State abandon net reporting of emissions and agrees that carbon removals are a key part of the State's strategy to meet the goals of the Climate Act. While this rulemaking establishes the emission limit baseline, it does not itself foreclose any particular policy option, including policies directed at increasing carbon sequestration in forests.

As described in the RIS, the Scoping Plan is required to address both the statewide emission limits established pursuant to ECL § 75-0107 in Part 496, and the separate net zero goal. Net emissions will be reported alongside gross emissions in annual reporting per ECL § 75-0105. Finally, while not directly related to this rulemaking, DEC notes for context that the CLCPA-required framework for estimating the statewide emissions results in a total volume of emissions of over 400 million metric tons (mmt) of CO2e emissions, 15% of which is over 60 mmt. The United States Forest Service estimates that the State's forests remove slightly under 30 mmt of CO2e emissions and have been doing so at a roughly equal rate since 1990. DEC fully recognizes the importance of the State's natural carbon sinks for achieving the CLCPA goals and the need for new, transformational policies to protect and enhance these resources.

Comment 16: Net emission reductions are a necessary compliance strategy, including for upstream, downstream, and out of state sources. (Commenter 3)

Comment 17: The DEC's approach will strand clean energy assets. (Commenter 3)

Response to Comments 16 and 17: The commenter could be referring to direct compliance with a policy adopted by New York State, such as an emission standard applied to in-state stationary sources, or generally to the consideration of policies, such as in the Scoping Plan. However, as described in the RIS, this regulation does not impose a compliance requirement on any individual entity. While foundational to the State's overall implementation of the CLCPA, this regulation does not directly address policy design, GHG emissions from specific sources, or apply net accounting to upstream, downstream, or out of state GHG emission sources. Net emissions accounting, as will be used to track progress on achieving the net zero goal, is applied to total GHG emissions and will be reported alongside gross GHG emissions as part of the annual statewide GHG emission report as separately required by ECL § 75-0105.

Biogenic Emissions and Fuels

Comment 18: Commenters found that the best available science indicates that biogenic fuels (i.e., plant-based fuels such as wood and renewable natural gas) have no effect on climate change or are lower emission than fossil fuels. As such, the DEC proposal to include carbon dioxide emissions from the combustion of these fuels is incorrect. DEC should not treat biogenic emissions the same as "geologic" emission sources. (Commenters 3, 14, 15, 18, 30, 31)

Comment 19: New York State should not automatically assume carbon neutrality or blindly follow the IPCC guidance as it relates to biogenic fuels. (Commenters 17, 30).

Response to Comments 18 and 19: As described in the RIS and in responses to comments in the "Gross or Net Emissions Accounting" section above, Part 496 establishes statewide GHG emission limits on a gross basis. On this basis, the carbon dioxide released from the combustion

of plant material has the same effect as carbon dioxide emitted from the combustion of fossil fuels; any source of carbon dioxide can contribute to climate change. The atmospheric concentration of carbon dioxide will not be reduced until the rate at which it is removed from the atmosphere outpaces the rate at which it is added, when measured on a net basis. As explained in the RIS and above, both gross and net emissions will be reported in the separate annual GHG emission report required under ECL § 75-0105, and Part 496 does not itself foreclose any particular policy option with respect to the treatment of biogenic emissions under the CLCPA. Neither the Department nor the UN automatically assume carbon neutrality as it relates to all biogenic fuels. Land management strategies, including the growth and harvesting of plant materials, can be used to increase the rate of carbon dioxide removals. However, the IPCC guidance used by the UNFCCC does not automatically assume that energy crops are carbon neutral. As explained in the RIS, the UN model addresses these GHG emissions separately through reporting of land-based GHG emissions. Theoretically, if all lands across the globe were managed to sustain a growing volume of GHG emission removals to coincide with GHG emissions from fuel combustion, then such fuel combustion would be neutralized.

Comment 20: The CLCPA requires that this regulation include emissions associated with imported fossil fuels. DEC should expand the scope of the CLCPA so that it also includes the lifecycle emissions of imported biogenic fuels, specifically wood pellets. Otherwise, fuel producers in New York State will be disadvantaged because they will be subject to regulations that are not imposed on out-of-state producers. In the absence of such a policy, fuel producers will leave the state thereby leading to leakage. (Commenters 8, 13, 19, 25, 31)

Response to Comment 20: The scenario that commenters pose assumes a series of events that goes well beyond this rule and presupposes that no additional polices will be needed to meet the myriad goals of the CLCPA (including to reduce leakage) and that industries, stakeholders, and the public will have no opportunity to provide input regarding the development of such policies. The commenters also did not discuss how future State policies may seek to enhance carbon sequestration or reduce waste-based methane, which may be a benefit of some biogenic fuel production.

The sole intention of this rule is to establish a framework for measuring and reporting estimated 1990 levels of "statewide" emissions of GHGs that are driving climate change. This allows the Department to translate the statewide GHG emission limits established on a percentage basis in ECL § 75-0107 into tonnage-based limits measured in CO2e (GWP20). As described in the RIS, the CLCPA itself requires that certain out-of-state lifecycle fossil fuel emissions are part of statewide GHG emissions. ECL § 75-0101(13).

It would not be appropriate to design the rule's accounting methodology to address any potential competitive disadvantages among fuel producers. This rule does not attempt to pick "winners and losers". DEC knows of no national or subnational government inventory that includes extra-jurisdictional emissions in its GHG inventory, including the national inventory of the United States. The CLCPA deviates from this by including emissions associated with imported fossil fuels and electricity. Instead, these inventories are intended work in tandem with a variety of policies that may address intra and extra-jurisdictional emission sources, fuel switching, and other related areas. Such policies need not measure the same emission sources or measure them in the same way. In other words, this rule does not directly address the State's treatment of out-

of-state non-fossil fuel GHG emissions, as this may be addressed as part of future policy actions to implement the Climate Act.

The California Low Carbon Fuel Standard (LCFS), for example, uses lifecycle-based measurements and considers emissions outside of the state, but the California GHG inventory does not. Importantly, the commenters assume that in-state fuels would necessarily have an advantage in a lifecycle-based accounting, but they provide no assessment of this. DEC notes that most of the lowest Carbon Intensity fuel pathways in the California LCFS are not produced in California.

Comment 21: A commenter noted that this regulation should account for the emissions from biomass and biofuels and from harvesting and combustion and ensure that emissions are accurately estimated. Another commenter states that the RIS made unsubstantiated assertions, including that the annual rate at which the land use sector removes emissions has been declining in the United States since 1990. (Commenters 3, 17)

Response to Comment 21: DEC agrees that, under the CLCPA, the State must accurately portray the impacts of land management in terms of gross and net emissions. Indeed, that is the intention of both this rulemaking and the separate forthcoming annual report required by ECL § 75-0105. With regard to the statement in the RIS regarding the importance of proper accounting and the concern regarding sustainable land use, the sentence in question is referring to the national GHG inventory which was cited elsewhere in the RIS. From the United States Environmental Protection Agency's (EPA) 2020 report, "Total C sequestration in the LULUCF sector decreased by approximately 7.1 percent between 1990 and 2018. This decrease was primarily due to a

decline in the rate of net C accumulation in Forest Land and Cropland Remaining Cropland, as well as an increase in emissions from Land Converted to Settlements."

Comment 22: Commenters expressed concern that the inclusion of biogenic fuel emissions will have unintended impacts on bioenergy. Comments included that the RIS did not anticipate future renewable fuel needs; DEC should have considered the need for "low carbon" and dispatchable fuels; DEC should have considered the benefits of waste-based fuels such as residual wood products; DEC should not pick winners and losers and if DEC intended to do so it should be required to complete an environmental assessment. (Commenters 3, 14, 15, 16, 31)

Comment 23: Previous reports from New York State or other jurisdictions, including a report provided to the Council, indicated that renewable fuels would be an important part of the State's energy and climate strategy. (Commenters 3, 16, 18)

Response to Comments 22 and 23: As stated above in Response to Comment 20, the sole intention of this rule is to establish a framework for measuring and reporting estimated 1990 levels of statewide emissions of greenhouse gases that are driving climate change. It would not be appropriate to design that accounting methodology to address any potential competitive disadvantages among fuel producers. This rule does not attempt to pick "winners and losers." Likewise, as described in Responses to Comments 15 and 18 and 19, this rule does not itself foreclose any particular policy options for the State as it continues its implementation of the Climate Act, including with regard to renewable fuels.

Comment 24: Gross emissions accounting should only be applied to the 1990 baseline. Biogenic sources shouldn't be subject to CLCPA. (Commenter 3, 31)

Response to Comment 24: DEC appreciates the suggestions but, as described in the RIS and in responses to comments in the "Gross or Net Emissions Accounting" section above, Part 496 establishes statewide GHG emission limits on a gross basis, including certain biogenic gross emissions. While the commenter's suggestion would not be consistent with the requirements of the CLCPA for purposes of this rulemaking, as noted the Department intends to report both gross and net emissions as part of the separate annual GHG emission report required under ECL § 75-0105. Finally, this rule does not itself foreclose any particular policy options for the State as it continues its implementation of the Climate Act, including with regard to biogenic emissions.

Energy Sector Comments

Comment 25: Commenters cited the benefits of lifecycle assessments, particularly for estimating emissions associated with fuels. These comments included that the proposed approach to accounting for out-of-state emissions through lifecycle assessment is innovative; applauding the use of the "Greenhouse gases, Regulated Emissions, and Energy use in Transportation" (GREET) model for estimating fossil fuel emissions; remarking that lifecycle assessments such as that used in LCFS policies can incentivize the use of cleaner fuels; and suggesting that the gross accounting approach disincentivizes fuels that have a negative carbon intensity in the LCFS. (Commenters 16, 18)

Response to Comment 25: Lifecycle assessments are typically distinct from the types of methods historically used for governmental GHG accounting. This is because lifecycle assessments are typically static, rather than updated on an annual basis, and cover emissions over a wide geographic area, rather than within a specific jurisdiction. New York State had not previously used lifecycle assessments for the purposes of annual GHG emissions reporting. However, as

described in the RIS, the CLCPA requires that DEC also incorporate emissions from certain sources outside of the state, i.e., those associated with imported fuels. ECL § 75-0101(13). As described in the RIS, DEC consulted with the New York State Energy Research and Development Authority (NYSERDA) to develop a lifecycle approach for addressing these emissions. DEC will continue to evaluate this approach and if other alternative approaches are deemed superior, DEC may reconsider this approach.

LCFS policies use lifecycle assessment to assess the environmental impacts of different fuels. However, as described above in Responses to Comments 20 and 22 and 23, the development of policies to incentivize specific types of fuels is beyond the scope of this rule. Additionally, while beyond the scope of this rulemaking, lifecycle assessment and LCFS policies do not address the gross versus net emissions issue cited by the commenters. LCFS policies may evaluate a variety of emission sources associated with biogenic fuels, but they do not attempt to test or validate carbon neutrality. If DEC were to incorporate lifecycle emissions for biogenic fuels into the current rule, this would be in addition to combustion emissions. Additionally, fuels with a negative carbon intensity in an LCFS are those associated with reduced methane. However, a lifecycle assessment is not needed to incorporate this benefit into this rule as methane emissions are already included. These issues may be addressed as part of any future consideration of an LCFS or other similar policies to implement the CLCPA.

Comment 26: The 1990 baseline estimation for fugitive methane needs scrutiny, if it is too low and will not capture the emission reductions that industry has made in the past. (Commenter 12).

Comment 27: Commenters support the use of “bottom-up” analyses as these are consistent with historical air quality regulations and result in more accurate assessment of emission sources

needed to identify emission reduction opportunities. “Top-down” analyses can’t be verified for 1990 and do not provide adequate spatial resolution to assess current emissions so they should not be used in this rule or the annual report. (Commenter 26)

Comment 28: Recent “top-down” analyses show that “bottom-up” assessments are underestimating methane emissions. To reconcile these two approaches, some commenters supported the use of a single, blanket emission factor be applied to natural gas in all years, as provided by Robert Howarth. Others do not cite this author but noted the need to address the underestimation of fugitive methane. (Commenters 4, 11, 17, 29)

Comment 29: The commenters acknowledge that the “top-down” information is more important for later years or note that they expect fugitive methane emissions to be higher in later years. (Commenter 4, 17)

Response to Comments 26, 27, 28, and 29: DEC appreciates the various positions that the commenters have taken on this issue. The Department acknowledges their concerns that different methods could over- or under-estimate methane emissions associated with the extraction, processing, transmission and distribution of fossil fuels in 1990 and that this baseline will affect the rest of the timeseries. Much of this concern is due to the uncertainty inherent in estimating fugitive emissions from three decades ago using imperfect data.

As stated in the RIS, DEC does not consider it appropriate at this time to apply results from recent top-down analyses to the 1990 baseline, even if such analyses may be appropriate for estimating emissions for current or future years. DEC will continue to make improvements to the 1990 baseline as needed. If future research enables the Department to use top-down analyses to inform the estimation of historical GHG emissions, DEC can revise this rule as appropriate. However, DEC notes that any increase in the GHG emissions associated with the 1990 baseline

will increase the statewide emission limits. DEC did not consider whether the annual report will show GHG emission levels that are higher or lower than the 1990 baseline and does not believe that this assumption should be made at this time.

Comment 30: Additional information is needed to understand the estimation of the 1990 baseline and if the "best available" information was used, such as fuel volumes. Commenters asked why the CLCPA required this rule to be promulgated prior to the full annual report if that report would provide this information (ECL § 75-0105). (Commenters 1, 3, 26)

Response to Comment 30: The RIS provided an explanation of the methods and data sources used in the estimation of the 1990 baseline. The Department agrees that the CLCPA separately calls for additional, detailed information in the annual report, the first of which is due by the end of 2021 pursuant to ECL § 75-0105. For example, the RIS explained that the source of data for fuel volumes is the same as in previous State inventory reports, i.e., federal data reported by NYSERDA in their annual Patterns and Trends report. Any exceptions were explained in the text of the RIS.

Comment 31: Commenters did not think that the RIS provided a sufficient summary of the literature regarding top-down and bottom-up GHG emission estimation or cited specific references that they think should have been cited. (Commenters 1, 3)

Comment 32: DEC should conduct an assessment of the literature and evaluate the extent to which top-down approaches have been tested in urban areas before applying this approach to GHG accounting. (Commenter 27)

Response to Comments 31 and 32: DEC agrees that it is important to conduct a thorough review of the scientific literature when evaluating this sector. As stated in the RIS, DEC used the recent NYSERDA Oil and Gas Methane Inventory, which included a review of sources referenced by the commenters, including those related to downstream GHG emissions. In some cases, DEC and NYSERDA consulted with the authors of these papers for technical advice. DEC will continue to critically review the literature and seek technical advice from the scientific community. As described in the RIS and above in Responses to Comments 26-30, DEC does not consider it appropriate at this time to apply results from recent top-down analyses to the 1990 baseline, even if such analyses may be appropriate for estimating emissions for current or future years.

Comment 33: DEC should work with the Public Service Commission, "LDCs", and upstream pipeline companies to assess the methods and data used to estimate fugitive methane. (Commenter 27)

Response to Comment 33: DEC agrees and will continue to work with staff in other agencies and with industrial partners in gathering technical advice and data.

Comment 34: Commenters noted errors in Table 7 or text referring to Table 7. (Commenters 1, 3)

Response to Comment 34: A revised RIS has addressed the errors noted. None of the errors noted have a material effect on the substance of the RIS or on the emission limits established in the regulation.

Comment 35: The RIS described how the estimation of aviation GHG emissions is different from the previous NYSERDA inventory but does not explain the role of aviation fuel in the overall transportation sector. This is an example of unsubstantiated assertions in the RIS. (Commenter 3)

Response to Comment 35: The RIS provided information regarding the data sources and choice of methods used to estimate the 1990 baseline. Where necessary, the RIS explained deviations from the previous NYSERDA GHG inventory. In many cases, DEC applied the same data and methods as was used by NYSERDA and that report can still be reviewed in order to, for example, assess the relative contribution of aviation GHG emissions. This is notable because the transportation sector may have changed in the past thirty years. The 1990 baseline is not an adequate reference for understanding the role of aviation in New York State's transportation sector today. The relative contribution of different sources of GHG emissions to current overall statewide GHG emissions, including the relative contribution of the transportation sector, will be further reported in the separate annual GHG emission report required under ECL § 75-0105.

Waste Sector Comments

Comment 36: DEC must account for exported waste. (Commenter 17)

Response to Comment 36: DEC agrees and these GHG emissions are included in the baseline as they were in previous NYSERDA GHG inventories for the State.

Comment 37: Commenters indicated support, including appreciation for the treatment of waste combustion in waste as opposed to energy, recognition of waste as a source of GHG emissions, and the recognition of waste GHG emissions but with a request that DEC acknowledge that waste management is a public service. (Commenters 6, 30)

Response to Comment 37: DEC thanks you for your comment.

Comment 38: The RIS created substantial uncertainty with regards to whether biogenic sources of carbon dioxide will be omitted in net reporting, specifically renewable natural gas from landfills, organic waste diverted to anaerobic digesters, or comingled organic waste and dairy manure in an anaerobic digester and whether this will apply to any feedstock, regardless of geography, because waste flows across borders. (Commenter 18)

Comment 39: DEC should treat biogenic GHG emissions of carbon dioxide from the waste sector consistently and the proposed approach differs from EPA policies (citing the WARM model and Clean Power Plan) and the IPCC. Commenters stated that either all GHG emissions affect climate change and should be included, that none of these GHG emission sources affect climate change, or that all waste management ends up emitting the same carbon dioxide so they should all be treated the same. One commenter indicated that fire can be natural and so combustion should be treated as equivalent to decomposition. (Commenters 14, 17, 18, 30)

Comment 40: This regulation will have unintended consequences for energy policy, specifically the development of renewable natural gas (RNG) or "biogas". Commenters predict scenarios in which methane will be flared or leaked, that landfills will no longer be incentivized to capture methane in order to reduce methane combustion, that there will be no incentive to divert plastics and reduce such sources of fossil fuel GHG emissions, that anaerobic digestion will appear less desirable than composting despite the benefits of recovered RNG, and that RNG will provide no benefits compared to natural gas. (Commenters 15, 18, 26, 30)

Response to Comments 38, 39, and 40: As described above in the responses to comments in the sections above regarding gross or net emissions and biogenic GHG emissions and in the RIS,

DEC proposed applying gross accounting in order to meet the requirements of the CLCPA. Moreover, this rule is not intended to incentivize or disincentivize particular fuel sources, including RNG or "biogas." As noted, Part 496 does not itself foreclose any particular policy option with respect to the treatment of biogenic GHG emissions under the Climate Act, including with regard to renewable fuels.

In the case of GHG emissions from waste management, DEC determined that some sources are omitted in the IPCC guidance used by the UNFCC in the reporting of net emissions, because they are intended to be balanced against removals on the land base. However, other sources are omitted because they represent natural, non-anthropogenic emissions. In the first instance, the proposed regulation considered gross rather than net emissions, so there is no need to omit these sources. Separate from this rulemaking, questions regarding net emissions accounting will be addressed in consultation with stakeholders and the public as part of the development of the annual report required pursuant to ECL § 75-0105, the first of which is due by the end of 2021 (ECL § 75-0105). For the second type of GHG emissions, i.e. non-anthropogenic GHG emissions, DEC maintains that these GHG emissions are not appropriate for GHG accounting under the CLCPA. Waste incineration, on the other hand, is in fact anthropogenic, despite the fact that fire can be natural. Commenters also introduce a third type of potential emissions, or avoided methane. Methane emissions are included in the proposed regulation and will be reported annually. It is likely that State policies to reduce methane will consider various ways that methane emissions can be avoided. Finally, DEC notes that, unlike biogenic fuels, under the CLCPA fossil fuels are associated with GHG emissions from both combustion and imported, upstream GHG emissions.

Many of the other comments presuppose the outcome of policies and planning that is outside of the scope of this regulation. This regulation is intended to establish statewide emission limits as required by the CLCPA by estimating a 1990 emission baseline. DEC did not consider the merits of different fuels or consider the ways in which future policies would be needed to promote specific fuels or even ensure emission controls. Many additional policies will be needed to achieve the statewide emission limits, and these issues may be addressed by the Department, the Council, and the State as part of the consideration and implementation of various policies to meet the requirements of the CLCPA.

Comment 41: The commenter thinks methane emissions from landfills should be a smaller proportion of statewide emissions and requests that DEC "refine its emission calculations using new developments in GHG quantification technologies." (Commenter 28)

Response to Comment 41: The Department based the 1990 emission estimate on the best available information as described in the RIS. At this time, the Department is not aware of any specific information that would warrant a change in the methodology used to estimate 1990 methane emissions from landfills. DEC will continue to make improvements, as necessary and appropriate, to the 1990 baseline and in the data and methods used in the separate annual reporting required under ECL § 75-0105. The public is welcome to provide recommendations and specific, detailed suggestions are particularly helpful. For example, as in the case of methane emissions associated with oil and gas sources, “top-down” research has suggested that improvements may also be needed to identify methane sources at landfills. DEC will seek additional feedback in this area as part of its upcoming process to develop the first annual GHG emission report.

Comment 42: DEC should include a more accurate accounting of wastewater GHG emissions. The Commenter points to potential GHG emissions from septic systems that were omitted and offers to share data from municipal facilities. (Commenter 27)

Response to Comment 42: DEC thanks you for your comment and has added an estimate of septic system GHG emissions to the 1990 baseline, which was not included in the EPA State Inventory Tool. Additional explanatory text has been added to the revised RIS and additional details will be provided in the GHG annual report pursuant to ECL § 75-0105. DEC plans to continue to make improvements in the estimation of both septic and wastewater management sources.

Comment 43: The RIS "ignores the magnitude to the methane reductions that could be possible if the State's goals were to incentivize the capture of methane from solid waste disposal...and wastewater." (Commenter 3)

Response to Comment 43: As stated above and described in the RIS, the regulation includes the estimation of methane emissions in 1990 based on the best available information. While methane reductions will be required to achieve the statewide GHG emission limits, as explained in Response to Comment 7, DEC did not establish separate and distinct limits on individual gases. Therefore, the precise magnitude of methane reductions necessary to achieve the statewide GHG emission limits is not a subject of this rulemaking. Additional policies and programs may be needed to ensure these statewide GHG emission reductions are achieved, as required by the Climate Act, and these may include incentives for methane recovery.

Industry Sector Comments

Comment 44: DEC should not penalize industries by failing to capture transitions that have already occurred such as in Heating Ventilation and Air Conditioning (HVAC) and refrigeration. This relates to comments regarding the establishment of an accurate baseline. (Commenter 12)

Response to Comment 44: While this regulation does not penalize any particular industry as it solely establishes the GHG emissions baseline, DEC appreciates the transitions previously made by many industries, for example the transition away from ozone-depleting substances as required by federal regulations under the United States commitment to the Montreal Protocol. Looking forward, many additional policies will likely be needed at the State and national level to also transition away from HFCs to align with the Kigali Amendment to the Montreal Protocol.

Comment 45: The Industrial Process and Product Use (IPPU values in Table 8 of the RIS do not sum. (Commenter 1)

Response to Comment 45: DEC thanks you for your comment and has made non-substantive edits to the tables in the RIS to fix any errors.

Requests for Additional Reporting

Comment 46: Commenters noted that the annual report per ECL § 75-0105 will require additional detail and requested additional aspects of annual reporting that are not related to this rule, including tracking GHG emissions by location to ensure that reductions in disadvantaged communities are prioritized, the reporting of co-pollutants, and reporting sufficient information to identify what GHG reductions are necessary to achieve the GHG limits and to compare the baseline to current GHG emission levels. The latter is required to ensure that the statewide

emission limits maintain the same level of ambition compared to methods used in the previous NYSERDA GHG inventory. (Commenter 3, 17)

Response to Comment 46: While outside the scope of this rulemaking, DEC appreciates the feedback regarding the type of information that could be provided in the GHG annual report pursuant to ECL § 75-0105. The Department agrees that the GHG annual report will require additional information not directly related to this rulemaking. DEC plans to provide the information that is required by the Climate Act and that is best able to inform policy and planning to achieve both the statewide emissions limits and net zero emission goal.

Comment 47: The CLCPA requires DEC to consider establishing a mandatory reporting system by January 2021, but DEC has not yet proposed such a program. The Commenter states that DEC only currently requires reporting for certain facilities and suggests that DEC look at examples in other states. (Commenter 17)

Response to Comment 47: While beyond the scope of this rulemaking, the commenter is correct. As stated in the CLCPA, "the department shall consider establishing a mandatory registry and reporting system from individual sources to obtain data on greenhouse gas emissions exceeding a particular threshold." ECL § 75-0105(4). As required by the CLCPA, the Department has considered establishing such a mandatory registry and reporting system to obtain GHG emission information from individual sources exceeding a particular GHG emission threshold. At this time, the Department is not proposing such a system. The Department may, however, propose such a system in the future. The Department will continue to consider whether such a system is necessary for the overall successful implementation of the CLCPA.

Currently, DEC uses a variety of data collected under State and federal regulations, including the reporting by individual sources in the State that can be accessed via the EPA Greenhouse Gas Reporting Program's Facility Level Information on GreenHouse gases Tool (FLIGHT; 40 CFR Part 98) or DEC's InfoLocator Map tool. Going forward, DEC and other State entities will consider adopting additional reporting programs to gather data and for individual GHG sources that exceed an emissions threshold. This may include consideration by the Department as part of the forthcoming stakeholder process to develop the annual statewide GHG emission report required by ECL § 75-0105, or by the Council as part of its development of recommendations in the Scoping Plan. The statewide emission limits also encompass a large amount of cumulative emissions from small sources, suggesting the potential need to gather additional data.

Comment 48: The Commenter states that the estimation of the 1990 baseline is based on "mean estimates of emissions in 1990" and does not include confidence intervals. DEC should report uncertainty such as in the EPA national inventory. The commenter cites specific estimates in the EPA national inventory associated with a relatively large amount of uncertainty (nitrous oxide from soil management). (Commenter 17)

Response to Comment 48: DEC agrees that it is helpful to assess uncertainty, and acknowledges that there is inherent uncertainty in any estimate of statewide emissions from three decades ago. However, reporting confidence intervals is not a requirement of ECL § 75-0107 and would be less informative when applied to historical GHG emissions, which will always be associated with several sources of irreducible uncertainty. Finally, while the reporting of confidence intervals may be appropriate for purposes of a GHG emissions inventory, this rulemaking serves somewhat different purposes as required by the CLCPA and as explained in the RIS. That is, it

translates the 2030 and 2050 statewide emission limits established in the CLCPA into specific statewide tonnage volumes on a CO2e basis (GWP20), based on an estimate of 1990 statewide GHG emissions.

Comment 49: The Commenter cites Section 7(3) of the CLCPA and states that DEC must prioritize GHG emission reductions in disadvantaged communities. As such this rule should cite Section 7 in the "benefits and needs" section of the RIS and promote early action by "reporting all relevant temporal and locational emissions data at the community level." This regulation should also include a reporting framework that will allow tracking of emissions and limits at the community level. (Commenter 21)

Response to Comment 49: The Department agrees regarding the importance of prioritizing reductions of GHG emissions in disadvantaged communities, as required by the CLCPA. This rulemaking, however, does not itself require any specific GHG emission reductions at individual GHG emission sources. Instead, as described in the RIS, this rulemaking establishes the estimated 1990 emission baseline against which statewide GHG emissions must be reduced under the Climate Act. As required by the CLCPA, future actions by the Department and the State to reduce GHG emissions will prioritize reductions of GHGs in disadvantaged communities.

Comment 50: In addition to the tables providing 100-year GWP total emissions, there should be a table that shows the in-state only values using the 100-year GWP so these can be compared with other jurisdictions. (Commenter 1)

Comment 51: Commenters cite the value of lifecycle emissions accounting and request an estimate of such GHG emissions as associated with construction materials and recycling. (Commenter 27)

Response to Comment 50 and 51: The RIS is intended to support the public review of the regulation, but it is not a regulation itself. The RIS is also not intended or required to provide information regarding the design of other policies or programs. For the proposed regulation, the RIS is intended to explain how the statewide emission limit was derived, per the statutory requirements. ECL § 75-0107. DEC agrees that there are many other types of information that could be helpful in the design of policies and programs to address GHGs and co-pollutants, and to compare the CLCPA with other models. However, these policies and programs will be implemented separately as part of the State's overall implementation of the CLCPA, and the RIS provided for this regulation is not the appropriate source for this information.

Other Requests or Comments

Comment 52: Commenters stated that the CLCPA will be detrimental to the State economy and should be put on hold until a full fiscal analysis is completed or commented that such impacts were possible and that the current regulation should not be finalized until the regulations that are intended to meet these limits are released for public review. (Commenters 3, 23)

Response to Comment 52: The commenter's suggestion is inconsistent with the requirements of the CLCPA. The Department is required by law to promulgate this regulation before January 1, 2021. ECL § 75-0107. As described in the RIS, this regulation does not itself impose any compliance obligation on any entity. Finally, the Department is separately required by the Climate Act to promulgate regulations to ensure the achievement of the statewide GHG emission

limits. ECL § 75-0109. In proposing such regulations, the Department will follow the requirements of the State Administrative Procedure Act, as well as the additional requirements of ECL § 75-0109. Among other things, these provisions provide for public notice and comment and require consideration of any potential costs or fiscal impacts.

Comment 53: Several commenters suggested that DEC undertake actions that are beyond the scope of this rule or cited implications of the rule/law or policy needs beyond the rule, such as to support specific technologies or fuels and related industries, or suggested actions to be considered in the Scoping Plan. (Commenters 7, 8, 13, 15, 16, 18, 20, 22, 24, 25, 28)

Comment 54: Commenters requested amendments to the CLCPA including prohibitions on biodiesel and biofuels or an expectation that the proposed rule will form the basis of a GHG tax, carbon price, or cap-and-trade program that was not described in the CLCPA. (Commenters 24, 25)

Comment 55: The proposed rule will drive businesses out of the state and thereby cause emission leakage. (Commenter 8)

Response to Comments 53, 54, and 55: These comments are beyond the scope of this rulemaking. The regulation is limited to the establishment of a 1990 baseline and certain GHG emission limits, as required by the CLCPA. Separate from this rule, particular programs, policies, or other actions to support specific technologies may be considered by the Department, the State, or the Council as part of the ongoing implementation of the CLCPA. This rule does not itself impose any prohibitions or impose any type of GHG tax or carbon tax. Similarly, it does not establish or require a GHG emissions accounting method or approach that may be used by other State policies or attempt to anticipate what these policies will ultimately be. It also does

not estimate or anticipate leakage, although the CLCPA does include provisions addressing leakage. DEC notes that many jurisdictions maintain annual inventories of GHG emissions that are supplemented by policies and programs that do not directly relate to that inventory.

Comment 56: The proposed rule places an undue burden on organizations such as local governments who will now be required to track emissions using gross accounting. DEC should help local governments align statewide accounting with the types of protocols that they typically use for government and community emissions accounting.

Response to Comment 56: DEC disagrees that the approach to GHG emissions accounting in this rule must be adopted by municipal entities. This rule does not impose any compliance obligations on local governments or other entities and does not specific a particular accounting methodology that must be followed by municipalities. These entities already used protocols for GHG emissions accounting that vary from those used by national and state-level governments. However, DEC and other State agencies and authorities will likely continue to provide technical support to local governments through existing or new programs.

Comment 57: The public should have a way to report non-compliance. (Commenter 2)

Response to Comment 57: As described in the RIS and in this Assessment of Public Comments, this rule does not impose any compliance obligations on any entity. Therefore, there will not be direct violations or non-compliance under Part 496. While DEC is unsure what specific type of compliance is of interest to the comment, the Department notes that violations of the ECL or of the Department's implementing regulations can be reported following the "Report an Environmental Violation" instructions on https://www.dec.ny.gov/regulations/67751.html.

List of Commenters

#	Name, Organization
1	Roger Ciazza
2	David Stout
3	Sandra Meier, Environmental Energy Alliance of New York
4	Robert Howarth, Cornell University
5	John Rath, NY Geothermal Energy Organization
6	Linda Bunde, Islip Resource Recovery Agency
7	Eric Weltman, Food and Water Action
8	John Bartow, Empire State Forest Products Association
9	Michael Helme, NYers for Cool Refrigerant Management
10	Tara Vamos, NYers for Cool Refrigerant Management
11	Bill Novak, NY Geothermal Energy Organization
12	Kevin Schwab, CenterState Center for Economic Development
13	Charles Niebling, Lignetics Inc
14	Alli Lemieux, Wheelabrator Technologies
15	Brian Paganini, Quantum Biopower
16	Phil Vos, Energy Vision
17	Rebecca Spector, Earth Justice and undersigned
18	Same Wade, Coalition for Renewable Natural Gas
19	Barry Malmberg, National Council for Air and Stream Improvement, Inc
20	Richard Murphy, NY Assembly - Englebright and Quart

21 Raya Salter, NY Renews

22 Christina Starr, Environmental Investigation Agency and undersigned

23 Will Barclay, NY Assembly

24 Ray Albrecht , National Biodiesel Board

25 Robert Malmsheimer, SUNY Environmental Science and Forestry

26 Randy Rucinski, National Fuel Gas Distribution Corporation

27 Russell King, City of New York / Couch White

28 Samuel Nicolai, Cassella Waste Systems Inc

29 Erin Murphy, Environmental Defense Fund

30 Michael vanBrunt, Covanta

31 Abigail Turner Sztein, American Forest & Paper Association and American Wood Council

Supporting Documents

6 NYCRR Part 496, Statewide Greenhouse Gas Emission Limits

Table of Contents

Job Impact Statement

1. Nature of Impact:

The proposed rule does not itself impose any direct impacts on the State, but future actions by the Department and other State agencies to implement the requirements of the Climate Leadership and Community Protection Act will consider these impacts as necessary and appropriate. This includes as part of any Department rulemaking actions pursuant to the State Administrative Procedure Act.

2. Categories and Numbers Affected:

The proposed rule does not impose a compliance requirement on any entity, and therefore does not directly affect any jobs.

3. Regions of Adverse Impact:

The proposed rulemaking applies statewide. There are no regions of the state where jobs or employment opportunities are expected to be adversely impacted by this rule.

4. Minimizing Adverse Impact:

As detailed above, this rule is not expected to have a significant adverse impact on jobs and employment.

Rural Area Flexibility Analysis

1. Types and Estimated Numbers of Rural Areas:

The proposed rulemaking will apply statewide and there are no requirements in the proposed rule that would apply only to rural areas.

2. Reporting, Record Keeping and Other Compliance Requirements; and Professional Services:

There are no reporting, record keeping or other requirements in the proposed rulemaking therefore there is no specific need for entities to contract for professional services.

3. Costs:

The proposed rule does not impose a compliance requirement on any entity, and therefore does not directly impose any costs on any regulated entities.

4. Minimizing Adverse Impact:

The Department has considered the issues and determined that Part 496 will not have an adverse impact on rural areas.

5. Rural Area Participation:

The Department conducted pre-proposal, stakeholder outreach starting the date on which the CLCPA went into effect, or January 1, 2020, through May, 2020. This included two public webinars held on February 14 and 28, 2020 to discuss the scope and key considerations of this rulemaking.

Regulatory Flexibility Analysis for Small Businesses and Local Governments

1. Effect of Rule:

The New York State Department of Environmental Conservation is proposing to adopt statewide greenhouse gas emission limits per the requirements of the Climate Leadership and Community Protection Act.

2. Compliance Requirements:

The proposed rule does not impose compliance obligations on any entity.

3. Professional Services:

As there are no compliance obligations introduced by the proposed rule, there is no specific requirement or need for entities to contract for professional services in order to comply with the proposed rule.

4. Compliance Costs:

The proposed rule does not impose a compliance requirement on any entity, and therefore does not directly impose any costs on any regulated entities.

5. Economic and Technological Feasibility:

The proposed rule adopts a future, statewide limit on greenhouse gas emissions based on estimated statewide emissions levels in 1990 as required pursuant to the Climate Leadership and Community Protection Act.

6. Minimizing Adverse Impact:

The Department has determined that there are no adverse impacts from the proposed rule.

7. Small Business and Local Government Participation:

The Department conducted pre-proposal, stakeholder outreach starting the date on which the CLCPA went into effect, or January 1, 2020, through May, 2020. This included two public webinars held on February 14 and 28, 2020 to discuss the scope and key considerations of this rulemaking