# Global Warming & Your Carbon Footprint

http://chemconnections.org/Global Warming/

The United Nations' Nobel Prize winning International Panel on Climate Change (IPCC: http://www.ipcc.ch/) of more than 1,000 scientists have concluded that "Human influence on the climate system is clear, and recent anthropogenic (man made) emissions of greenhouse gases are the highest in history, The atmospheric concentration of key greenhouse gases — carbon dioxide, methane, and nitrous oxide — is unprecedented in at least the last 800,000 years, and our fossil-fuel driven economies and (mankind's) ever-increasing population are to blame."

The Global Climate Change writing assignment, which relates to this conclusive statement, is divided into three portions. The first addresses the science of a major part of the root causes of global warming and climate change, which is carbon, human behavior, and the historically rapid increase in greenhouse gases particularly carbon dioxide ($CO_2$). The second portion is how you personally relate to and contribute to putting carbon into our environment, using a UC Berkeley "Cool Climate" carbon calculator to assess your impact on global warming and our climate. The carbon calculator estimates how many equivalent tons of carbon dioxide our personal behavior and life choices contribute each year. Learning of your personal carbon footprint, you will identify what you can do to improve it. If improvements are not made, life on earth faces potentially catastrophic environmental consequences. The third portion is evaluating other students' writing samples and then evaluating your own.

In Parts I & II, you are to individually write and submit on-line an un-plagiarized essay of ~500 words incorporating responses to 20 questions into a few cohesively written paragraphs using the provided on-line resources relating to the science of global warming & climate change as your references. In Part III, you will evaluate three of your classmates written submissions, and finally evaluate your own.

The Web reading and informational references include U.S. and Australian governmental sites and interactive on-line surveys, IPCC & Woods Hole Marine Biological Research Powerpoint presentations, a UC Berkeley Carbon Calculator, and recent articles from the *New York Times* newspaper, The *Economist* news magazine, and *Science*, the journal of the American Association for the Advancement of Science (AAAS).

***OPTIONAL ARC Group**:* You have an option to self organize an *Academic Reading Circle* (ARC) help group to share, interpret and understand the information in the reading. If you elect to form a group, then, on the Lab check-in roster, identify up to five group members in total & provide an unused designation next to your names: *M1, or M2, or M3, or M4 or W1, or W2, or W3, or W4*. Dr. R. will set up your groups' private wiki page and include e-mail links to your other ARC-group members on it. Log-in will be from your ChemWiki / Libretext account (http://chemwiki.ucdavis.edu; http://chem.libretexts.org/), and the Chem 106 Vocabulary III (private) page, where you will find the link to a working space built exclusively for your Group should you choose to organize one.

### *Consider:*

*What might be the long term impact on the environment of any constructive change in your carbon footprint (over the next 50 years)? ....if the entire DVC population of students, staff, & faculty (>25,000 people) were to implement them? ....if the entire state of California (>30 million people) were to follow your example? .....if the entire U.S. (>300 million people) followed? .....if the world (>7 billion people) all joined in?*

READING links: (resources ➔interpretation ➔ application)
Journals, Magazines, Newspapers, Presentations

A) Plagiarism
URL: https://honorcouncil.georgetown.edu/whatisplagiarism

B) Science of global warming:

1. Basics of the Carbon Cycle & the Greenhouse Effect - National Oceanic & Atmospheric Administration (NOAA): Global Greenhouse Gas Reference
URL: http://www.esrl.noaa.gov/gmd/ccgg/basics.html
2. History of atmospheric carbon dioxide from 800,000 years ago until January, 2014. - National Oceanic & Atmospheric Administration (NOAA): Global Greenhouse Gas Reference
URL: http://www.esrl.noaa.gov/gmd/ccgg/trends/history.html
3. Meeting the Climate-Change Challenge: Powerpoint Presentation - SES Distinguished Scientist Seminar Marine Biological Laboratory Woods Hole
URL: http://chemconnections.org/Global%20Warming/Climate-Chg-06.ed-JPL.pdf
4. Mitigation of Climate Change: IPCC Powerpoint Presentation - Mitigating Global Warming
URL: http://chemconnections.org/Global%20Warming/IPCC_WGIII_AR5_2014.Presentation.pdf
5. Why scientists are (almost) certain that climate change is man-made - The Economist, Nov 2nd 2014
URL:
http://chemconnections.org/Global%20Warming/The%20Economist_%20Why%20scientists%20are%20almost%20certain%20that%20climate%20change%20is%20man-made%20_%20The%20Economist.pdf
6. The science of climate change - The Economist, Nov 28th 2015
URL: http://chemconnections.org/Global%20Warming/Supermodels%20_%20The%20Economist.pdf
7. Three possible future paths for annual global greenhouse gas - Science Magazine: Nov. 2016
URL: http://chemconnections.org/Global%20Warming/After%20Paris-Science-1018.2016.full.pdf
8. Short Answers to Hard Questions About Climate Change - New York Times, 2016
URL:
http://chemconnections.org/Global%20Warming/Short%20Answers%20to%20Hard%20Questions%20About%20Climate%20Change%20-%20The%20New%20York%20Times.pdf
9. A heated mirror for future climate - Science Magazine: April 2016
URL: http://chemconnections.org/Global%20Warming/Climate%20Change-future-Science151.2016.full.pdf
10. Scientists Warn of Perilous Climate Shift Within Decades, Not Centuries - New York Times, March 22, 2016
URL:
http://chemconnections.org/Global%20Warming/Scientists%20Warn%20of%20Perilous%20Climate%20Shift%20Within%20Decades%2C%20Not%20Centuries%20-%20The%20New%20York%20Times.pdf
11. Failure to address global warming will cost many lives - The Economist, Dec 10th 2015
URL:
http://chemconnections.org/Global%20Warming/Climate%20change_%20Failure%20to%20address%20global%20warming%20will%20cost%20many%20lives%20_%20The%20Economist.pdf

12. Oceans and climate science - The rise in sea levels may be accelerating The Economist, Jan 17th 2015
URL:
http://chemconnections.org/Global%20Warming/Higher%20water%20mark%20_%20The%20Economist.pdf
13. Rising Sea Levels May Disrupt Lives of Millions - New York Times, March 14, 2016
URL:
http://chemconnections.org/Global%20Warming/Rising%20Sea%20Levels%20May%20Disrupt%20Lives%20of%20Millions%2C%20Study%20Says%20-%20The%20New%20York%20Times.pdf

## Guiding Questions
## PART I:

1. What is the greenhouse effect?

2. What are the 4 most important greenhouse gases?

3. How can relatively small concentrations of greenhouse gases have such a large impact on global surface temperatures?

4. Not all greenhouse gases contain a carbon atom. Why has carbon been focused on as the leading global warming concern?

5. How much $CO_2$ is presently in the atmosphere?

6. How do we know $CO_2$ in the atmosphere is increasing?

7. How has the amount of $CO_2$ in the atmosphere changed over time in the last 200 years?..... over the past hundreds of thousands of years?

8. How do we know that humans are responsible for the sudden increase in $CO_2$?

9. What is the carbon cycle?

10. Why is burning fossil fuels the main focus of global climate concerns?

11. What are the possible alternative energy resources that can replace fossil fuels, and why is solar energy perhaps the most important among them?

12. How does $CO_2$ relate to: 1) the increase in ocean acidity, 2) to acid-base equilibrium, and 3) to what would happen if the buffering effects in the oceans were to stop?

13. What are the overall concerns if the carbon cycle's $CO_2$ equilibrium level is not re-set to a lower concentration level?

## PART II:

C.) **Individually** complete the following CoolClmate calculator's survey, refer to your respective personal and/or household levels relating to the following four areas and then answer the following seven questions.

http://coolclimate.berkeley.edu/calculator


14. What is the carbon footprint in tons of $CO_2$ per year for an average household in the U.S.?
15. What is your personal and/or household carbon footprint in tons of $CO_2$ per year?

## Taking action to improve your carbon footprint:


What can you do to improve your carbon footprint in relation to

16. Travel?
17. Housing?
18. Food & Diet?
19. Shopping for Goods & Services?

20. What can you do to bring attention to and improve the awareness of carbon & global warming locally?, … in your home?, ...on the DVC campus?, in your community?

Incorporate the answers to the 20 questions into a clearly written, grammatically correct essay, which is free of spelling errors, that is organized with a minimum of 3 paragraphs: an introductory paragraph defining global warming, a main paragraph describing the role that carbon and $CO_2$ play in global warming, and a closing paragraph that provides your role in contributing to and mitigating global warming.

There can be more than 3 paragraphs. The essay is to address all of the 20 guiding questions. The essay's word count must be in the range of 250-500 words. If any of the essay is plagiarized, it will result in a failing grade.

The evaluation segment, which follows your essay submission, has three student writing samples that will be provided to you to appraise. They vary in quality. You will be provided a set of questions which are to serve as a rubrik and guide for you to consider while reading and evaluating the samples then providing a grade for each. After completing the three evaluations, you will apply the same rubric to your essay.

*Dr. R. will provide instructions for submitting your essay on-line and for the PART III evaluations that follow. Consult the course calendar for due dates.*

## PART III:

*After submitting your paragraphs, Dr. R. will e-mail you instructions on evaluating your fellow Chem 106 students' written work and your self-evaluation.*