Dr. Jeremy A. Pare

Education:
BS; Univ. of New England
MSEL; Vermont Law
LPD; Northeastern
Postdoc; Harvard JFK School

Academic Experience:
Duke University, MEM program
Thomas College, MBA program
UNE; ENV Science Lecturer

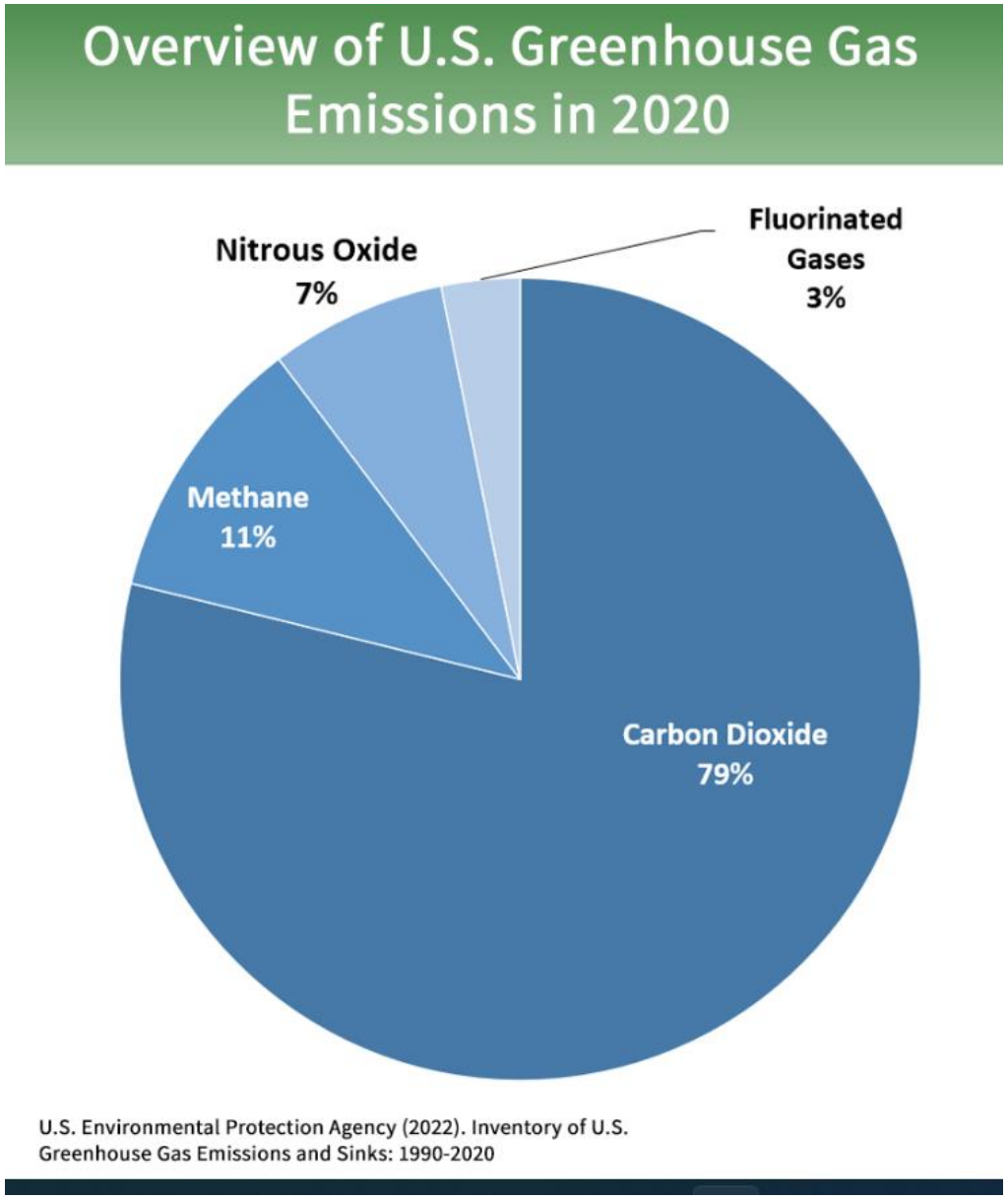
Corporate Experience:
Maine General Health
Lonza Biologics
Hodgdon Yachts
General Dynamics
Hostess Baked Goods
Consultant with MEP

Duke | NICHOLAS SCHOOL of the ENVIRONMENT
Business & Environment

Carbon 101

Greenhouse Gas emissions (GHGs) are gases that trap heat in the atmosphere.

- The term “Carbon Emission” is often use in the place of GHGs as carbon dioxide is the primary greenhouse gas emitted through human activities.



Carbon Management

Firms are being driven to operationalize carbon management for:

- Environmental reasons to identify emission hotspots and potential reduction strategies and
- Business and social reasons including transparency, identify areas of inefficiency, identify and mitigate risks, participate in environmental markets and voluntary programs, tax prep., and marketing

Carbon Management differs from a business's ongoing energy management efforts as managing energy use typically results in reduced energy usage and savings on an electricity bill while carbon management does not result in this direct savings to the bottom line.

If you participate in the global market however, elements of your value chain may be subject to carbon taxes or an emissions trading scheme.

Carbon Accounting

Management of carbon typically begins with a GHG inventory. This inventory is a list of emission sources from corporate activities quantified using standardized methods.

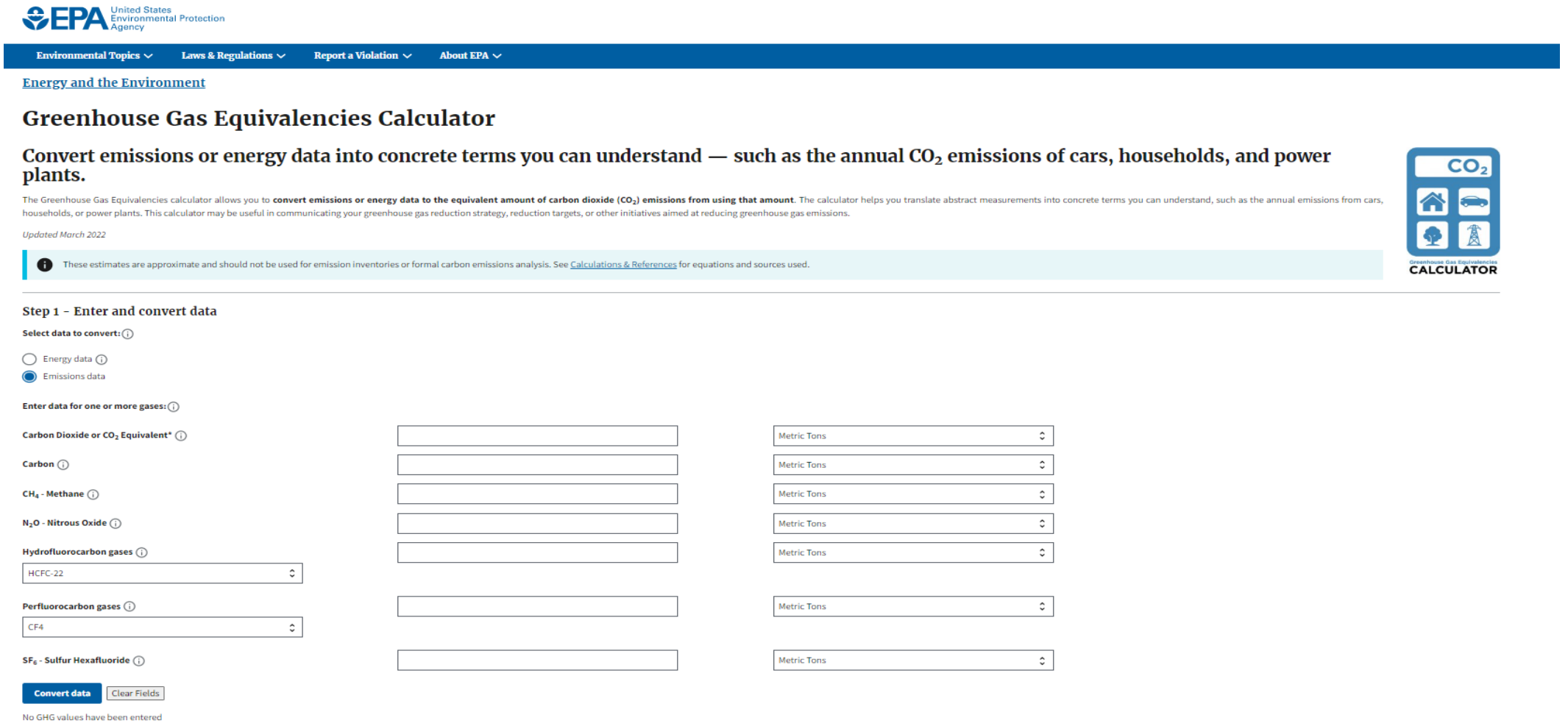
Emission sources can be broken down into Scope 1, 2 and 3 emissions.

- Scope 1 - direct GHG emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).
- Scope 2 - indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.
- Scope 3 - the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly impacts in its value chain.

Accounting protocols are growing in number but major ones currently in use include:

- GHG Protocol from WRI and the WBCSD
- ICLEI Protocol
- B Lab Assessment

Carbon Equivalencies



EPA United States Environmental Protection Agency

Environmental Topics | Laws & Regulations | Report a Violation | About EPA

Energy and the Environment

Greenhouse Gas Equivalencies Calculator

Convert emissions or energy data into concrete terms you can understand — such as the annual CO_2 emissions of cars, households, and power plants.

The Greenhouse Gas Equivalencies calculator allows you to **convert emissions or energy data to the equivalent amount of carbon dioxide (CO_2) emissions from using that amount**. The calculator helps you translate abstract measurements into concrete terms you can understand, such as the annual emissions from cars, households, or power plants. This calculator may be useful in communicating your greenhouse gas reduction strategy, reduction targets, or other initiatives aimed at reducing greenhouse gas emissions.

Updated March 2022

These estimates are approximate and should not be used for emission inventories or formal carbon emissions analysis. See Calculations & References for equations and sources used.

CO_2 Greenhouse Gas Equivalencies CALCULATOR

Step 1 – Enter and convert data

Select data to convert:

- ○ Energy data
- ◉ Emissions data

Enter data for one or more gases:

Carbon Dioxide or CO_2 Equivalent*		Metric Tons
Carbon		Metric Tons
CH_4 - Methane		Metric Tons
N_2O - Nitrous Oxide		Metric Tons
Hydrofluorocarbon gases: HCFC-22		Metric Tons
Perfluorocarbon gases: CF4		Metric Tons
SF_6 - Sulfur Hexafluoride		Metric Tons

Convert data | Clear Fields

No GHG values have been entered

Emission Factors (cont'd)

Emission Factors for Greenhouse Gas Inventories

Last Modified: 1 April 2022

Red text indicates an update from the 2021 version of this document.

Typically, greenhouse gas emissions are reported in units of carbon dioxide equivalent (CO_2e). Gases are converted to CO_2e by multiplying by their global warming potential (GWP). The emission factors listed in this document have not been converted to CO_2e. To do so, multiply the emissions by the corresponding GWP listed in the table below.

Gas	100-Year GWP
CH_4	25
N_2O	298

Source: Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (AR4), 2007. See the source note to Table 11 for further explanation.

Table 1 **Stationary Combustion**

Fuel Type	Heat Content (HHV) mmBtu per short ton	CO_2 Factor kg CO_2 per mmBtu	CH_4 Factor g CH_4 per mmBtu	N_2O Factor g N_2O per mmBtu	CO_2 Factor kg CO_2 per short ton	CH_4 Factor g CH_4 per short ton	N_2O Factor g N_2O per short ton
Coal and Coke							
Anthracite Coal	25.09	103.69	11	1.6	2,602	276	40
Bituminous Coal	24.93	93.28	11	1.6	2,325	274	40
Sub-bituminous Coal	17.25	97.17	11	1.6	1,676	190	28
Lignite Coal	14.21	97.72	11	1.6	1,389	156	23
Mixed (Commercial Sector)	21.39	94.27	11	1.6	2,016	235	34
Mixed (Electric Power Sector)	19.73	95.52	11	1.6	1,885	217	32
Mixed (Industrial Coking)	26.28	93.90	11	1.6	2,468	289	42
Mixed (Industrial Sector)	22.35	94.67	11	1.6	2,116	246	36
Coal Coke	24.80	113.67	11	1.6	2,819	273	40
Other Fuels - Solid							
Municipal Solid Waste	9.95	90.70	32	4.2	902	318	42
Petroleum Coke (Solid)	30.00	102.41	32	4.2	3,072	960	126
Plastics	38.00	75.00	32	4.2	2,850	1,216	160
Tires	28.00	85.97	32	4.2	2,407	896	118
Biomass Fuels - Solid							

The Carbon Legal Environment

- 1990 – Electric power firms begin reporting under CAA rules
- 2007 – GHGRP Passed by Congress with reporting beginning to EPA in 2010/2011
- 2020 - Omnibus package includes clean energy tax incentives and directs EPA to phase down HFC consumption over 15 years
- 2022 – SEC Proposal on Climate Related Disclosures as well as new Climate and ESG Taskforce for enforcement
- 2022 – SCOTUS embraces “major questions doctrine” and finds EPA exceeded congressional authority by pushing utilities to make system-wide moves away from coal power generation under the CAA

Duke | NICHOLAS SCHOOL of the ENVIRONMENT
Business & Environment

Duke and Your ESG/Carbon Strategy!

- Duke is seeking firms to participate in sustainable business strategy classes.
- Courses provide master's level students to firms in developing and/or enhancing strategy efforts related to ESG including carbon mgt.
- Students have a global perspective, experience in the field, and work as a small team to provide valuable strategy recommendations.
- Currently working with Conagra, Disney, Indeed.com, SJF Ventures, and Wolfspeed among others.
- Jeremy.pare@duke.edu to contact our team.