Hawaii Greenhouse Gas (GHG) Emission Report for 2005, 2018, and 2019
Summary of Key Results

Statewide carbon dioxide equivalent (CO_2 Eq) emissions and sinks (GHG removals) were compiled for the following four (4) Intergovernmental Panel on Climate Change (IPCC) sectors:

(1) Energy - emissions from stationary combustion, transportation, waste incineration, and oil and natural gas systems;
(2) Industrial Processes and Product Use (IPPU) - emissions from cement production, electrical transmission and distribution, and substitution of ozone depleting substances (ODSs);
(3) Agriculture, Forestry, and Other Land Use (AFOLU) - emissions and sinks from agricultural activities, land use, changes in land use, and land management practices; and
(4) Waste - emissions from waste management and treatment activities such as landfills, composting, and wastewater treatment.

Per Act 234[1], Energy sector emissions from aircraft (domestic aviation and military aviation) were quantified and subtracted from the net emissions for comparison to Hawaii's CO_2 Eq emissions limit of equal to, or below, 1990 statewide GHG emissions by 2020 and beyond. Per Act 15 (net negative GHG goal by 2045)[2] and Act 238 (50% below 2005 GHG levels by 2030 goal)[3], aircraft emissions were added in the net emissions total for comparison to Hawaii's CO_2 Eq emission limits. Biogenic carbon dioxide (CO_2) and international bunker fuel CO_2 Eq emissions were excluded from the statewide GHG totals in accordance with IPCC guidelines.

As of 2019, with 13.59 million metric tons (MMT) of net CO_2 Eq emissions excluding aviation, the statewide GHG emission limit specified in Act 234 (at or below 1990 GHG levels)[1] of 15.38 MMT CO_2 Eq has been reached, and statewide GHG projections of 11.58 MMT, 9.38 MMT, and 5.36 MMT CO_2 Eq for 2020, 2030, and 2045, respectively, indicate Hawaii is on target to meet its statewide GHG emissions limit by 2020 and will continue to meet the limit after 2020. Act 15 (net negative GHG level by 2045 goal)[2] and Act 238 (50% below 2005 GHG levels by 2030 goal)[3] emission limits are not projected to be met in goal years 2030 and 2045. These findings will be reassessed and updated in the forthcoming emissions report for 2020 and 2021. Please see table on page 2 for key results.

Energy: Results from the report show that most of the emissions are from the Energy sector for all emission years. For 2019, the Energy sector's 19.44 MMT CO_2 Eq emissions represent approximately 88% of the total statewide emissions which are equal to 22.01 MMT CO_2 Eq.

IPPU: IPPU sector emissions for 2019 represent about 4% of statewide emissions but are seen to grow from 0.17 MMT CO_2 Eq in 1990 to 0.84 MMT CO_2 Eq in 2019. The growth rate in this sector is due to the way IPPC guidance considers ODS versus their substitutes. While IPPC guidance does not count the significant GHG emission reductions from the decline in use of ODSs associated with the Montreal Protocol, it does count the increase in GHG emissions from the associated growth in the use of their substitutes.

AFOLU: AFOLU (Sources) emissions for 2019 represent about 6% of the statewide GHG emissions. The AFOLU (Sinks) for 2019 offset about 12% of the statewide GHG emissions.

Waste: Waste sector emissions for 2019 represent about 2% of statewide emissions

[1] Act 234 (2007): achieve at or below Hawaii's 1990 GHG emissions by January 1, 2020 (excluding emissions from airplanes). Excludes aviation and international bunker fuel emissions and includes carbon sinks. International bunker fuel emissions are defined as marine and aviation travel originating in Hawaii and ending in a foreign country.

[2] Act 15 (2018): Established a statewide carbon net-negative goal by 2045.

[3] Act 238 (2022): Established a goal for the level of statewide GHG emissions to be at least 50 percent below 2005 levels by the year 2030 (including emissions from aviation).

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Hawaii GHG Emissions and Sinks (MMT CO_2 Eq) by Sector for 1990, 2005, 2007, 2010, 2015, 2016, 2017, 2018, 2019, 2020, 2025, 2030, 2035, 2040, and 2045; Reproduced from Tables ES-1 and ES-2 (Projections*) of the Report.															
Sector/Category	**1990**	**2005**	**2007**	**2010**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Energy**	20.26	22.71	24.35	19.38	18.50	18.52	18.97	19.23	19.44	14.78	16.03	15.30	14.59	12.85	12.16
IPPU	0.17	0.53	0.58	0.71	0.83	0.83	0.83	0.83	0.84	0.74	0.77	0.62	0.41	0.26	0.25
AFOLU (Sources)	1.55	1.22	1.29	1.24	1.28	1.29	1.28	1.48	1.31	1.30	1.22	1.14	1.08	1.03	0.98
AFOLU (Sinks)	-2.43	-2.56	-2.57	-2.58	-2.72	-2.69	-2.68	-2.59	-2.59	-2.54	-2.50	-2.46	-2.49	-2.55	-2.62
Waste	0.93	0.91	0.82	0.55	0.47	0.43	0.40	0.38	0.41	0.42	0.43	0.43	0.45	0.47	0.49
Total Emissions (Excluding Sinks)	**22.91**	**25.37**	**27.04**	**21.88**	**21.08**	**21.07**	**21.48**	**21.92**	**22.01**	**17.24**	**18.44**	**17.49**	**16.52**	**14.61**	**13.88**
Net Emissions (Including Sinks)***	**20.48**	**22.80**	**24.47**	**19.29**	**18.37**	**18.38**	**18.80**	**19.33**	**19.42**	**14.69**	**15.94**	**15.03**	**14.03**	**12.06**	**11.25**
Aviation (domestic & military)	5.10	7.14	5.65	4.64	5.10	5.18	5.47	5.64	5.83	3.11	5.47	5.65	5.75	5.82	5.89
Net Emissions (Incl. Sinks, Excluding Aviation) ******	**15.38**	**15.66**	**18.81**	**14.65**	**13.27**	**13.20**	**13.33**	**13.69**	**13.59**	**11.58**	**10.46**	**9.38**	**8.28**	**6.24**	**5.36**

* Projected Emissions are underlined.

** Emissions from International Bunker Fuels are not included in the totals, as per IPCC (2006) guidelines.

*** Net Emissions (Including Sinks) include sinks and aviation per Act 15 (2018). Updated statewide limit is the 2005 GHG emissions level. Emissions beyond 1990 show Hawaii's progress relative to the statewide goal of not exceeding the 1990 GHG level.

**** Domestic aviation and military emissions, which are reported under the Energy Sector, are excluded from Hawaii's GHG emission reduction goal established in Act 234 (2007).

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The report provides new 2005, 2018, and 2019 GHG estimates, updates emission estimates for 1990, 2007, 2010, 2015, 2016, and 2017 from those provided by ICF in the 2017 annual report as shown in the table on page 4, updates prior 2020, 2025, and 2030 projections, and provides new projections for 2035, 2040, and 2045[4]. The change to the 1990 net statewide GHG emissions (including sinks and excluding aviation) also updates the 1990 statewide GHG emissions limit. As found in ICF's Hawaii Greenhouse Gas Emissions Report for 2005, 2018, and 2019, Appendix B, "Updates to the Historical Emission Estimates Presented in the 2017 Inventory Report," changes can be attributed due to:

(1) In the Energy Sector, the Domestic and Military Aviation and Aviation International Bunker Fuels category was updated to reflect revised fuel consumption estimates;
(2) In the Waste sector, updates to incorporate CH_4 emissions from industrial landfills and application of a back-casting method based on GHGRP-reported data for landfills;
(3) In the Waste sector, updates to incorporate new sources of Hawaii-specific data (e.g., tons of waste composted);
(4) In the AFOLU sector, the Nitrogen excretion (Nex) rates and weighted Methane Conversion Factors (MCFs) were updated to incorporate Hawaii specific data for agricultural soil carbon;
(5) In the AFOLU sector, updates to incorporate top-down estimates for cattle population data for Enteric Fermentation and Manure Management;
(6) In the AFOLU sector, updates to historical urea fertilizer consumption for Urea Application; and
(7) Updates to the U.S. Inventory also resulted in some minor updates compared to the 2017 report for the sectors that utilize data from the U.S. Inventory, such as Agricultural Soil Carbon, Substitution of Ozone Depleting Substances (ODS), and Electric Transmission and Distribution.

[4] Prior 2020, 2025, and 2030 projections, prepared by ICF and the University of Hawaii Economic Research Organization (UHERO) for the Hawaii Department of Health, "Hawaii Greenhouse Gas Emissions Report for 2017", April 2021; https://health.hawaii.gov/cab/files/2021/04/2017-Inventory_Final-Report_April-2021.pdf. Updates to prior projections and new 2035, 2040, and 2045 projections are provided in the subject annual report.

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Sector	Energy	Energy (Excluding Aviation)	Energy (Aviation)	IPPU	AFOLU (Sources)	AFOLU (Sinks) [a]	Waste	Total Emis. (Exclud. Sinks)	Net Emis. (Includ. Sinks)	Net Emis. (Includ. Sinks, Exclud. Aviation)
1990										
2017 Report	19.30	15.19	4.11	0.17	1.60	(2.44)	0.75	21.83	19.39	15.28
2019 Report	20.26	15.16	5.10	0.17	1.55	(2.43)	0.93	22.91	20.48	15.38
Difference	0.96	(0.03)	0.99	(+)	(0.05)	0.01	0.18	1.08	1.09	0.10
Percent Change	5.0%	-0.2%	24.1%	-0.1%	-3.4%	-0.3%	23.8%	4.9%	5.6%	0.7%
2007										
2017 Report	23.12	18.66	4.46	0.59	1.35	(2.58)	1.05	26.11	23.53	19.07
2019 Report	24.35	18.70	5.65	0.58	1.29	(2.57)	0.82	27.04	24.47	18.81
Difference	1.23	0.03	1.19	(+)	(0.06)	0.01	(0.23)	0.93	0.94	(0.26)
Percent Change	5.3%	0.2%	26.8%	-0.4%	-4.7%	-0.5%	-22.3%	3.5%	4.0%	-1.3%
2010										
2017 Report	18.15	14.75	3.40	0.71	1.28	(2.62)	0.95	21.10	18.48	15.08
2019 Report	19.38	14.74	4.64	0.71	1.24	(2.58)	0.55	21.88	19.29	14.65
Difference	1.23	(0.01)	1.24	(+)	(0.05)	0.03	(0.41)	0.78	0.82	(0.42)
Percent Change	6.8%	-0.1%	36.4%	0.4%	-3.5%	-1.2%	-42.6%	3.7%	4.4%	-2.8%
2015										
2017 Report	17.58	13.37	4.20	0.83	1.30	(2.73)	0.84	20.55	17.81	13.61
2019 Report	18.50	13.40	5.10	0.83	1.28	(2.72)	0.47	21.08	18.37	13.27
Difference	0.92	0.03	0.89	+	(0.02)	0.01	(0.37)	0.54	0.55	(0.34)
Percent Change	5.3%	0.2%	21.3%	0.3%	-1.4%	-0.5%	-44.2%	2.6%	3.1%	-2.5%
2016										
2017 Report	17.66	13.44	4.22	0.83	1.29	(2.71)	0.78	20.56	17.86	13.64
2019 Report	18.52	13.34	5.18	0.83	1.29	(2.69)	0.43	21.07	18.37	13.19
Difference	0.86	(0.10)	0.96	(0.01)	(+)	0.01	(0.35)	0.50	0.52	(0.44)
Percent Change	4.9%	-0.7%	22.7%	-0.8%	-0.1%	-0.5%	-44.8%	2.4%	2.9%	-3.2%
2017										
2017 Report	17.64	13.54	4.10	0.83	1.26	(2.69)	0.82	20.56	17.87	13.77
2019 Report	18.97	13.51	5.47	0.82	1.28	(2.68)	0.40	21.47	18.79	13.33
Difference	1.33	(0.03)	1.36	(0.01)	0.02	0.01	(0.43)	0.92	0.92	(0.44)
Percent Change	7.6%	-0.2%	33.2%	-1.7%	1.8%	-0.3%	-51.9%	4.5%	5.2%	-3.2%

+ Does not exceed 0.005 MMT CO_2 Eq or 0.05%. [a] positive % change in this column indicates an increase in carbon sinks.