



# Be a Part of the Solution

Student Greenhouse Gas Solutions at Rutgers

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# Historical Context



## Fall 2019

Students Climate Strike

President Barchi announces “he would support the students demand for Rutgers to reach zero carbon emissions by 2030”

Presidents task force on Carbon Neutrality and Climate Resilience Formed

Pre-planning report 2/3/2020

Interim report 7/13/2020

# Historical Context



## Rutgers Energy Institute

Discussed ideas of using Rutgers as a “living lab” for students to understand sustainable energy production and consumption transitions

# Advancing a Climate Action Plan through Undergraduate Research

Addressing the  
Problem

01

Coordinating the  
Students

02

Communicating  
the Results

03

# Addressing the Problem

## Fast Timeline

Put the date of creation of task force and date of intended climate plan, compare to the timeline other schools could follow

Include some of the tasks needed from the different working groups, and talk about how budgets were cut because of covid

## Low Resources

## Student Availability

With the onset of covid-19, many students were left with cancelled summer internships and programs. Entire departments of students needed experiential learning credits

# Research Needed for Climate Action Plan

## Work Needed

### **WG 2: Transportation**

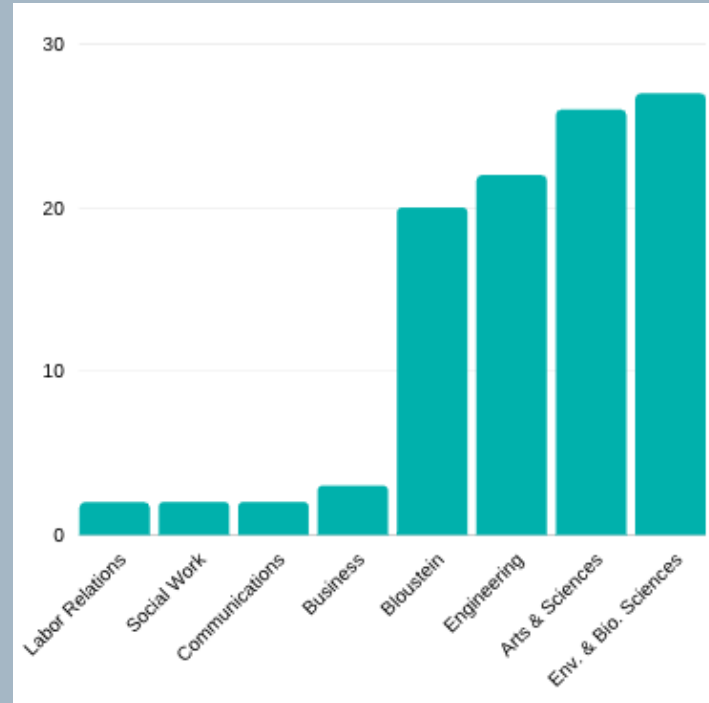
#### **Assessing Potential Climate Solutions**

1. Make recommendations for new initiatives for teaching, research, and university operations involving food systems and climate. The Working Group will identify gaps and opportunities at Rutgers for teaching and research in the area of food systems, and climate neutrality and resilience. This will include, but is not limited to:
  - a. food waste reduction
  - b. food recovery and potential benefits to local communities
  - c. influencing student food choices in Dining Halls to reduce carbon footprint while also ensuring healthy eating
  - d. anaerobic digestion and composting of food waste
  - e. water quality and climate impacts
  - f. sustainable food production
  - g. food production on campus including technological innovation for urban food production and plant breeding opportunities
  - h. food storage technologies to reduce energy for heating and cooling
  - i. food-energy-water nexus
  - j. local food system resiliency and economic opportunities

# Addressing the Problem

## Student Involvement

- 125 students expressed interest
- Evenly distributed across classes
- Interdisciplinary success!



# Student Involvement: Broad Recruitment through Institute Faculty & Student Groups



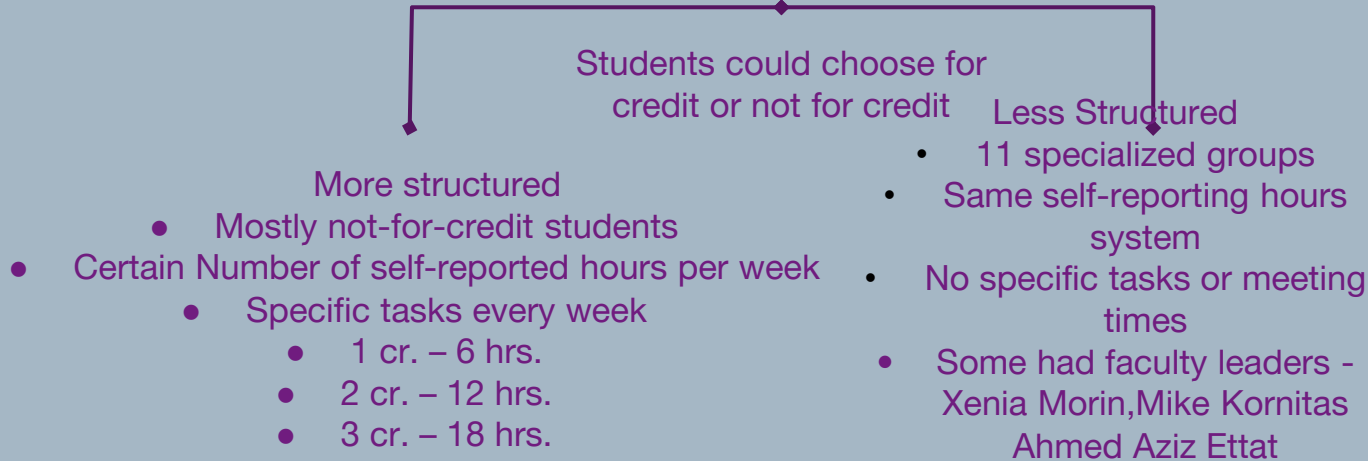
## No selection process

- Lower barriers to introduction to research
- Increase diversity of participants
- Larger number than expected
- 60 overall, 25 or so for credit



# Coordinating the Students

## Two different types of structures



# Coordinating the Students

## More structured

<p>Week July 27, 2020 and August 3, 2020</p>	<p>Tasks (work until you've met your hours – submit hours <u>July 27<sup>th</sup></u> through August 7<sup>th</sup>)</p> <p><b>Survey</b></p> <p>a) <u>Take</u> the revised survey for the Rutgers climate action plan baseline <a href="https://rutgers.ca1.qualtrics.com/jfe/form/SV_8HBhguLviHpapMh">https://rutgers.ca1.qualtrics.com/jfe/form/SV_8HBhguLviHpapMh</a> If you have a comment on the revised survey where there <u>is a</u> typo, a not clear question, or a computer programming <a href="https://docs.google.com/document/d/1UTtCwFboltifJfYhZ_b0AhwXTMotXmssBWNTulwtSs/edit?usp=sharing">https://docs.google.com/document/d/1UTtCwFboltifJfYhZ_b0AhwXTMotXmssBWNTulwtSs/edit?usp=sharing</a></p> <p><b>Food Greenhouse gas emissions</b></p> <p>a) <u>Under</u> resources for 7 27 2020 there are two excel spreadsheets. One has the emission factors for food – that is they tell you how much CO2e per kg of each kind of food (column E). One has the amounts of food Rutgers has purchased by pounds (so you will need to change those pounds to kg). Calculate CO2e the emissions from the foods Rutgers has purchased and upload those in an excel sheet in your <u>dropbox</u>.</p>
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# Coordinating the Students

## More structured

### **Power purchasing Agreements**

- a) Go to [https://drive.google.com/drive/folders/1YITewvACbtaPwOvKQoWF3olB00\\_gw2zH?usp=sharing](https://drive.google.com/drive/folders/1YITewvACbtaPwOvKQoWF3olB00_gw2zH?usp=sharing) and find a campus plan that used power purchasing agreements
- b) Using the campus plans and other sources from the internet answer the questions in the “power purchasing agreement questions” document posted in sakai. Upload in the dropbox when you are done.

# Coordinating the Students

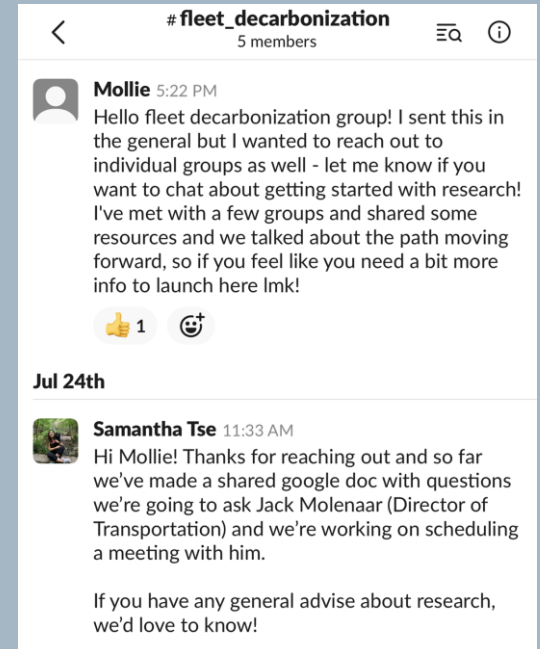
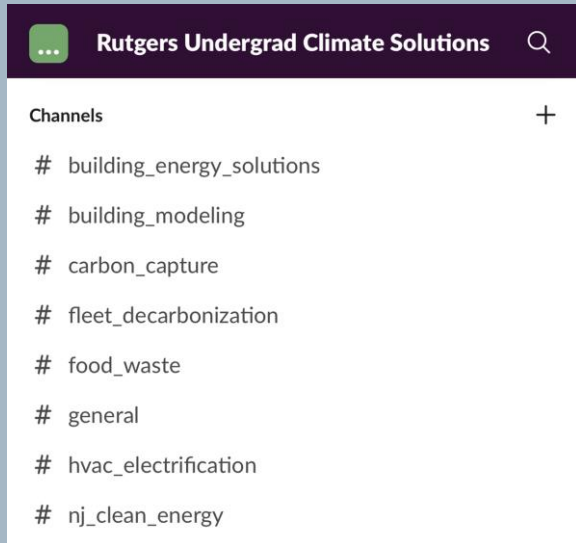
## Less Structured

- Analysis of administrative university travel records
- Analysis of switching to carbon-capturing concrete
- Analysis of Heat system electrification
- Analysis of Biking and Walking Infrastructure
- Analysis of Fleet Decarbonization
- Modeling and Analysis of Building Energy Data
- NJ Clean Energy building submissions
- Purchased Water Analysis
- Dining Hall Waste Assessment
- Getting Rutgers Buses on Google maps
- Cost-Benefit analysis of building energy solutions

# Coordinating the Students

## Less Structured

- Slack workspace was used to coordinate all projects
- Individual channels to put together specific projects
- General channels for everybody to collaborate

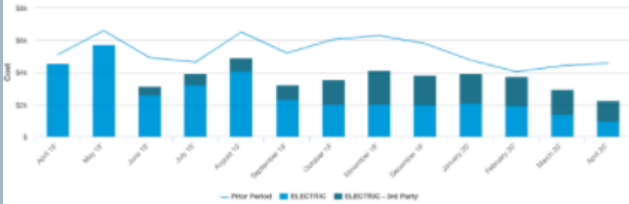


# Communicating the Results

## Facility Usage & Cost: 2019

[https://docs.google.com/spreadsheets/d/15PTOc-GKYqlurP233Zw854FIMOrGyMc0wr\\_7v](https://docs.google.com/spreadsheets/d/15PTOc-GKYqlurP233Zw854FIMOrGyMc0wr_7v)

- Rutgers New Brunswick Campus
  - January 1st 2019- December 31st 2019 (more accurate data)
- Electric
- Gas
- Water and Sewer
  - Also a category titled just "water" but that shows no data



- Diversity of Interdisciplinary research
- Familiarity with new data sets
- Application to real life
- Feeling like a part of the Rutgers sustainability community

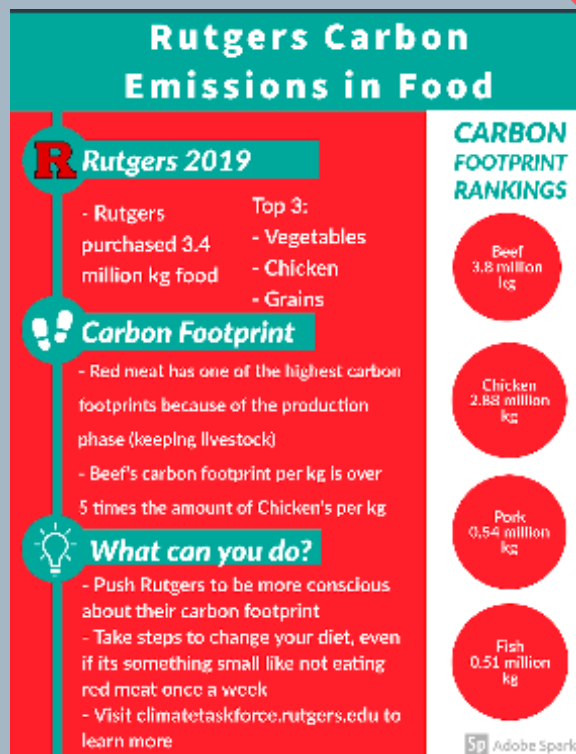
## PPC Microstructure



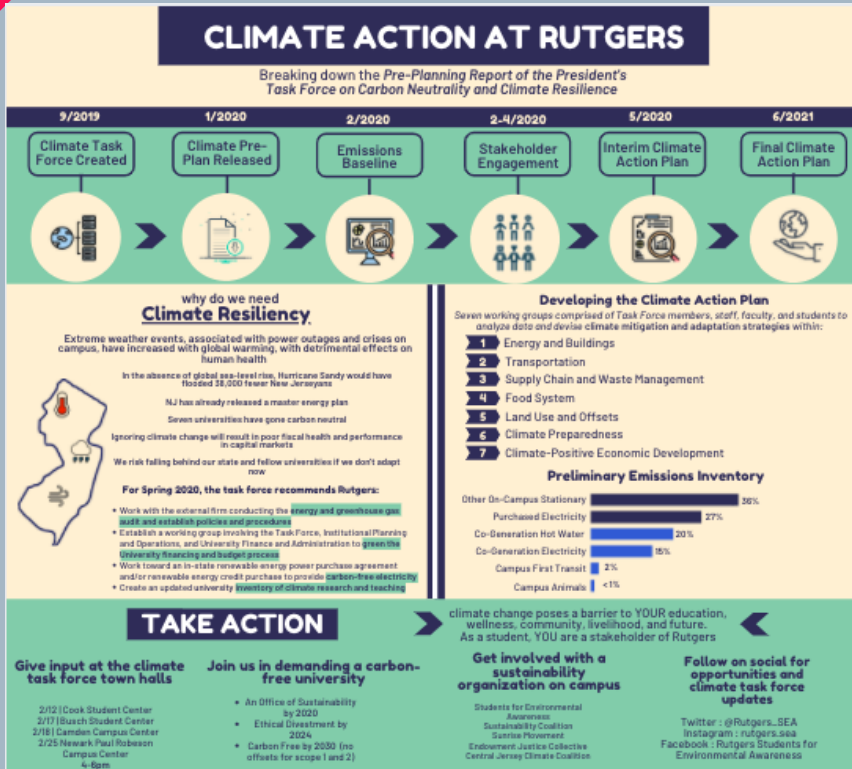
- Concrete is:
  - 12% Cement + 8% Water + 80% Aggregate
- C-S-H gel is fairly continuous and helps to bind
- C-H crystals are found within the gel and at gel - aggregate interfaces

# Communicating the Results

- Emphasis on visual displays of information
- Students learned to make infographics using adobe software
- Food waste was used as the topic of interest



# Communicating the Results



- Ties to Students for Environmental Awareness Instagram as a method of distributing research
- This post summarizing the Rutgers pre-plan reached 292 students
- Used to refer back to and educate newcomers in the sustainability community



# Communicating the Results

The use of social media to communicate findings in a visually appealing way



- Video made for a “Climate Action Week” breaking down Rutgers emissions
- Reached 212 accounts, watched by 115 individual people

# What did Students Get Out of This?

- Interdisciplinary Applications
  - Access to professors
  - Handling real data
- Integration into sustainability community
  - Real work with real impact!

Questions?

# Questions for Audience Input

Ideas for organizing broad,  
large numbers in student  
research?

Ideas for sustainable  
funding mechanism so  
there is faculty time and  
funding for research?