4-19-2023

Offsets and the Path to Carbon Neutrality in Higher Education and Study Abroad

Paul Sylvester
West Chester University of Pennsylvania, psylvester@wcupa.edu

Michael A. Di Giovine
West Chester University of Pennsylvania, mdigiovine@wcupa.edu

Bradley Flamm
West Chester University of Pennsylvania, BFLAMM@wcupa.edu

Offsets and the Path to Carbon Neutrality in Higher Education and Study Abroad

PROFESSOR PAUL SYLVESTER, *EARLY AND MIDDLE GRADES EDUCATION*

AND **PROFESSOR MICHAEL DI GIOVINE,** *ANTHROPOLOGY*

IN CONVERSATION WITH **BRADLEY FLAMM,** *OFFICE OF SUSTAINABILITY*

WCU SUSTAINABILITY RESEARCH & PRACTICE SEMINAR:

APRIL 19, 2023

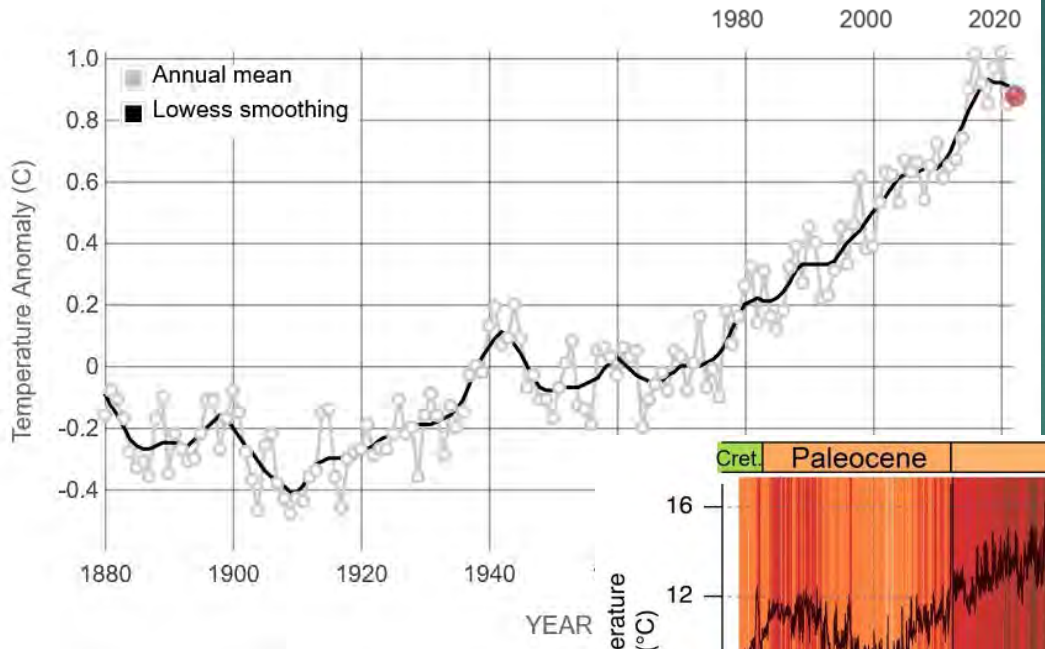
Our agenda

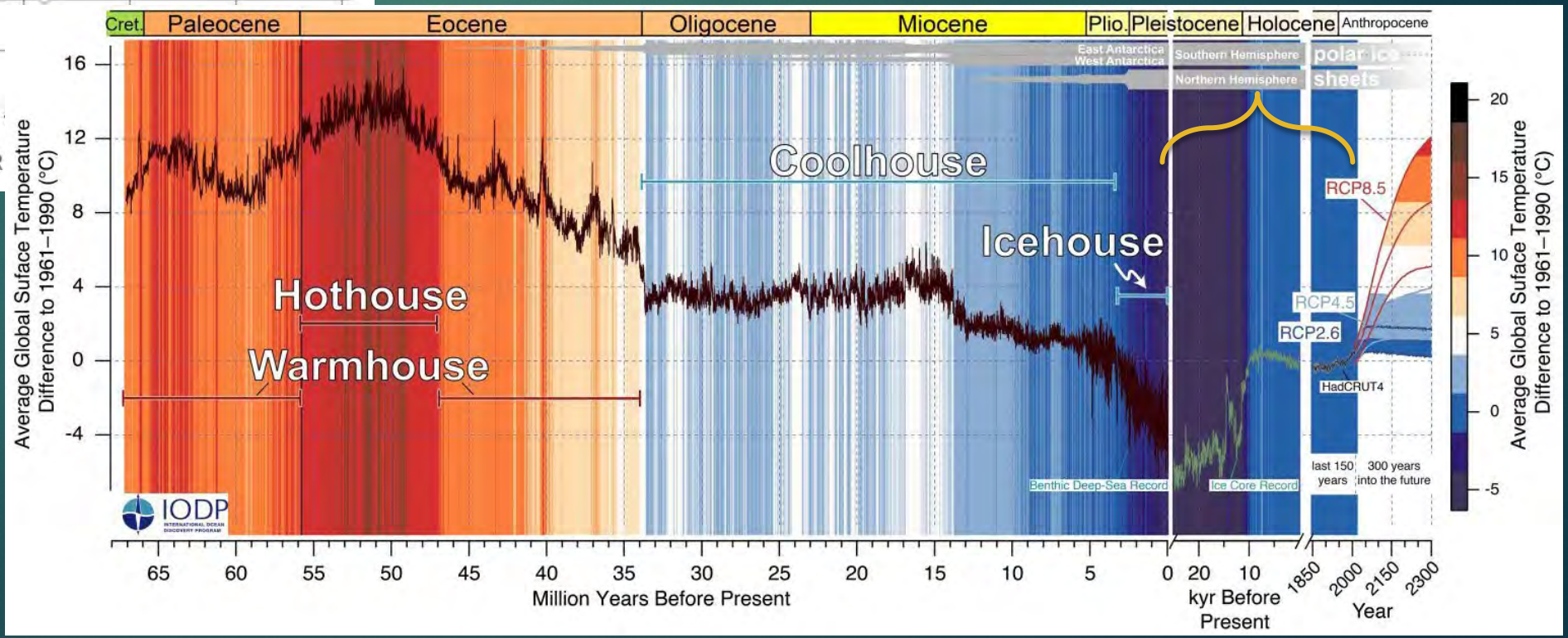
- Climate change, carbon emissions, & WCU
- Carbon offsets
- Sustainability, carbon neutrality, & study abroad

Homo sapiens

GLOBAL LAND-OCEAN TEMPERATURE INDEX

Data source: NASA's Goddard Institute for Space Studies (GISS). Credit: NASA/GISS





What we might expect

- … **final warning on 1.5°C**… **catastrophic**… **Code Red**… **alarming**… **oil profits or a livable future**… **unprecedented**… **rapid decline**… **dangerous tipping points**… **pervasive and irreversible**… **severe impacts**…

- Every increment of global warming will intensify **multiple and concurrent hazards**.
- Climatic and non-climatic risks will increasingly interact, creating **compound and cascading risks** that are more complex and difficult to manage.

Language from IPCC reports, 1992 to 2023

WCU actions

1971: **Gordon Natural Area** protect

2001: Formation of WCU's **Environmental Council**

2005: First **geo-exchange heating and cooling system** installed

2007: "Environmental awareness" added to WCU *Plan for Excellence* **strategic plan**

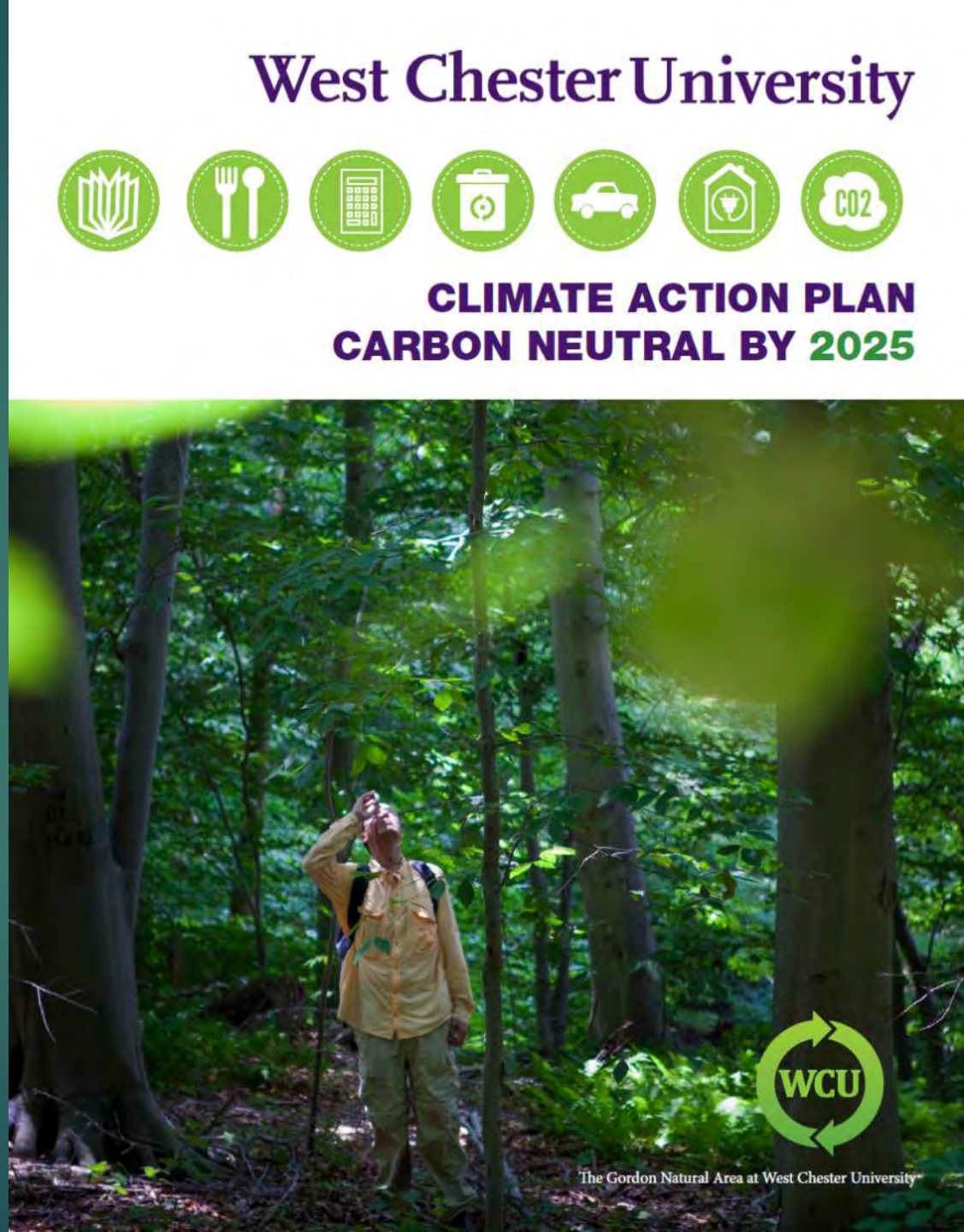
2008: **North campus district geo-exchange** heating and cooling system

2010: WCU signs the **American College and University Presidents Climate Commitment**

2013: **Climate Action Plan: Carbon Neutral by 2025**

2014: Decommissioning of **coal-fired boiler plant**

2019: **Demolition** of WCU's coal-fired boiler plant



Scopes of emissions

Scope 1

On campus combustion, aka *Direct Emissions*

- Natural Gas and Heating Oil
- Gasoline and Diesel
- Refrigerants and other chemicals

Scope 2

Purchased electricity, aka *Indirect Emissions*

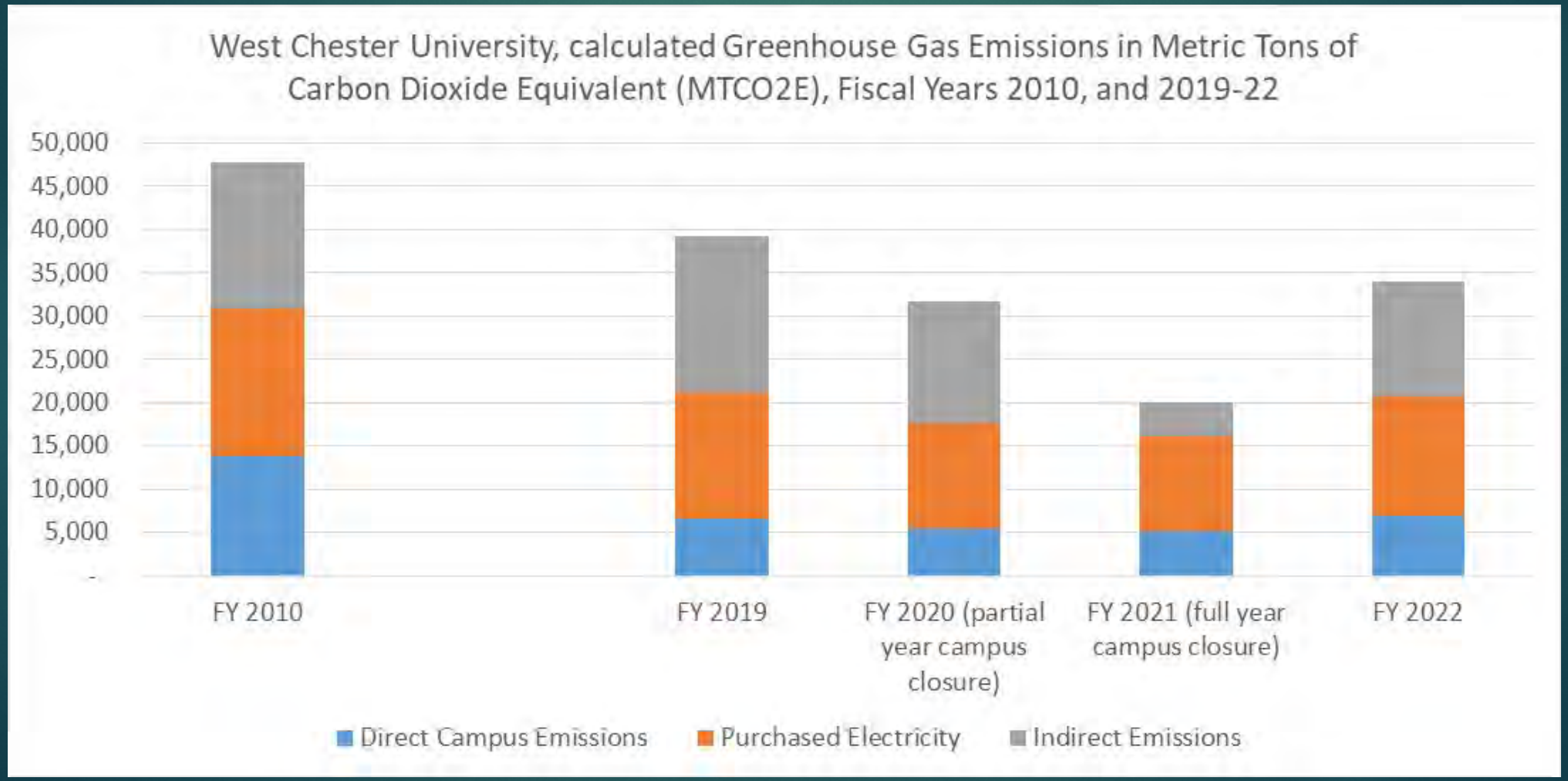
- PECO-delivered electricity
- Renewable Energy Credits (RECs)
- On campus electricity generation

Scope 3

All other indirect emissions

- Commuting
- Business Travel
- Study Abroad Travel
- Solid Waste and Waste Water
- Food

Good progress: 29%, 38%



But we’re not on track to carbon neutrality by 2025…

- … nor even 2050

Updated Climate and Sustainability Action Plan

- New carbon neutrality targets by Scope
  - **Scope 1:** On campus fossil fuel combustion → 2035
  - **Scope 2:** Purchased electricity → 2025
  - **Scope 3:** Indirect emissions → 2050 or later
- Other sustainability strategies in seven topic areas

Our agenda

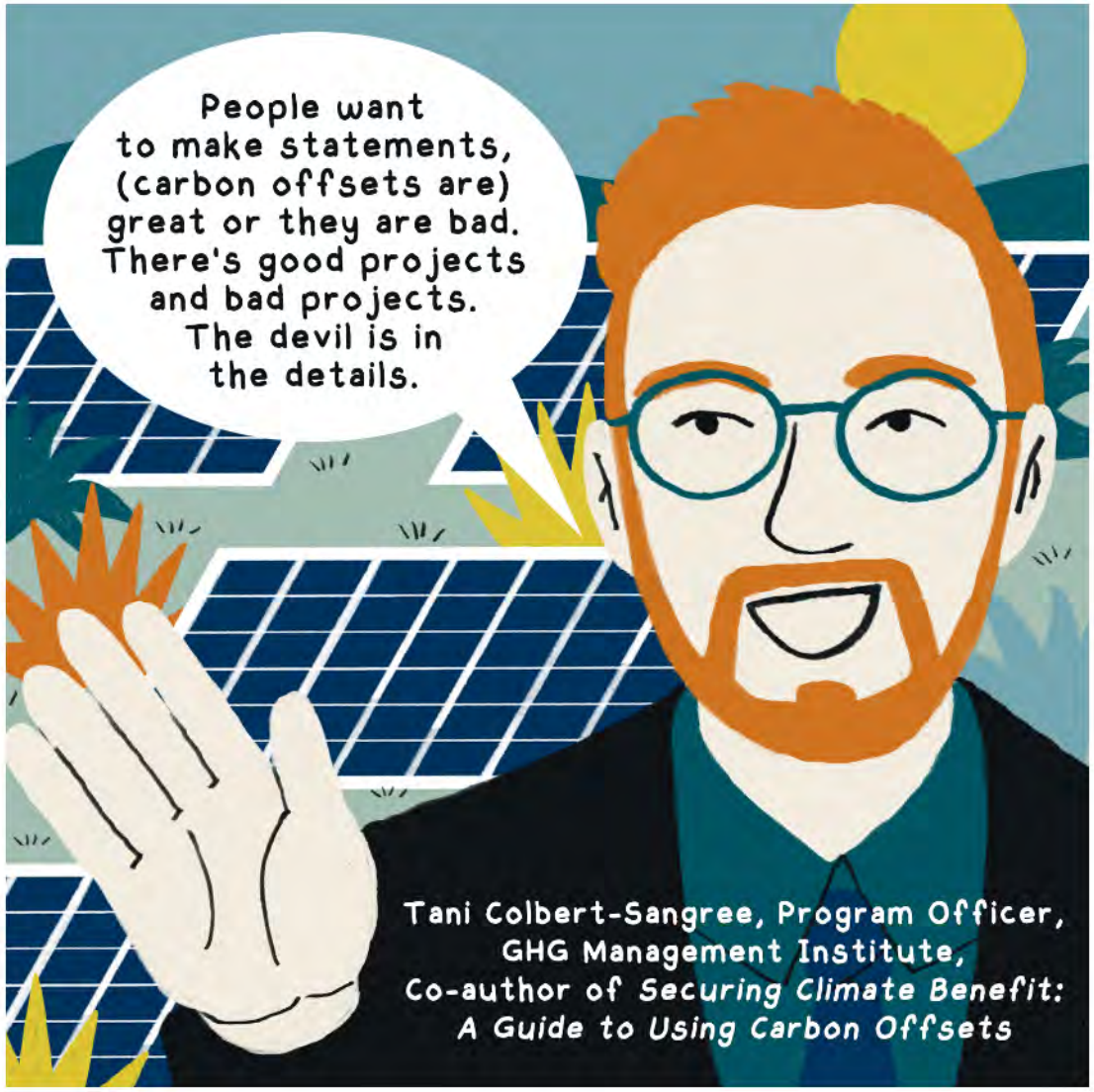
- Climate change, carbon emissions, & WCU
- Carbon offsets
- Sustainability, carbon neutrality, & study abroad

What is carbon offsetting?

A system of paying a fee that represents the cancellation of the impact of "emissions by investing in projects that reduce or store carbon – forest preservation and tree planting are among them, but carbon credits are also awarded for projects that reduce fossil fuels in other ways, such as windfarms, solar cookstoves, or better farming methods."

Fiona Harvey, The Guardian, 4 May 2021

(https://www.theguardian.com/environment/2021/may/04/what-is-carbon-offsetting-and-how-does-it-work)



Vreni, 2020, *Are Your Carbon Offsets Doing Anything?*
https://thenib.com/are-your-carbon-offsets-doing-anything/

Quality programs will meet the following criteria:

ADDITIONALITY

PROJECT WOULDN'T HAVE OCCURRED WITHOUT FUNDING FROM OFFSETS

RISKS

DOESN'T NEGATIVELY IMPACT THE SOCIETY OR ENVIRONMENT

EXCLUSIVE

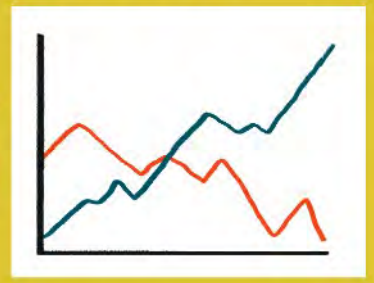
MULTIPLE PROGRAMS AREN'T SELLING OFFSETS FOR THE SAME PROJECT OR AREA

LONG TERM

CARBON REDUCTIONS WILL BE STABLE OR PERMANENT

QUANTIFICATION

CARBON REDUCTIONS ARE MONITORED AND INDEPENDENTLY VERIFIED



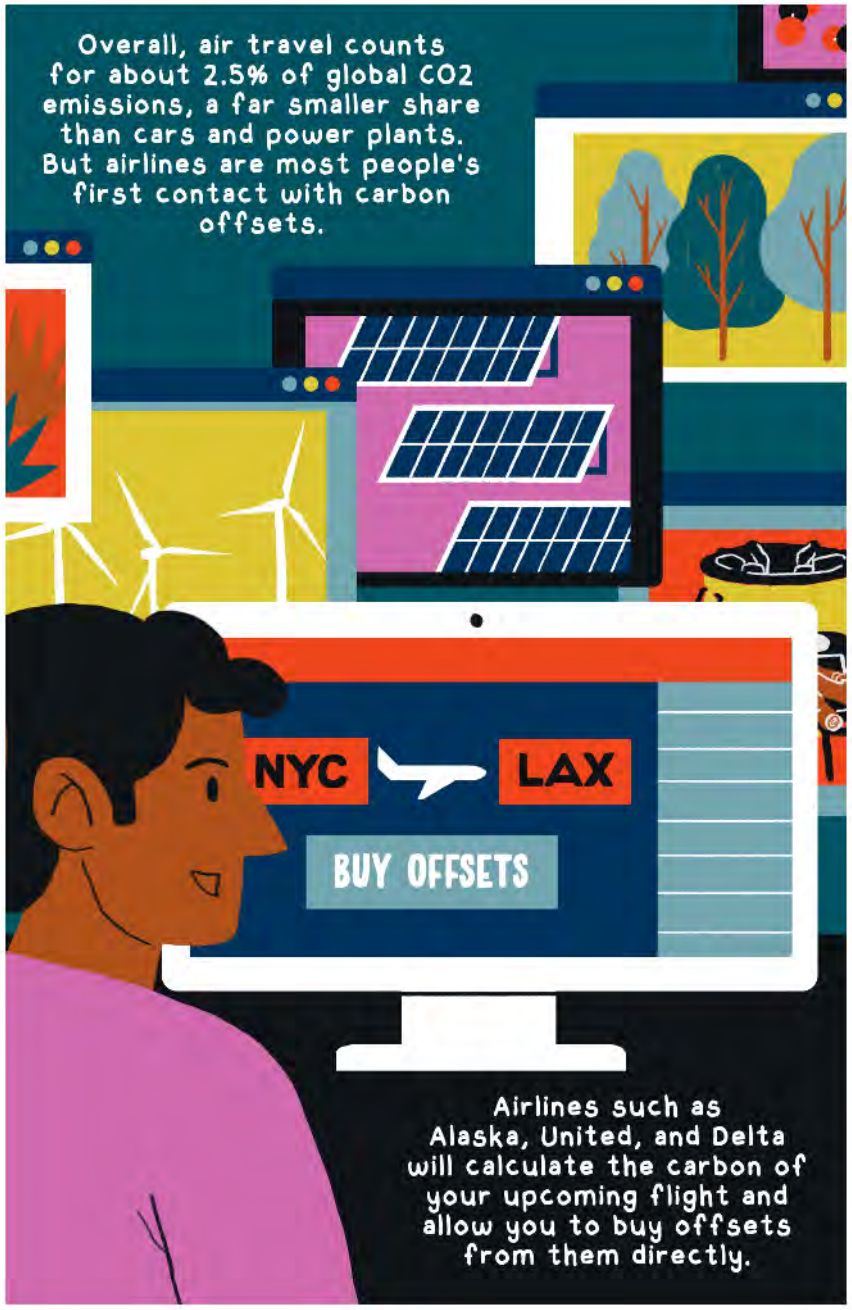
The Oxford Principles for Net Zero Aligned Carbon Offsetting

- **Prioritize reducing emissions first**
- **Purchase high-quality, verifiable, transparently managed carbon offsets**
- **Focus on offsets that *remove carbon* from the atmosphere**
- Shift to long-lived storage
- Support net zero aligned offsetting

Source: https://www.smithschool.ox.ac.uk/research/oxford-offsetting-principles

Our agenda

- Climate change, carbon emissions, & WCU
- Carbon offsets
- Sustainability, carbon neutrality, & study abroad


Overall, air travel counts for about 2.5% of global CO2 emissions, a far smaller share than cars and power plants. But airlines are most people's first contact with carbon offsets.
NYC
LAX
BUY OFFSETS
Airlines such as Alaska, United, and Delta will calculate the carbon of your upcoming flight and allow you to buy offsets from them directly.

Some resources

- **Developing University-Initiated Offsets and Using Peer Verification**
  - https://hub.aashe.org/browse/video/23755/Developing-University-Initiated-Offsets-and-Using-Peer-Verification
- **Uncovering Risk in the Voluntary Carbon Market**
  - https://hub.aashe.org/browse/video/18745/Uncovering-Risk-in-the-Voluntary-Carbon-Market
- **The Oxford Principles for Net Zero Aligned Carbon Offsetting**
  - https://www.smithschool.ox.ac.uk/sites/default/files/2022-01/Oxford-Offsetting-Principles-2020.pdf
- **The World Is Finally Cracking Down on 'Greenwashing'**
  - https://www.theatlantic.com/science/archive/2023/03/greenwashing-refuses-to-die/673241/
- **Are Your Carbon Offsets Doing Anything?**
  - https://thenib.com/are-your-carbon-offsets-doing-anything/
- **What is carbon offsetting and how does it work?**
  - https://www.theguardian.com/environment/2021/may/04/what-is-carbon-offsetting-and-how-does-it-work
- **Study Abroad and the Quest for an Anti-Tourism Experience**, Edited by John J. Bodinger de Uriarte and Michael A. Di Giovine, 2020, Lexington Books
- **WCU Study Abroad and Carbon Offsets: Not Whether but ~~When~~ NOW!** Paul Sylvester, 2019
  - https://digitalcommons.wcupa.edu/srca_sp/11/

Additional Slides, Professor Paul Sylvester

4,524,026

President’s commitment (2010) to offset all air travel by 2020

4,524,026

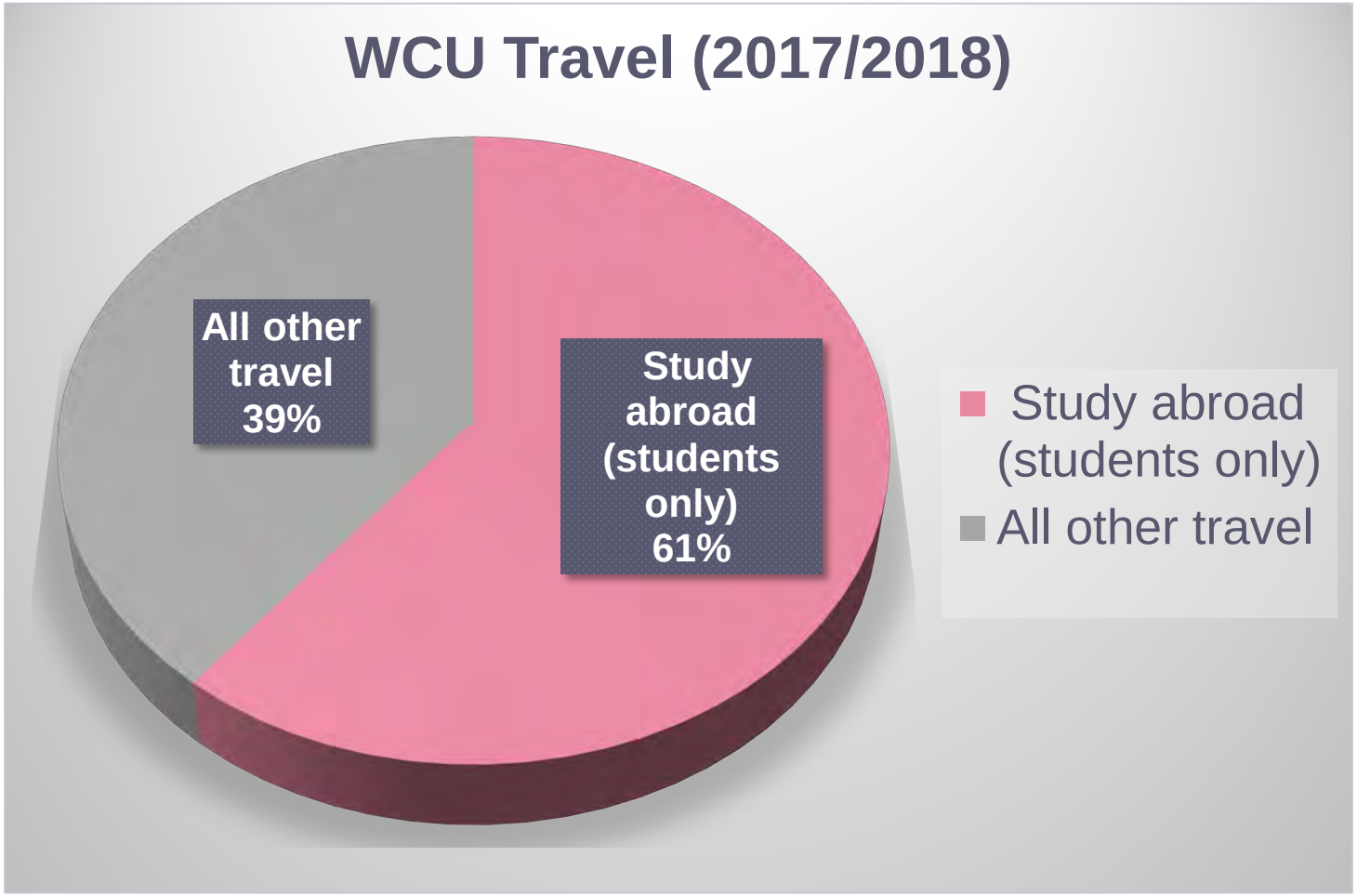
How many WCU study abroad miles?

2016-2017	4,000,000 miles
2017-2018	4,500,000 miles
2018-2019	3,800,000 miles
2021-2021	760,000 miles

Sources: 1) Center for International Programs for study abroad miles

4,524,026

How many WCU air travel miles?



Sources: 1) Center for International Programs for study abroad miles and 2) Accounts payable for other travel.

4,524,026

Current miles offsets by WCU

0

4,524,026

Agreeing with Michael with a caveat

- Carbon offsets
- Voter registration
- Regulations on industry
- Investment in green energy
- Investment in energy research
- Taxing polluters
- Cap and Trade
- FonFifa fund (Costa Rica)

4,524,026

Carbon output for 4.5 million miles of study abroad:

Carbon Calculations

Source	**Tonnes of Co2** (metric tons)
NativeEnergy	1639 tonnes
CarbonFund.org calculator (cited by WCU Plan)	900 tonnes
Terra Pass	746 tonnes

Excellent opportunity!

4,524,026

Carbon offset for 4.5 million miles of study abroad:

Carbon Calculations

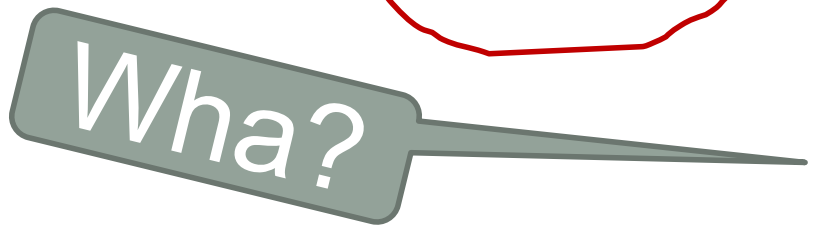
Source	**Tonnes of Co2** (metric tons)	**Cost to offset**
NativeEnergy	1639 tonnes	$25,000
CarbonFund.org calculator (cited by WCU Plan)	900 tonnes	$9000
Terra Pass	746 tonnes	$8000

4,524,026

Carbon offset for 4.5 million miles of study abroad:

Carbon Calculators

Source	Tonnes of Co2 (metric tons)	Cost to offset	Average cost per student
NativeEnergy	1639 tonnes	$25,000	$47.00
CarbonFund.org calculator (cited by WCU Plan)	900 tonnes	$9000	$17.00
Terra Pass	746 tonnes	$8000	$15.00



4,524,026

Types of carbon offset projects

1) Renewable energy (Wind, solar, hydroelectric, biofuel)

4,524,026

Types of carbon offset projects

1) Renewable energy
2) Methane collection and combustion
   (Collection and combustion of methane generated by farm animals by use of an anaerobic digester, landfills and other waste)

4,524,026

Types of carbon offset projects

1) Renewable energy
2) Methane collection and combustion
3) Energy efficiency (reducing the demand by replacing carbon combustion devices, development of energy efficient buildings)

4,524,026

Types of carbon offset projects

1) Renewable energy
2) Methane collection and combustion
3) Energy efficiency
4) Destruction of industrial pollutants

4,524,026

Types of carbon offset projects

1) Renewable energy
2) Methane collection and combustion
3) Energy efficiency
4) Destruction of industrial pollutants
5) Land use, land-use change, and forestry

4,524,026

Types of carbon offset projects

5) Land use, land-use change, and forestry

- Avoided deforestation is the protection of existing forests.
- Reforestation is the process of restoring forests on land that was once forested.
- Afforestation is the process of creating forests on land that was previously unforested, typically for longer than a generation.
- Soil management projects attempt to preserve or increase the amount of carbon sequestered in soil.

4,524,026

Co-benefits

Economic co-benefits for communities

Tri-City Forest project: Holyoke MA

6,500 acre watershed preservation

Funding green jobs

Purchasing carbon credits from marginalized communities

Job creation

Increased livelihood

Source: Second Nature https://secondnature.org/wp-content/uploads/Co-Benefits-Document-Rev5.pdf

4,524,026

Co-benefits

Environmental co-benefits for communities

Land-Use, Land-Use Change, and Forestry (LULUCF)

Ecological balance in…

pollination,

seed dispersal,

germination,

plant regeneration

preserving wildlife and their habitats

Source: Second Nature https://secondnature.org/wp-content/uploads/Co-Benefits-Document-Rev5.pdf

4,524,026

Co-benefits

Social co-benefits

4 million people die every year from smoke from cooking.

"I used to be busy all the time. Cooking with traditional cookstoves was time-consuming. Now I have time to grow vegetables, which we eat and also sell in the market. Not only am I breathing better, but I'm also supporting my family. Clean cooking has changed my life."

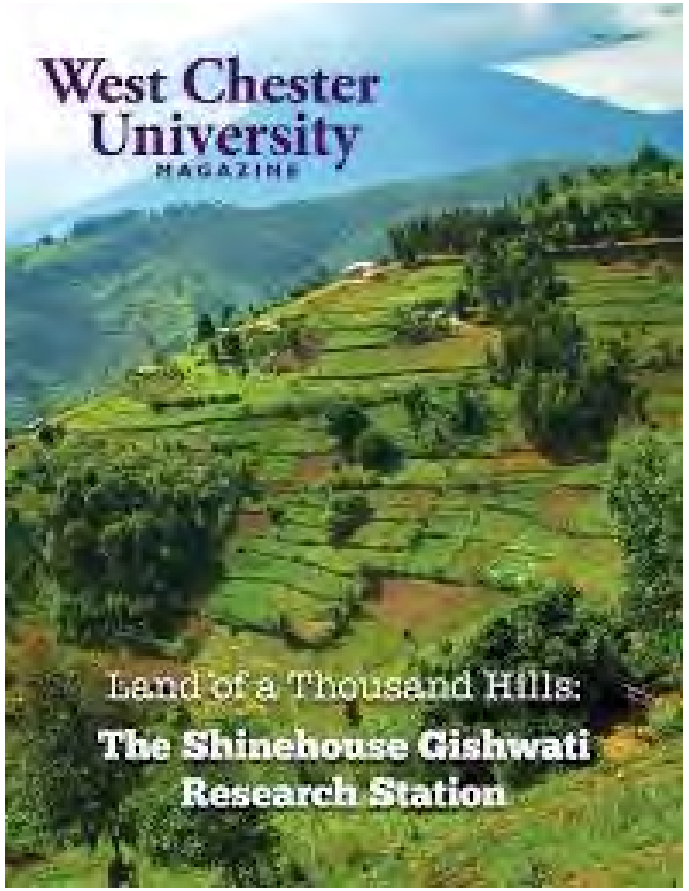
Sita Bai
Cookstove User, India

Source: Cooking Clean Alliance. https://cleancooking.org/the-value-of-clean-cooking/
Cited by Second Nature https://secondnature.org/wp-content/uploads/Co-Benefits-Document-Rev5.pdf

4,524,026

Co-benefits

Educational co-benefits



(As described my Michael).

4,524,026

Criticism of carbon offsets

The reduced fat Oreo problem

Education vs. Impact?

2014: West Chester University named “Tree Campus USA”

Source: John Bartram lives 2014
https://johnbartramlives.me/2014/03/07/west-chester-university-tree-campus-usa/

Education vs. Impact?

”West Chester University named “Tree Campus USA” for 2014

Standard 5—Development of a Service Learning Project. At West Chester, the student body was actively involved in a series of tree planting and gardening projects. This was a very life-affirming group of young adults.

Source: John Bartram lives 2014

https://johnbartramlives.me/2014/03/07/west-chester-university-tree-campus-usa/

Education vs. Impact?

”West Chester University named “Tree Campus USA” for 2014

Standard 3—Campus Tree Program with Dedicated Annual Expenditures. The hard work of establishing any garden is the money required to plant and maintain it. A suggested budget of $3.00 per student is a base line. In fact, the national average among recognized Tree Campuses is currently $9.00 to $11.00 per student. That is an empowering statement of intent.

$3.00 X 17,000 students = $51,000

Source: John Bartram lives 2014
https://johnbartramlives.me/2014/03/07/west-chester-university-tree-campus-usa/

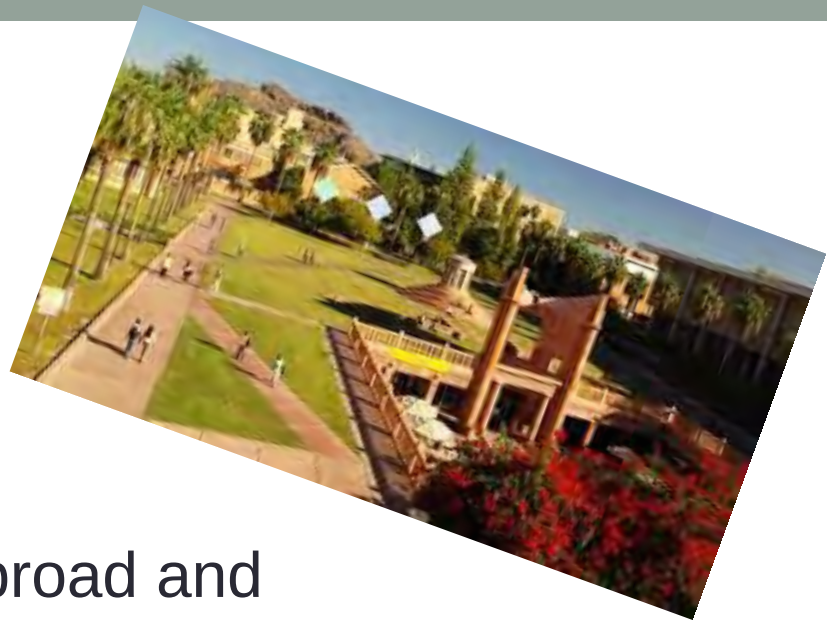
4,524,026

Criticism of carbon offsets

The reduced fat Oreo problem

4,524,026

Funding: Case Study #1:
Arizona State University



The Program

- Purchase of carbon offsets both abroad and through community-based offset projects
- Community project of planting trees to support mission of education, research. Helped win support.
- Flat rate of $8.00 (increasing to $18 over 4 years) for any trip including study abroad.
- Advantage: Simplicity

4,524,026

Funding case Study #2:

University of Maryland

The Program

- Offset for all forms of University travel
- Surcharge for flights is based on miles flown
- Surcharge made by office of study abroad

Grading offset programs:
Research on University of Richmond

Table 8.2. Grades for each criteria for Native Energy (China); Overall Grade C

Country	Program	Experience	Education	Incentive	Price	Effectiveness	Impact
China	Native Energy	F	F	D	C	A	A

Table 8.5. Grades for each criteria for Credible Carbon (South Africa); Overall Grade A.

Country	Program	Experience	Education	Incentive	Price	Effectiveness	Impact
South Africa	Credible Carbon	B	A	A	A	A	A

Source: Bailey, K., Kurz, K., Sushkova (N.D.)
Carbon Offset Solutions for International Travel Emissions. https://scholarship.richmond.edu/cgi/viewcontent.cgi?article=1017&context=geography-capstone

Grading offset programs:
Research on University of Richmond

China Program: Overall grade C

Table 8.2. Grades for each criteria for Native Energy (China); Overall Grade C

Country	Program	Experience	Education	Incentive	Price	Effectiveness	Impact
China	Native Energy	F	F	D	C	A	A

- Experience (F): No opportunity for students to contribute
- Education (F): No educational program related to the offsets
- Incentive (D): None besides knowing they contributed
- Price (C): Offsets cost $294 per flight (?)
- Effectiveness / Impact (A): Wind farms

Grading offset programs:
Research on University of Richmond

South Africa Program: Overall grade C

Table 8.5. Grades for each criteria for Credible Carbon (South Africa); Overall Grade A.

Country	Program	Experience	Education	Incentive	Price	Effectiveness	Impact
South Africa	Credible Carbon	B	A	A	A	A	A

- Experience (B): Install solar water heaters, LP cooking, speak to beneficiaries.
- Education (A): Students can observe but not contribute
- Incentive (A): Lifetime relationship with beneficiaries
- Price (A): (Not described)
- Effectiveness / Impact (A): Programs are effective

4,524,026

West Chester University

Start with all travel or just study abroad?

4,524,026

What steps could WCU take to develop a carbon offsets program?

Who will carry it forward?

- Leadership from the top?
- Office of Sustainability?
- Sustainability Council?
- Center for International Programs?
- Or some combination of the above

4,524,026

West Chester University

Who will pay for it?

- Voluntary contributions by the traveler (“a checkbox”)?
- Surcharge to departments (if it were for all flights)?
- Grant funding by the WCU Foundation?
- Surcharge to study abroad program fees?
- Other?

Additional Slides, Professor Michael Di Giovine

Michael A. Di Giovine, Ph.D.

Professor of Anthropology

Director, Museum of Anthropology and Archaeology

West Chester University of Pennsylvania

Why Study Abroad? (Definition)

- A form of mobility in which students voluntarily and temporarily travel elsewhere – off-campus, and, most often, outside of their familiar cultural setting and formal educational institution – to supplement their education through cross-cultural learning.

Why Study Abroad? (Definition)

A form of mobility in which students voluntarily and temporarily travel **elsewhere** – off-campus, and, most often, outside of their familiar cultural setting and formal educational institution – to supplement their education through cross-cultural learning.

- Outside of one's "comfort zone"
  - Erection of boundaries / Otherness
  - Fosters intercultural communication
- Learn about oneself
- Global citizenship
  - Recognition of cultural difference
  - Awareness of one's place in the world and current events

Why Study Abroad?

Promises to foster “Global Citizenship”

- An ideology that attempts to appeal to notions of global responsibility, community, mutual learning across cultures, and idealism” (Zemach-Bersin, p. 313)
  - Recognition of cultural difference
  - Awareness of current events
  - Understanding of one’s embeddedness in world events

Why Study Abroad?

Promises a “High Impact Educational Practices” (Kuh 2008)

- Integrative, deep approaches to learning
  - Demand students devote considerable time and effort to purposeful tasks
  - Place students in circumstances that compel them to interact meaningfully with peers and faculty member
  - Engages students in diversity through cross-cultural contact with people different from themselves
  - Opens students’ eyes to how learning works in different settings on and off campus

“Anti-Touristic Experience”

- Perception that travel stands in opposition to, and is an antidote to, the perceived ills of stereotypical mass tourism

- Tourism: fast, superficial / “staged authenticity”, uninformed, socially destabilizing, commodified leisure pursuit
- Study abroad: slower, “authentic” and deep; immersive and interactive; not a commodity; about learning learning and effort

Ethical considerations

- Social sustainability
  - Service / Voluntourism

Does it really monetarily help host community

- vertical integration
- costly

Socially help?

- What are the credentials of the students?
- Reproduces the very global inequalities that it purports to solve

Ethical considerations

- Environmental sustainability
  - High carbon footprint

Do you pay to off-set?

- Push the problem to someone else; keep doing what you're doing
- Can you trust provider?

How long do you have to stay to off-set it?

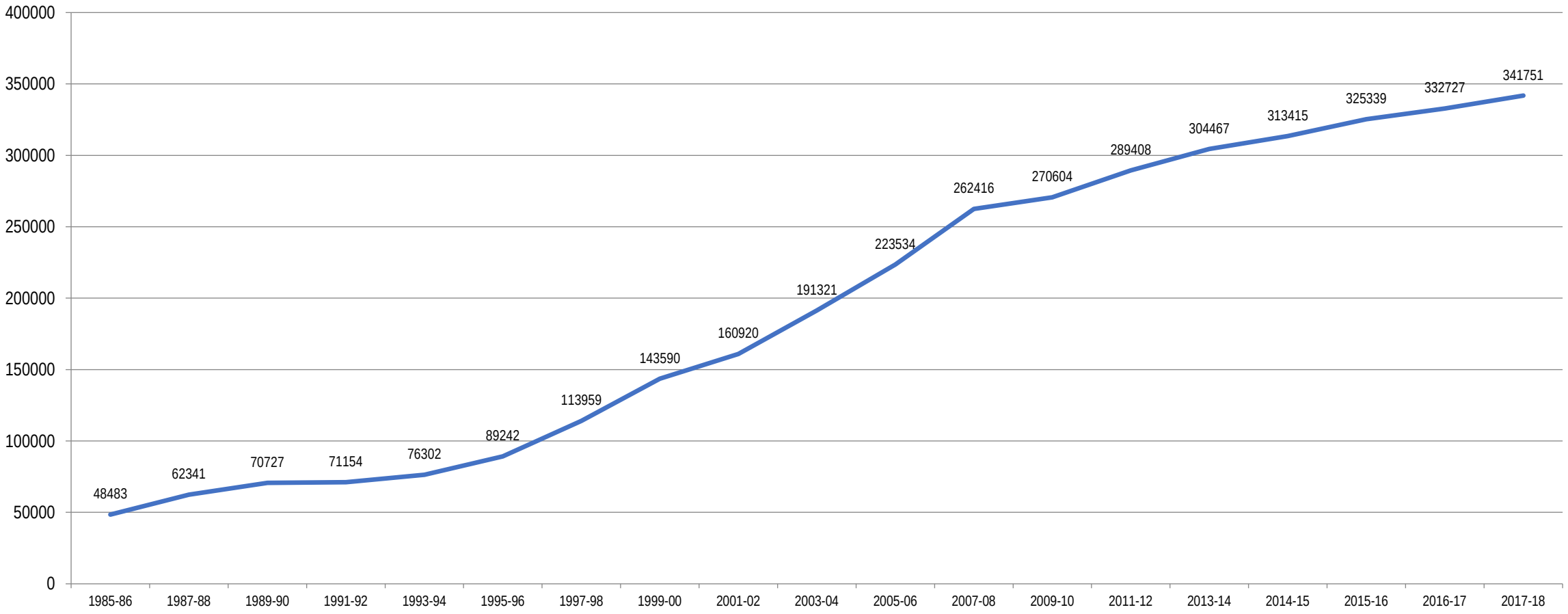
- Average carbon footprint at WCU vs. on-site

How can it be more ecologically sustainable?

- Public transportation and walking
- One-site vs. many places on an itinerary
- Sourcing local, organic food
- Local providers
- Minimize trash

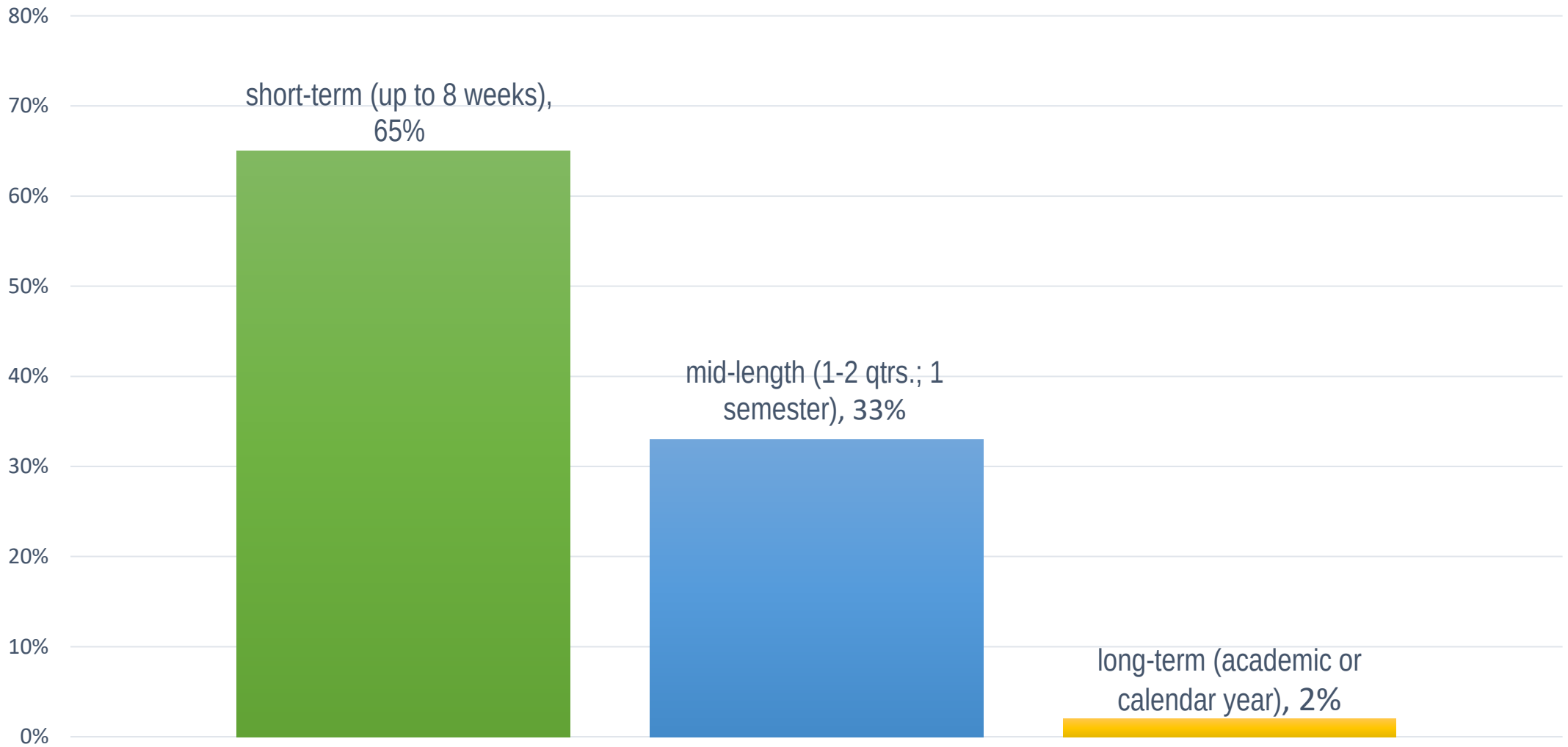
US University Students Studying Abroad

all locations 1985-2018



Data source: Open Doors 2019.

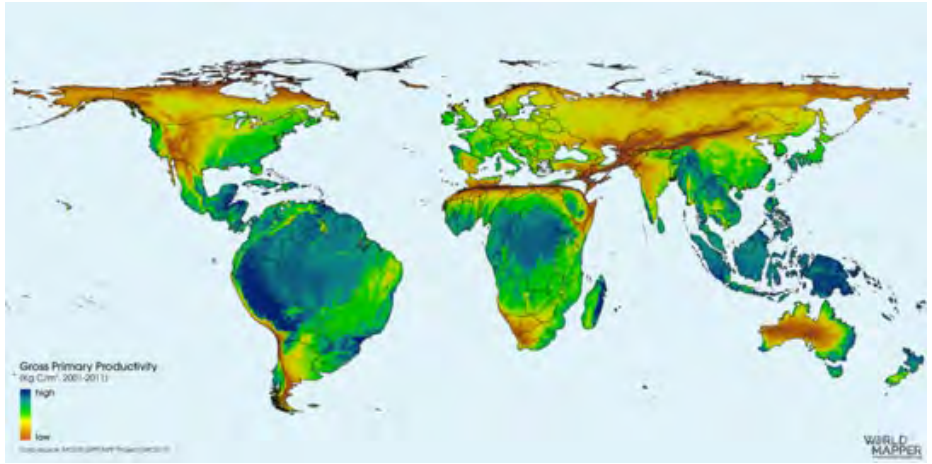
Study abroad participation by program duration



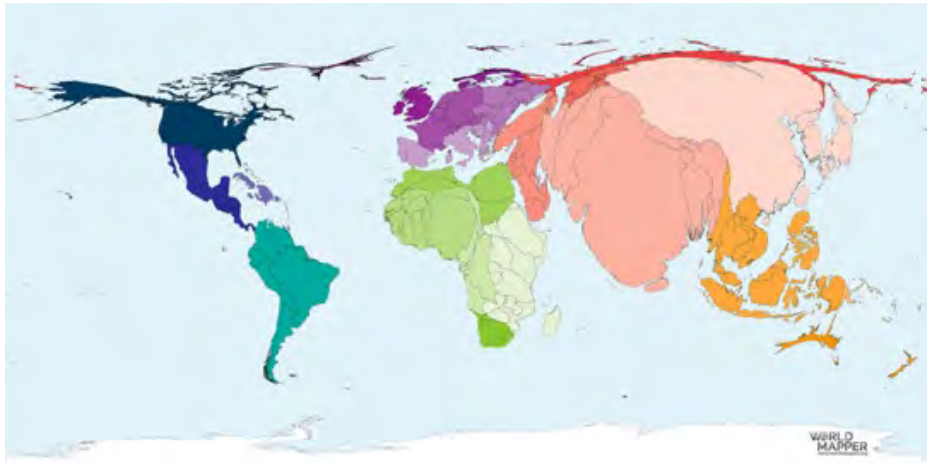
Data source: Open Doors 2019.

World Mapper: Comparisons…

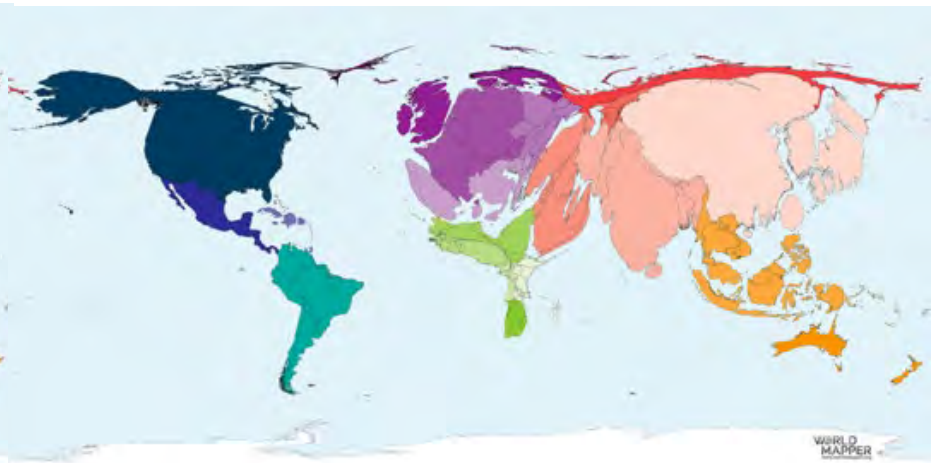
Land Area



Terrestrial Ecosystem productivity



Total Population



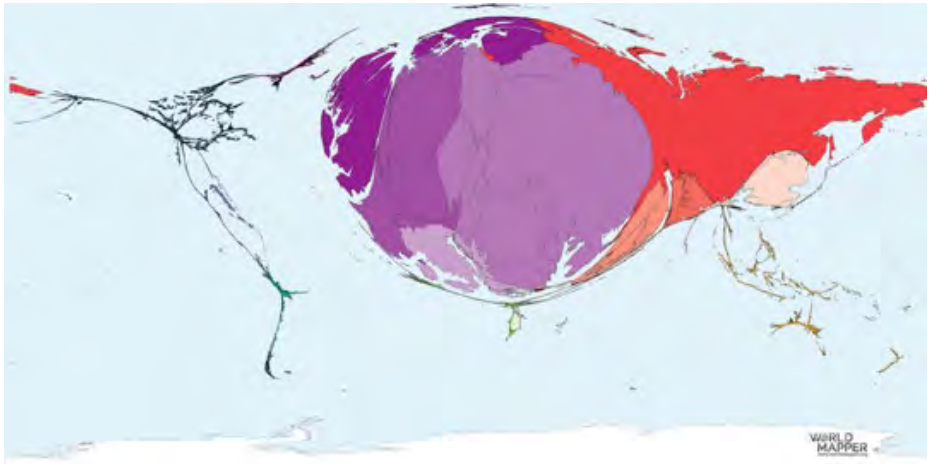
GDP Wealth

All maps from WORLDMAPPER: https://worldmapper.org/

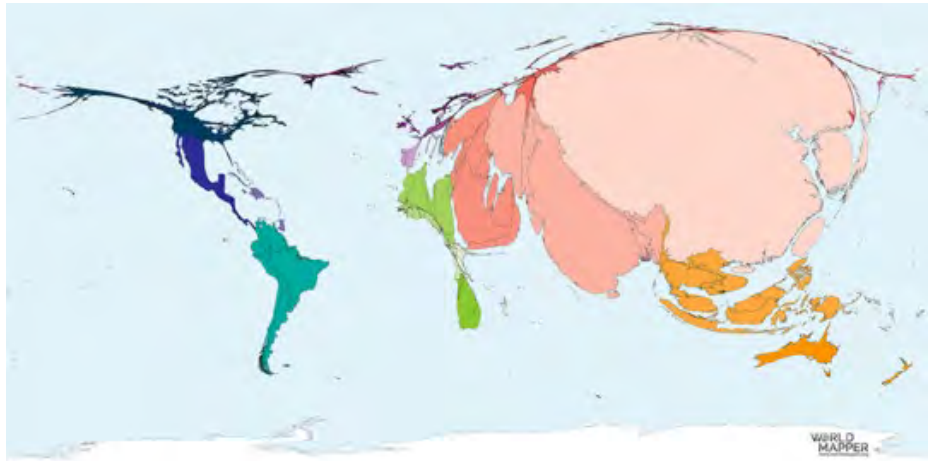
Carbon Emissions

Land Area

Carbon Emissions 2015



Carbon Emissions Decline 1990-2015



Carbon Emissions Increase 1990-2015

All maps from WORLDMAPPER: https://worldmapper.org/

Jennifer Coffman's (JMU) Case Study:
The IPAT Model

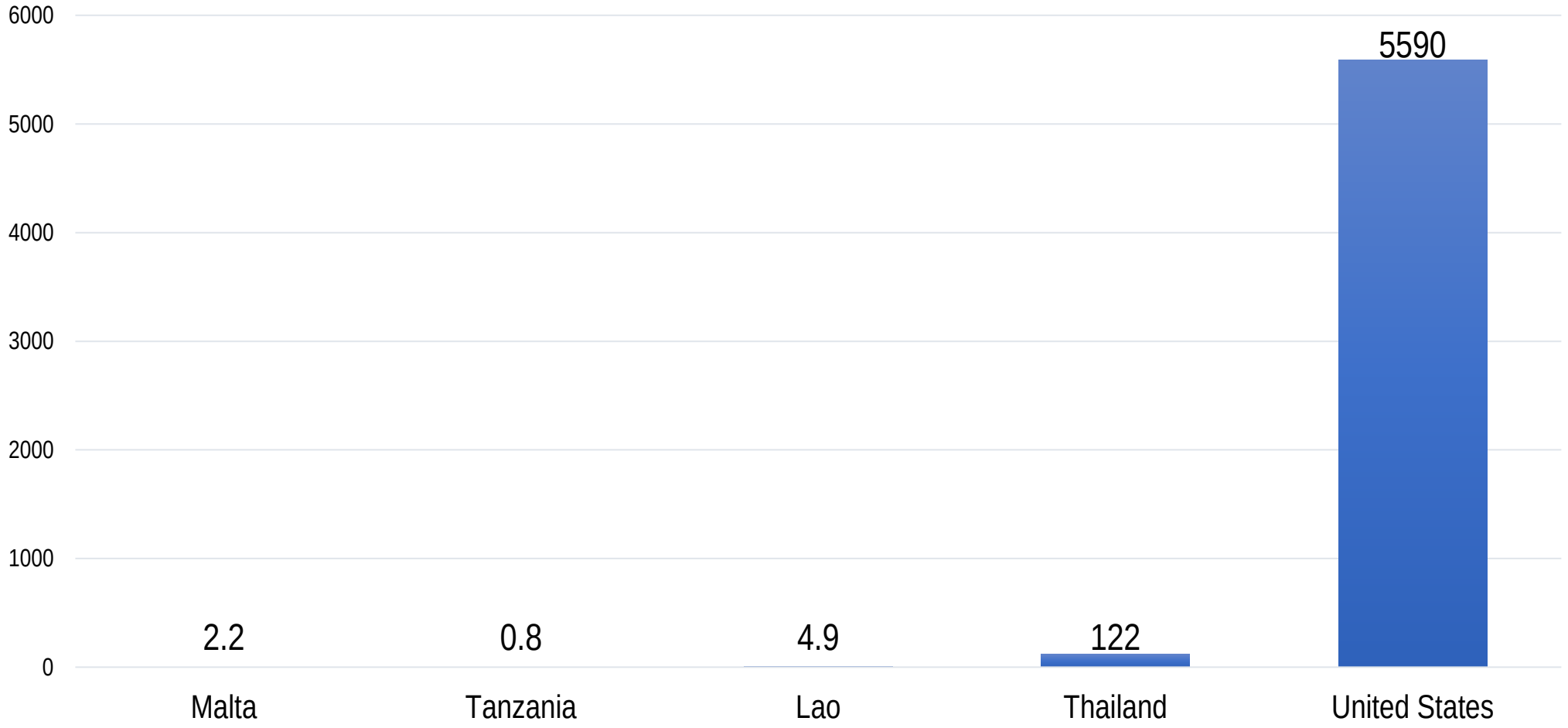
Calculating I=PAT according to Commoner, Ehrlich, Holdren in 1970s:

Impact = (population) x (economic good/population) x (pollutant/economic good)

...aligning a bit more with Japanese energy economist Yoichi Kaya's formulation:
I = (population) x (GDP/capita) x (environmental impact/unit of per capita GDP)



IPAT Calculations for Human Impact
in billions of kg CO_2e for 2016

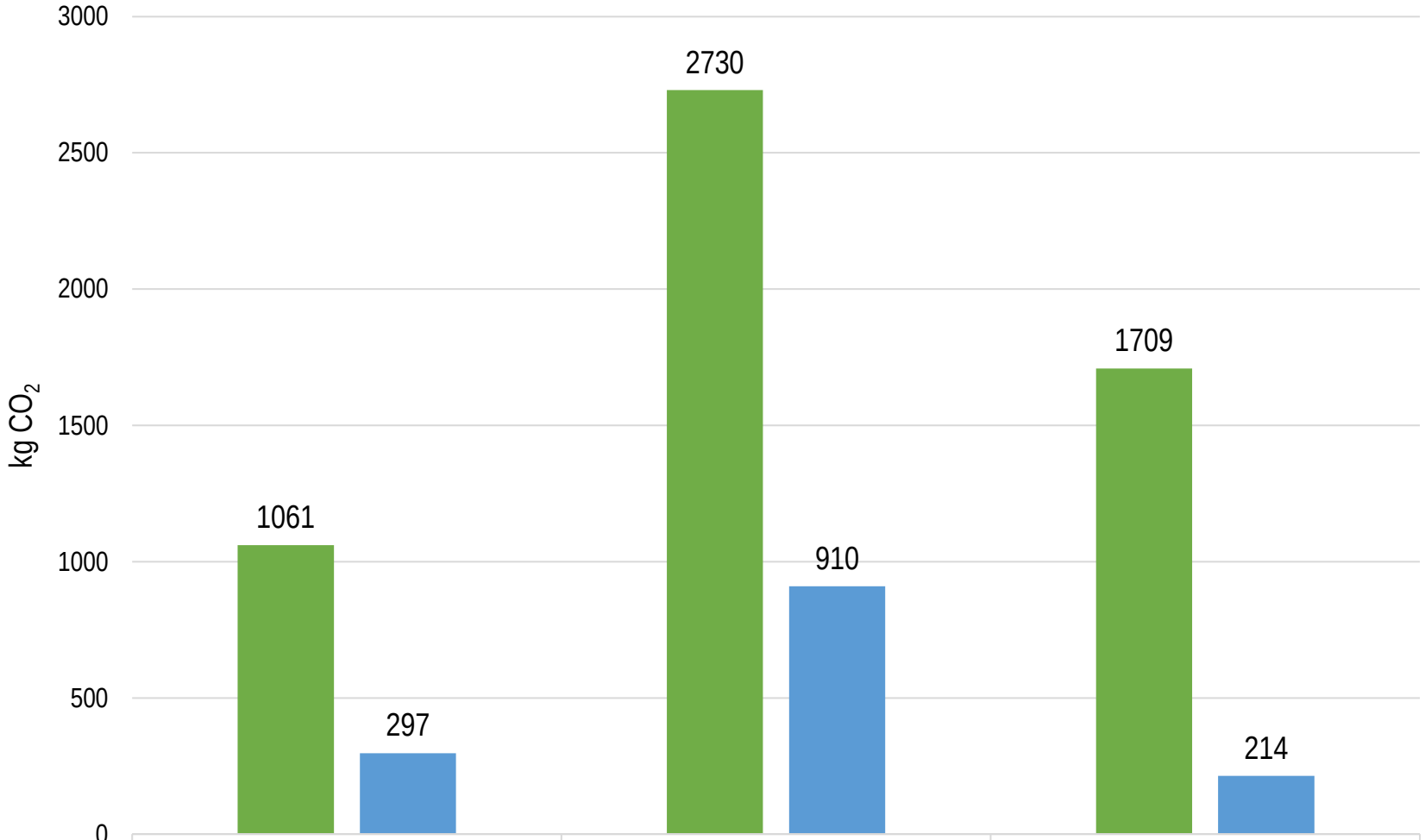


Source: World Bank Open Data

Calculating Flight Impacts

Flight Paths for Malta (red), Thailand & Laos (blue), and Tanzania (green)

Total and Weekly Emissions from Flights (kg CO_2e per capita)



	Malta	Thailand & Laos	Tanzania
Total	1061	2730	1709
Weekly	297	910	214

Energy Analysis

$$energy\ (kWh) = power\ (kW) * time\ (hr) \quad \text{(Eq. 1)}$$

$$weekly\ average\ (kWh) = \frac{total\ energy}{N} * 7 \quad \text{(Eq. 2)}$$

$$emissions\ (kg\ CO_2) = weekly\ avg * EF \quad \text{(Eq. 3)}$$

$N = number\ of\ days$
$EF = Emission\ Factor$

Country	EF
United States	522.25
Malta	872.32
Thailand	512.89
Tanzania	329.36

International Energy Agency (IEA)

In-Country Transportation Analysis

- Recorded vehicle make and model, distance traveled, and number of people in vehicle
- Researched fuel economy for each mode of transportation

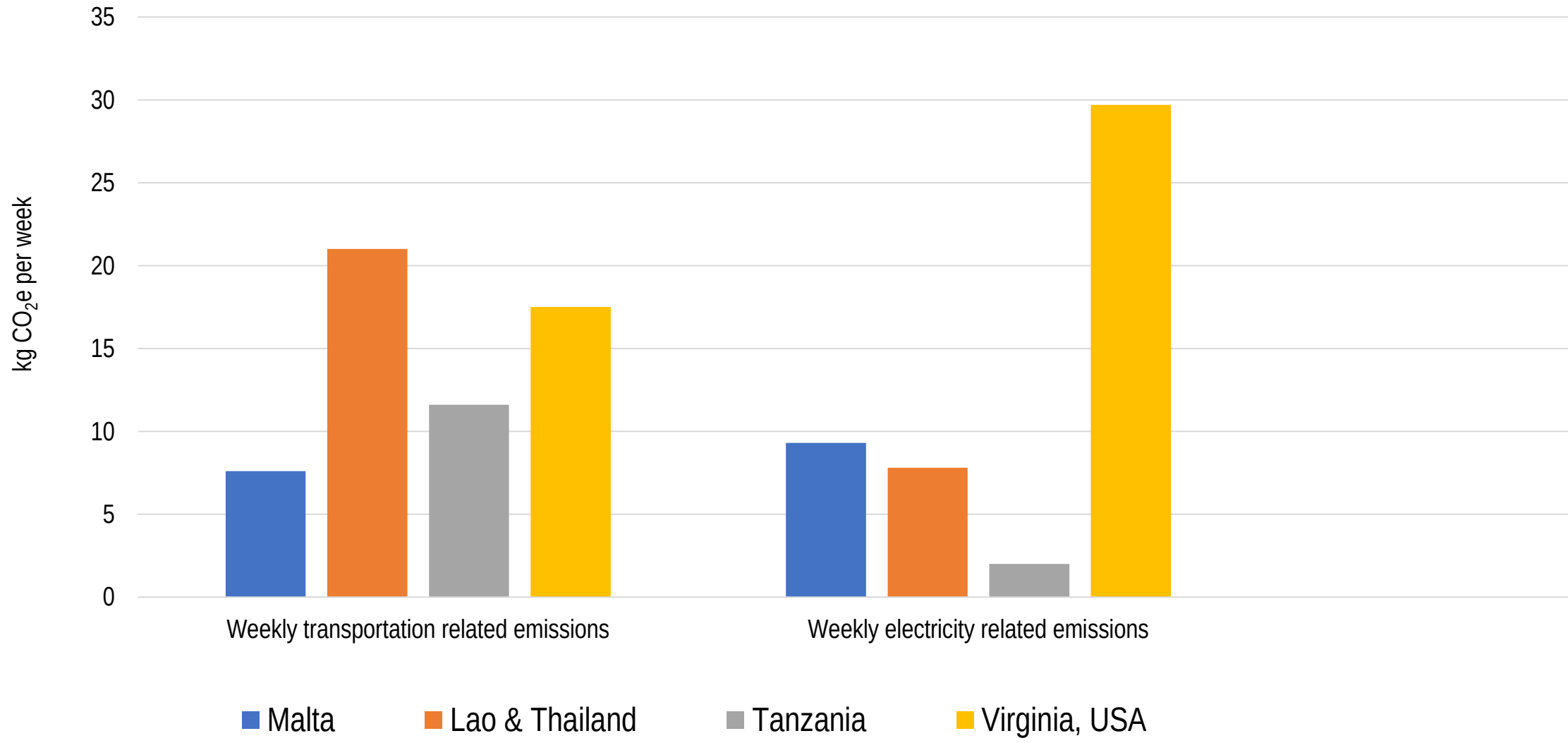
$$\frac{distance}{fuel\ economy} = amount\ of\ fuel\ used \qquad \text{(Eq. 7)}$$

$$amount\ of\ gasoline\ * 2.3035\ \frac{kg}{l} = emissions\ (kg\ CO_2) \qquad \text{(Eq. 8a)}$$

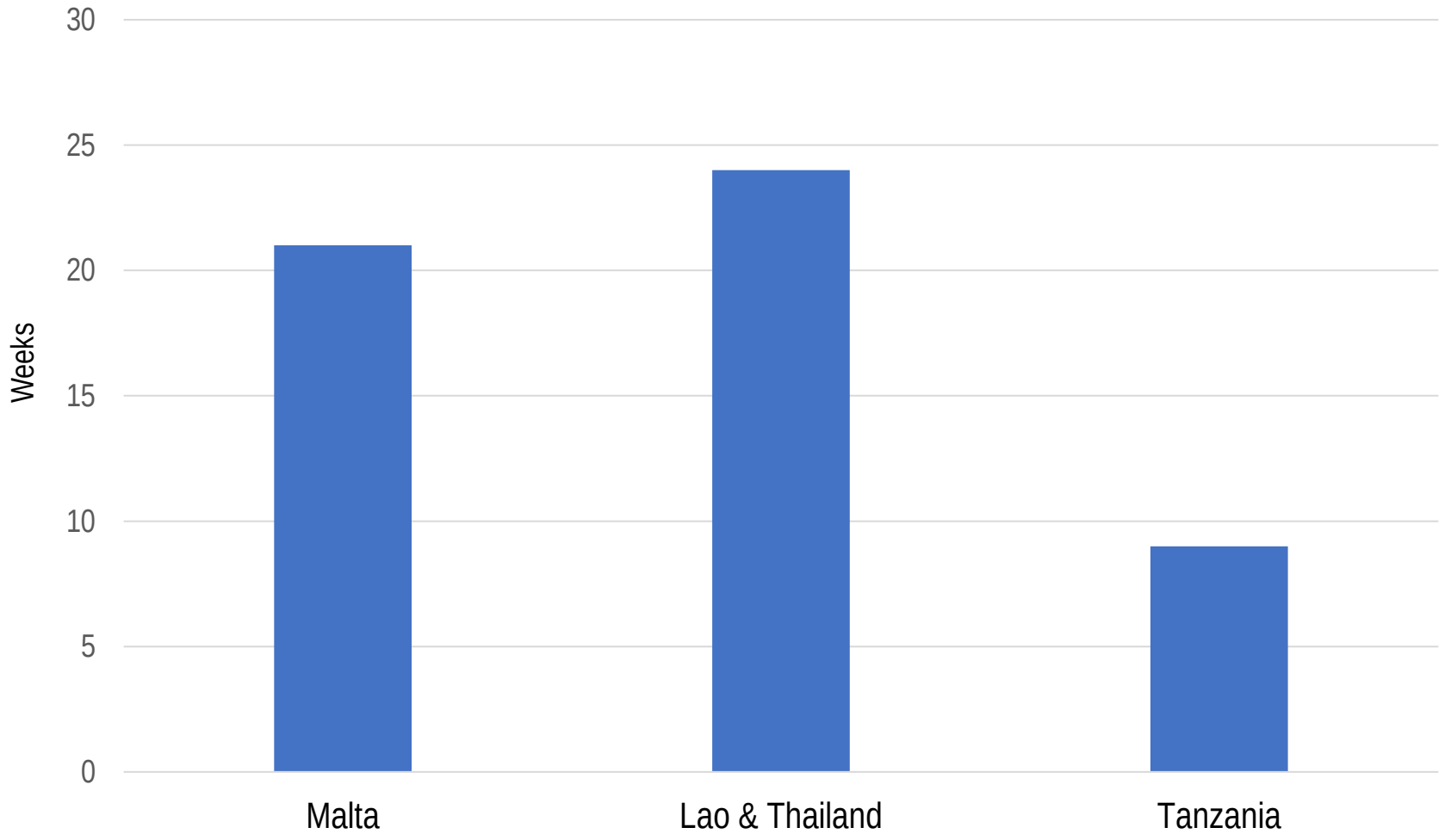
$$amount\ of\ diesel\ * 2.6256\ \frac{kg}{l} = emissions\ (kg\ CO_2) \qquad \text{(Eq. 8b)}$$

$$\frac{emissions}{\#\ of\ people} = emissions\ per\ person\ (kg\ CO_2) \qquad \text{(Eq. 9)}$$

Weekly Averages (kg CO_2e) of Transportation and Electricity Related Emissions



How long would the study abroad programs have to be, at a minimum, to “justify” the environmental impact of the flights?



Ethical considerations

- Education

How long?	• Getting shorter and shorter; resembling mass tourism • Can it be immersive?
Do students forge relationships?	• Do they get out of their tourist bubble? (Visiting tourist bars, etc.) • Treated as tourists by locals and hosts
What kind of learning goes on?	• Experiential learning • More than superficial? • Increasing protection / liability means they aren't allowed to take as many risks