

Carbon Reduction Challenge Initiative

Eduardo Ramirez – Georgia Institute of Technology

William Nguyen – Georgia Institute of Technology

Casey Erb – Mortenson / Georgia Institute of Technology Alumni

August 4TH, 2023


Mortenson


Georgia
Tech



▶▶ AGENDA

Background and Motivation

- ▶ Carbon Reduction Challenge (CRC) Mission and Climate Change

Carbon Reductions and Cost Savings

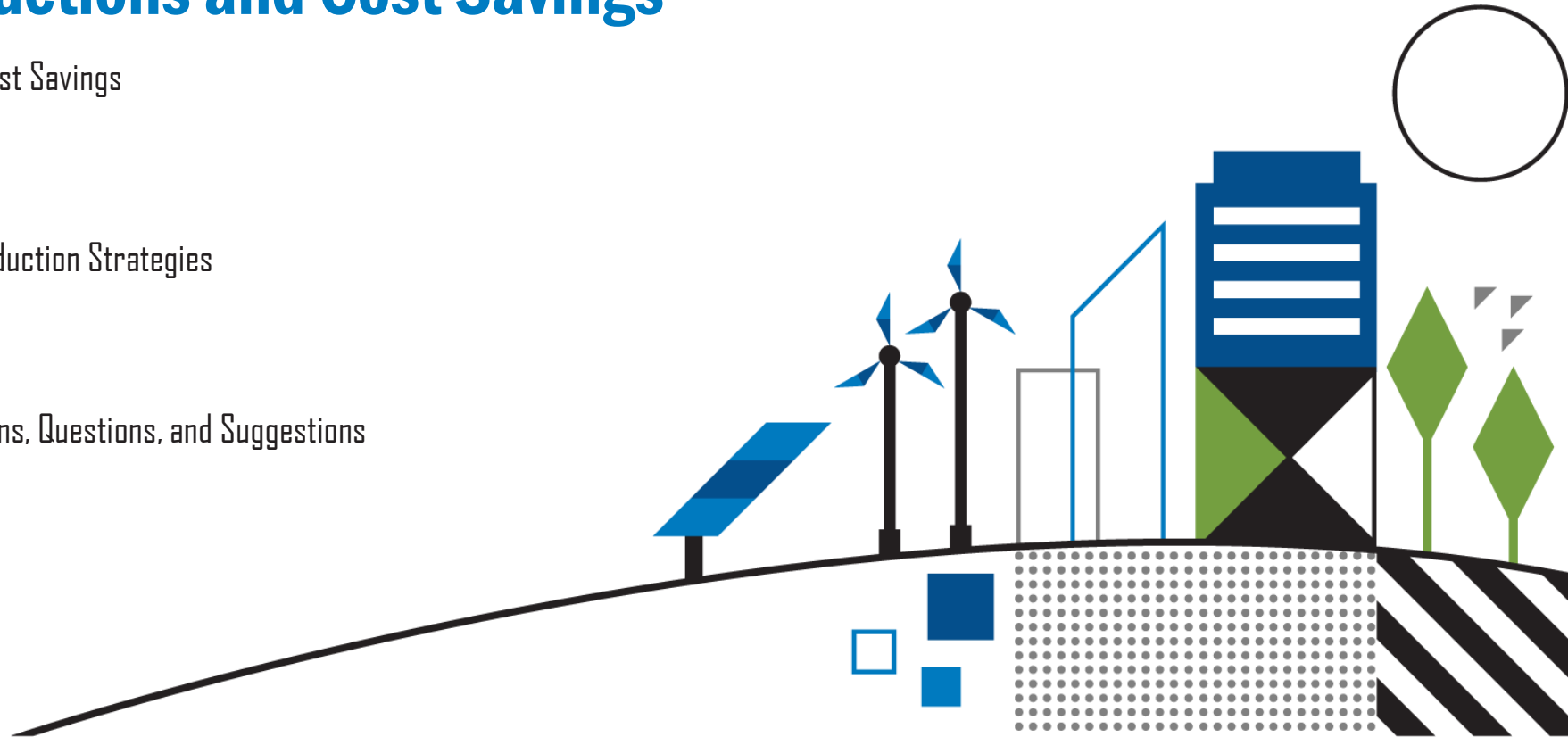
- ▶ CRC Subprojects and Cost Savings

Next Steps

- ▶ Feasibility of Carbon Reduction Strategies

Q&A

- ▶ Time to Address Concerns, Questions, and Suggestions





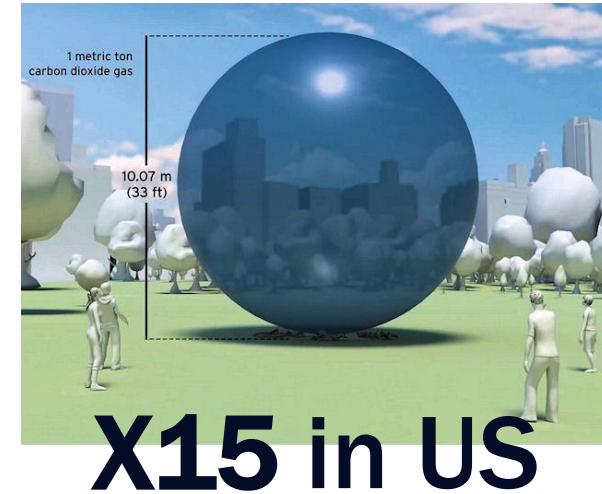
1 

Background and Motivation

Introduction to Carbon Reduction Challenge by **Georgia Tech**

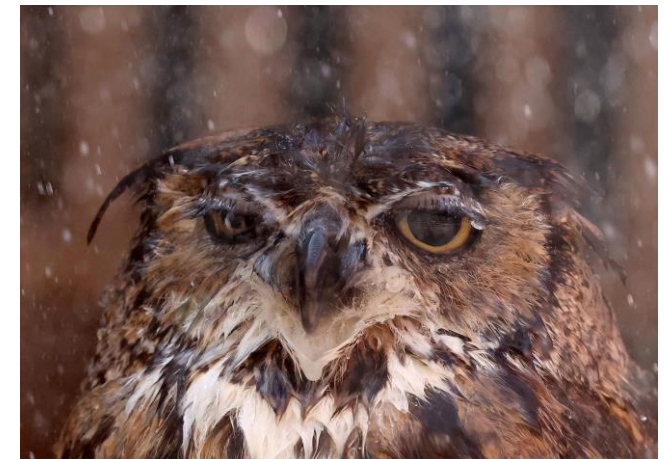
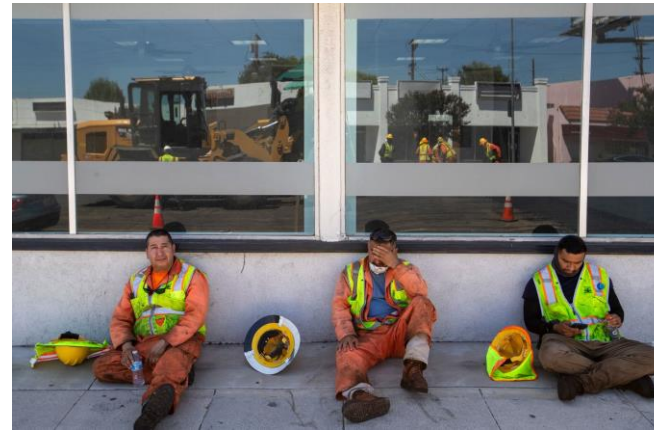
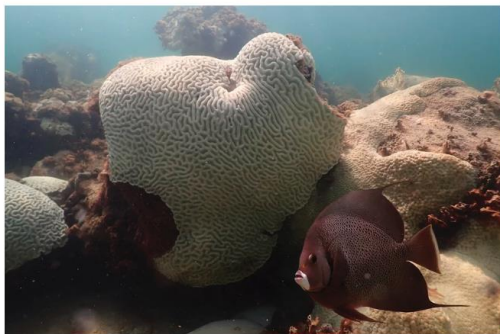
▶▶ Background and Motivation

- ▶ The **Georgia Tech Carbon Reduction Challenge** is a competition focused on empowering students to become part of the climate change solution. We work with an organization to achieve a significant reduction in eCO₂
- ▶ What is happening?
- ▶ How did we get here?
- ▶ What are the consequences in the US?
- ▶ How can we help reduce carbon emissions while allowing Mortenson to keep exceling and minimizing business as usual changes in assignments?



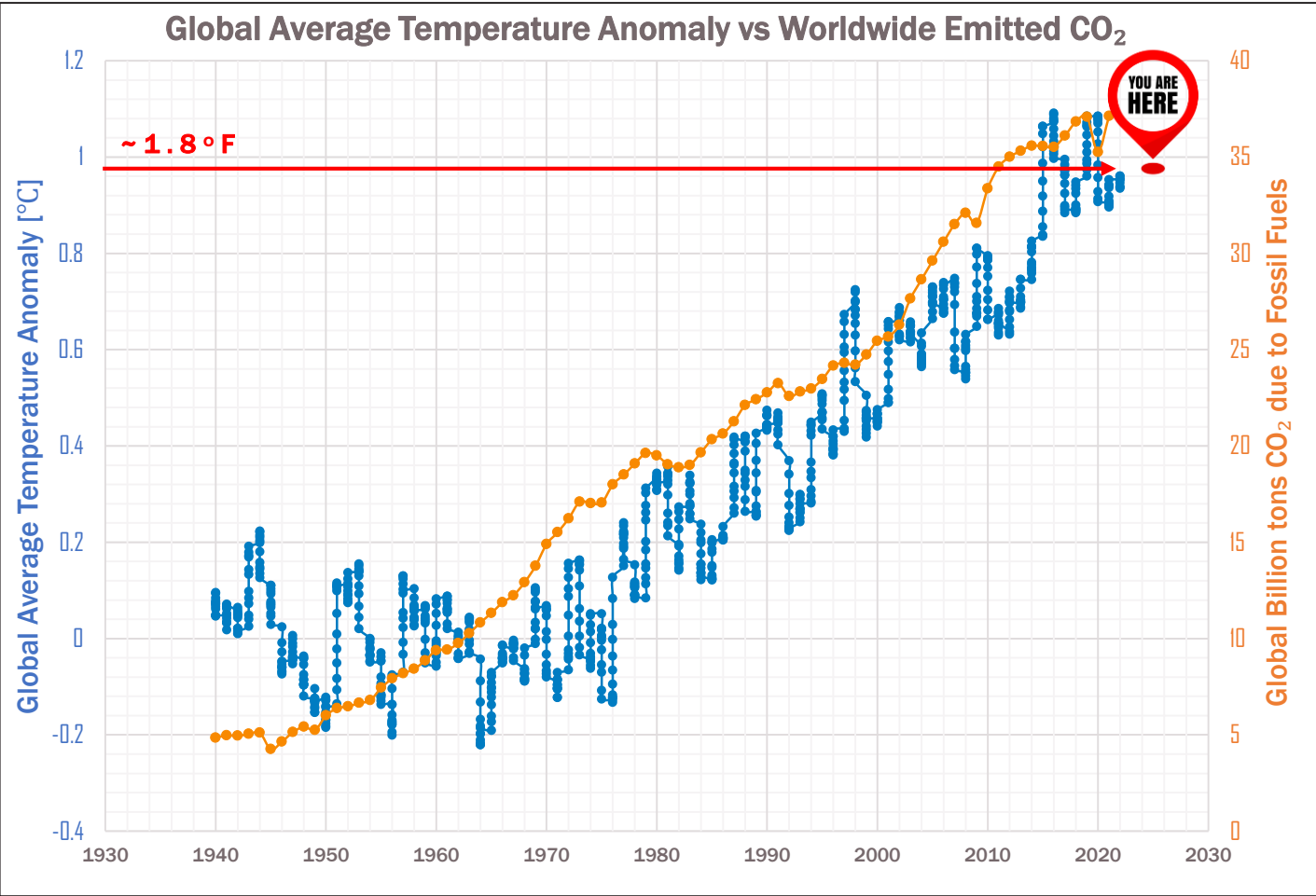
With Florida ocean temperatures topping 100, experts warn of damage to marine life

July 26, 2023 - 12:57 PM ET
By Joe Hernandez



▶▶ What is Driving Climate Change?

A quick outlook to global warming and potential future



*Our world in data and Berkely Earth

HALF A DEGREE OF WARMING MAKES A BIG DIFFERENCE: EXPLAINING IPCC'S 1.5°C SPECIAL REPORT

	1.5°C	2°C	2°C IMPACTS
EXTREME HEAT Global population exposed to severe heat at least once every five years	14%	37%	2.6x WORSE
SEA-ICE-FREE ARCTIC Number of ice-free summers	AT LEAST 1 EVERY 100 YEARS	AT LEAST 1 EVERY 10 YEARS	10x WORSE
SEA LEVEL RISE Amount of sea level rise by 2100	0.40 METERS	0.46 METERS	.06M MORE

*World Resources Institute



2 

Carbon Reduction Sub-Projects and Cost Savings

MAIN SESSION

▶▶ Carbon Reduction Strategies

What solutions can be implemented in Mortenson?

- ▶ Mortenson Cost & Carbon Reduction Initiative was split into 4 different sub-projects



Optimize material routing and staging plans to minimize material transport



Diesel to electric equipment conversion (buggies and skid steers)



Mortenson Truck downsizing (Company trucks)



Re-usable water bottles and coolers

▶▶ Diesel to Electric Equipment Conversion

Buggies and Skid Steers

- ▶ Mortenson site equipment third party rental services (Herc) has provided us with electric alternatives for Buggies and Skid steers that **meet HP requirements** for the BAU site operations
 - ▶ As companies such as Caterpillar/John Deere/Bob Cat Co. continue to electrify machinery, more alternatives will be available for other worksite machinery such as:
 - ▶ Forklifts
 - ▶ Pile Drivers
 - ▶ Diesel/Gas Trucks
- ▶ What are eCO₂ savings for using the electric alternatives?
 - ▶ Skid steers shave off 20.86 metric tons per 100MW (*45,988.42 lbs. eCO₂*)
 - ▶ Buggies shave off 37.34 metric tons per 100MW (*82,320.61 lbs. eCO₂*)
- ▶ Drawbacks?
 - ▶ Availability of rentals
 - ▶ Charging methods

▶▶ Mortenson Truck Downsizing

Company Trucks

- ▶ Proposed shift from Chevy Silverados to Ford Mavericks
- ▶ Why?
 - ▶ Much more affordable
 - ▶ ~\$15,000 difference in MSRP (\$35,833 vs. \$20,995)
 - ▶ Much more fuel-efficient
 - ▶ ~1/3 of gas used on Hildreth would have been sufficient for the Mavericks (\$44,688.52 gas savings)
 - ▶ Total cost savings could amount to ~\$740,000 and carbon reductions by 117.00 metric tons of CO₂ per 100 MW (*257,941.00 lbs. eCO₂*)
- ▶ Drawbacks?
 - ▶ Less payload capacity
 - ▶ Less towing capacity

▶▶ Re-usable Water Bottles and Coolers

An Alternative to Plastic Bottles

- ▶ Utilize a third-party service for hydration as opposed to purchasing cases of plastic water bottles
- ▶ Why?
 - ▶ Reduce landfill waste
 - ▶ Reduce consumption of microplastics
 - ▶ More cost-effective on sites with more workers
 - ▶ On one 100 MW site, save ~\$6,500 and reduce emissions by 3.61 metric tons of CO₂ (*7,958.68 lbs. eCO₂*)
- ▶ Drawbacks
 - ▶ Mobility around sites
 - ▶ Water sources

Final eCO₂ Emissions Cuts and Potential Cost Savings

Sub Project	Standard (Tons eCO ₂ /100MW)	Proposed Alternative (Tons eCO ₂ /100MW)	Savings (Tons eCO ₂ /100MW)	Tons eCO ₂ /2000MW
Site Equipment	175.9	117.7	58.2	1,164.1
Truck Downsizing	182.0	65.0	117.0	2,340.0
Water Bottle Alternative	3.6	-	3.6	72.2
Total in potential tons of eCO ₂ savings				3,504.1

7,725,218.13 lbs. eCO₂ per 2000 MW

Sub Project	Cost Savings/100MW	Cost Savings/2000MW
Site Equipment	\$6,961.13	\$139,222.67
Truck Downsizing	\$44,688.52	\$893,770.40
Water Bottle Alternative	\$6,542.2	\$130,844.0
Total in potential cost savings		\$1.16 million

3 

Next Steps



▶▶ Looking ahead

Feasible or Not So Much?

- ▶ Diesel to Electric Equipment Conversion (**FEASIBLE**)
 - ▶ Feasible initiative in the solar industry as fuel costs rise and emissions constraints regulations get lowered
 - ▶ Implementation can be quick and straightforward with sufficient supply of electric alternatives to meet demand
- ▶ Truck Downsizing (**FEASIBLE**)
 - ▶ Feasible project due to Mortenson's regular fleet vehicle purchases and decommissioning of old ones.
 - ▶ Extent of available fleet not used to full utility (towing, toolboxes, gas tanks, etc.) and could be replaced with more fuel-efficient vehicles
- ▶ WaterFleet (**FEASIBLE**)
 - ▶ ACTIVELY considered for upcoming projects
 - ▶ Can be implemented quickly, especially on a site in the pre-construction phase

Thank you!

Q&A Session

▶▶ Sources

1. <https://berkeleyearth.org/global-temperature-report-for-2021/>
2. <https://ourworldindata.org/co2-emissions>
3. <https://www.cnn.com/2023/07/13/weather/gallery/southern-us-heat-wave-july/index.html>
4. https://wri.org.cn/sites/default/files/styles/1260_wide/public/2022-01/half-degree-climate-warming-wri.png