

UC San Diego

Capstone Papers

Title

Sustainability Ambassadors: Spearheading Student Engagement in Climate Change Education

Permalink

<https://escholarship.org/uc/item/0t73d8dh>

Author

Valdes, Tyler

Publication Date

2020-06-01

Sustainability Ambassadors: Spearheading Student Engagement in Climate Change Education

Tyler Valdes
MAS Climate Science and Policy
Capstone Report
June 2020



UC SAN DIEGO
SUSTAINABILITY
AMBASSADORS

UC San Diego



SCRIPPS INSTITUTION OF
OCEANOGRAPHY

Table of Contents

Authorship and Capstone Advisory Committee.....2

Acknowledgements.....3

Executive Summary.....4

Motivations and Background.....5

 University of California's Carbon Neutrality Initiative
 and Bending the Curve Report.....6-8

 Strategic Communication to Achieve Carbon Neutrality
 within the University of California Report.....9

 UC San Diego's Climate Action Plan
 and Sustainability Ambassadors Program.....10-12

 Global Warming's Six Americas.....13

 Education and Engagement as Tools for Positive Behavior Change.....14

 Transition to Online Learning.....15

Education and Engagement Strategies.....16

 Presentations and Workshops.....17

 Social Media.....18

 Website and Blog.....19

 Green Talks Webinar.....20

 Online Carbon Neutrality Initiative Training and Survey.....21

Survey Results and Discussion.....22-33

Recommendations.....34-37

References.....38

Authorship



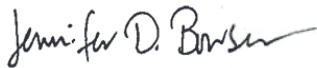
Tyler Valdes

Master of Climate Science and Policy

Scripps Institution of Oceanography

[linkedin.com/in/tylervaldes](https://www.linkedin.com/in/tylervaldes)

Capstone Advisory Committee



Jennifer Bowser | *Committee Chair*

Sustainability Engagement Manager

University of California, San Diego



Michelle Perez | *Committee Member*

Campus Energy Engineer

University of California, San Diego



Dr. Corey Gabriel | *Committee Member*

MAS Climate Science and Policy Executive Director

Scripps Institution of Oceanography

Acknowledgements

I would like to acknowledge and extend my gratitude to those who provided me mentorship, support, and expertise throughout my project.

The members of my Capstone Advisory Committee provided invaluable feedback and input that guided my project. Many thanks to Jennifer Bowser from UC San Diego Resource Management and Planning for advising me throughout my fellowship and for your dedication to educating the campus community on resource conservation. Thank you to Michelle Perez of UC San Diego Resource Management and Planning for your uplifting motivation and for sharing your expertise with the Sustainability Ambassadors. Thank you to Dr. Corey Gabriel for all of your tremendous support in my academic and professional pursuits.

My endless gratitude to the Sustainability Ambassadors, including Alicia Tam, Qianni Huang, and Bridget Rosen, for passionately volunteering and dedicating their time to supporting carbon neutrality engagement efforts. Thanks to Bridey Scully for sharing your knowledge on environmental justice with the Sustainability Ambassadors. Thank you to the Green Talks volunteers, UC San Diego Inter-Sustainability Council members, and Sustainability Resource interns for the support across many projects. None of this would have been possible without the support of an amazing campus community.

Many thanks to the entire MAS Climate Science and Policy Leadership Team and cohort. Thank you to Risa Farrell and Dr. Mark Merrifield for your endless encouragement. Thank you to Maureen McGreevy for your assistance with utilizing my capstone funds. I am beyond grateful to the members of my cohort who shared with me the joys and challenges of graduate school.

Lastly, a very special thank you to my family and friends. The years of encouragement, inspiration, and support have made this possible.

Executive Summary

UC San Diego's Sustainability Ambassadors Program: Spearheading Student Engagement in Climate Change Education

In 2013, the University of California announced the Carbon Neutrality Initiative (CNI), a commitment to achieving net-zero greenhouse gas emissions from its operations including buildings, purchased electricity, and its fleet vehicles. Inspired by CNI, The Bending Curve Report was released in 2015 and outlines ten scalable solutions for carbon neutrality and climate stability in which it highlights Societal Transformation and the need for a cultural shift through education and behavior change. In 2018, a report was released that provided key findings, opportunities, and recommendations for communications on CNI.

Among its mitigation strategies, UC San Diego's (UCSD) 2019 Climate Action Plan (CAP) calls for Behavior and Institutional Change where energy consumption habits are targeted and addressed through education and engagement. Launched in 2016, the UC San Diego Sustainability Ambassadors Program aims to support CNI and the UCSD CAP by raising awareness of UCSD's carbon neutrality efforts while encouraging students to implement sustainable living methods. Volunteer Sustainability Ambassadors work under the leadership of the CNI Student Engagement Fellow - a position I served during the 2019-20 academic year.

As the University transitioned to online learning, I focused on strengthening the Ambassadors Program's ability to remotely educate and engage students with climate change science and UCSD climate initiatives through a variety of strategies including: presentations and workshops, social media, a website and blog, a webinar, and an online CNI training and survey. Results from the survey captured students' attitudes and beliefs regarding climate change and how UCSD is addressing it. The results can be utilized to inform communication on CNI and campus climate policies in the future. In particular, I recommend the following strategies:

1. Prioritize educating incoming and first year students on CNI and campus sustainability resources.
2. Utilize a diverse portfolio of communication channels, including official campus social media accounts and campus-wide emails, to educate students on CNI.
3. Center CNI-related communications and education on local solutions that students can directly engage with and support.
4. Connect CNI efforts to other campus initiatives and issues.
5. Create a robust community-based social marketing strategy to promote positive behavior change.

Motivations and Background



University of California's Carbon Neutrality Initiative and Bending the Curve Report

History

As the emission of carbon dioxide and other greenhouse gases (GHG) contribute to accelerated changes in the climate system, communities are threatened by unprecedented environmental, economic, and social challenges. In 2007, the University of California (UC) joined many other higher education institutions in the pledge to decarbonize their campuses by 2050 when all ten campus chancellors signed the American College and University Presidents' Climate Commitment (ACUPCC).

CARBON NEUTRAL
BY
2025

Commitment to Carbon Neutrality

In response to the growing climate crisis, UC President Janet Napolitano announced the UC Carbon Neutrality Initiative (CNI) in 2013 which commits all ten UC campuses to emit net-zero GHG emissions from its operations including buildings, electricity purchases, and vehicle fleet by 2025. President Napolitano also formed a Global Climate Leadership Council to advise UC on achieving ambitious CNI goals while also providing guidance on integrating CNI and other sustainability goals in UC's teaching, research, and public service mission.

Carbon Neutrality and Carbon Offsets

Carbon neutrality means reaching a net zero carbon footprint. A net zero carbon footprint, or net zero emissions, means achieving a balance between human-produced GHG emissions and emissions taken out of the atmosphere. A net zero carbon footprint is preferably achieved by simply eliminating emissions altogether but can also be achieved through the use of carbon offsets. Carbon offsets are part of emissions reduction policies where a carbon-emitting entity can invest in projects that sequester atmospheric carbon or prevent emissions elsewhere such as the creation of renewable energy sources. The amount of carbon sequestered or avoided is subtracted from the carbon-emitting entity's own total emissions. Governments, companies, institutions, organizations, or individuals can purchase carbon offsets to negate their remaining carbon emissions after they have done everything financially and technologically feasible to reduce their emissions. For example, since 2009, UC has "reduced its emissions by 15% as student enrollment, research funding, and the medical centers [grew] considerably". While campuses continue to aggressively reduce their emissions, it is expected that they will be able to eliminate 40-60% of current emissions by 2025¹. After implementing all cost-effective emission reduction strategies, that will still leave about 40-60% of current emissions that mostly come from the burning of natural gas used for heating, which will have to be covered by carbon offsets.

Climate and Energy Policies

In 2004, UC Regents adopted the Presidential Policy on Green Building Design and Clean Energy Standard which has since evolved into today’s UC Sustainable Practices Policy (SPP). Currently, SPP includes ten policy areas: climate protection, clean energy, green building design, sustainable building operations, sustainable water systems, waste reduction and recycling, sustainable procurement, sustainable food service, transportation, and standards for UC Health locations². Prior to CNI, SPP’s climate protection goal was to reduce GHG emissions to 1990 levels by 2020 which aligns with California’s Assembly Bill 32. CNI amended the climate protection goal to include achievement of carbon neutrality for Scope 1 and 2 sources by 2025 and Scope 3 sources by 2050. According to the ACUPCC Implementation Guide, and as seen in Figure 1, Scope 1 sources refer to direct emissions that are “physically produced on campus,” Scope 2 sources refer to indirect emissions that are “mostly associated with purchased utilities”, and Scope 3 sources refer to other indirect emissions that occur from employee or student commutes and air travel funded by the campus³. The clean energy goals in SPP are explicitly stated to support climate neutrality goals outlined in the climate protection section by “reducing energy use and switching to clean energy supplies”². In summary, the clean energy policy goals include enhancing energy efficiency through 2% annual reduction of energy use intensity, increasing on-site renewable electricity generation, obtaining 100% clean electricity by 2025, and substituting 40% of natural gas in campus combined heating and power plants with biogas by 2025.²

UC Carbon Neutrality Initiative

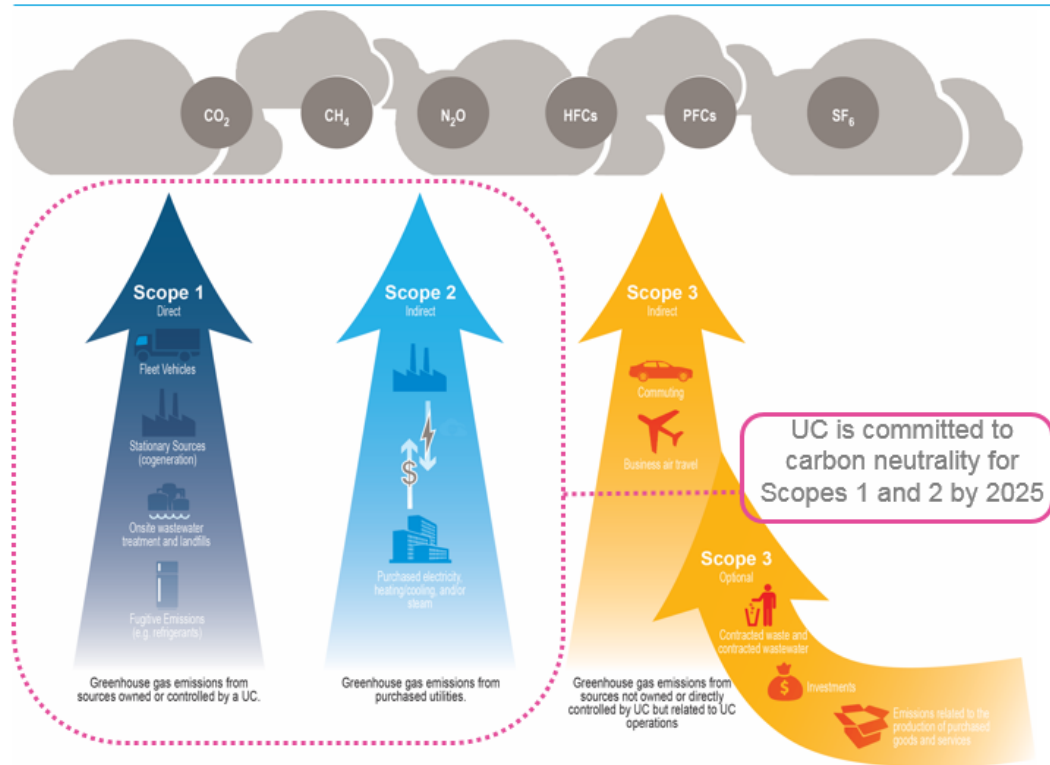


Figure 1: Graphic produced by UC Santa Cruz Physical Plant Services that visualizes UC Carbon Neutrality Initiative Scopes 1, 2, and 3 sources of GHG emissions.

Bending the Curve on Climate Change

In 2015, UC San Diego researcher Dr. Ramanathan, pictured in Figure 2, led a collaborative effort with 50 researchers and scholars across the UC campuses to identify climate change solutions which was compiled into a report known as *Bending the Curve: 10 scalable solutions for carbon neutrality and climate stability*⁴. The report's title refers to the flattening of the upward trend of human-caused GHG emissions which drive climate change. Inspired by CNI, the report outlines 10 key solutions that can be scaled up around the world and are categorized in 6 solution clusters that include: Science Solutions, Societal Transformation Solutions, Governance Solutions, Market- and Regulations-Based Solutions, Technology-Based Solutions, and Natural and Managed Ecosystem Solutions. Drawing inspiration from the State of California's ability to reduce emissions while growing its economy, the report proposes climate change mitigation strategies that promote economic vitality.

The second solution within the report states that we must "foster a global culture of climate action through coordinated public communication and education at local to global scales [and] combine technology and policy solutions with innovative approaches to changing social attitudes and behavior," highlighting the urgency and importance for education and engagement on climate change and its solutions⁴. Among all of the clusters, the Societal Transformation Solutions cluster is ranked the second most critical, above regulatory and technological solutions. In particular, the cluster calls for: energy consumption data to be transparent, accurate, and widely available; a provision of evidence-based indicators for the impacts of climate injustices; climate change education to be created and integrated across all academic levels; institutions to foster collaborative climate action where public universities invest in partnerships to educate locally for climate action; and an emphasis on local climate impacts and solutions in order to create positive behavioral change.⁴

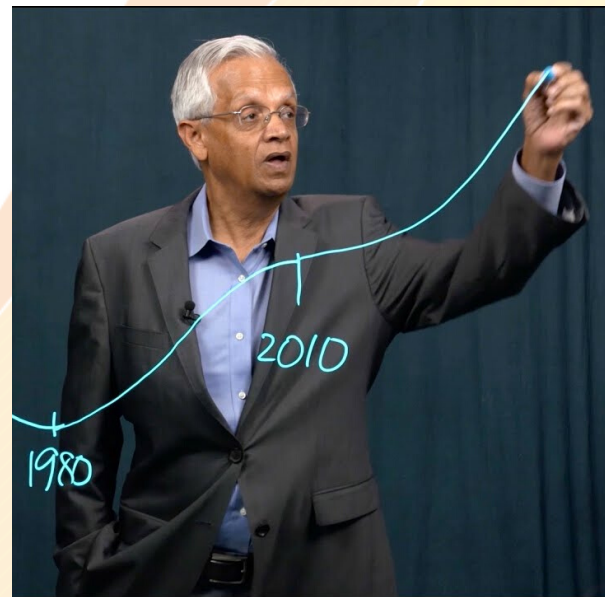


Figure 2: Photograph of Dr. Ramanathan from the UC video, 'Bending the curve' on climate change.

Creating a "Million Climate Champions"

In order to achieve the second solution highlighted in the report, UC launched *Bending the Curve: Climate Change Solutions*, a multifaceted education project that is designed to "empower a million climate champions across the world to solve the climate change problem"⁴. The project is expanding its reach as it is available as: a for-credit undergraduate course taught at UC campuses, an open-source digital textbook, and a massive open online course. Currently, the project has been implemented across 6 UC campuses and 4 universities beyond UC which has resulted in 500 students who have completed the curriculum.

Strategic Communication to Achieve Carbon Neutrality within the University of California Report

As the UC pledged to achieve net-zero GHG emissions from its on-campus operations and purchased energy by 2025, it became evident that engagement across the community of students, staff, and faculty would be essential in supporting carbon neutrality. In order to foster awareness of and participation in CNI, a diverse team of experts across the UC campuses investigated communication challenges and opportunities through analysis of campus news, interviews, surveys, workshops, focus groups, and data visualization testing. In July 2018, the TomKat Strategic Communication Working Group released a report titled *Strategic Communication to Achieve Carbon Neutrality within the University of California* which provided key findings, opportunities, and recommendations for improving communications on CNI within the UC⁵. Notably, the report provides a UC collaboratory framework where it suggests making "campus energy solutions" a core focus to have the greatest impact on the UC community engagement with CNI⁵.

“

Key Recommendation:
Develop information-rich communication resources that give CNI champions a big picture view of potential solutions and empower them to share ideas and engage others in creating solutions.

”

Among its key findings, my project was driven by the report's claims that "potential champions of the CNI need concrete and actionable information about the measures to achieve carbon neutrality," and "local solutions are highly valued, including on-campus energy efficiency and renewable energy."⁵ Therefore, I focused on providing students with individual actions that can be taken to support CNI and highlighted on-campus energy solutions that are being spearheaded by students and staff.

The report identifies a wide range of communications-related recommendations to help achieve UC carbon neutrality goals of which the most salient for my project were:

- Communicate solutions
- Provide actionable tips on how an individual on campus can make a change
- Put potential individual actions into a realistic, honest context in order to engage individual in the CNI
- Continue to conduct periodic research on campus attitudes, and behavioral changes, and levels of involvement as they relate to the CNI
- Develop venues for editorial coverage about challenges that need to be overcome to achieve carbon neutrality

UC San Diego's Climate Action Plan

In 2008, UC San Diego (UCSD) approved the first campus Climate Action Plan (CAP) to implement strategies to meet State of California and UC climate policies⁶. As a living document that is continually evaluated, assessed, and updated, the CAP was updated as of February 2019 to include GHG emissions inventory results through calendar year 2017, projected emissions forecasts, and proposed climate change mitigation strategies⁶. CNI sets that target by which UCSD aligns its CAP to approach UC climate protection goals. While the CAP sets out a path to carbon neutrality through a diversified portfolio of carbon reduction measures as seen in Figure 3, it also provides a cost effective approach to meet UCSD's future energy needs as the campus grows and evolves. In its Executive Summary and Introduction, the CAP emphasizes the necessity of support from campus leadership, faculty, students, and alumni to help ensure the campus meets its

“*Good communications will play a key role in making sure that there is a campus wide knowledge of and commitment for the UC [CNI] and the campus' [CAP]*”

commitment to climate change mitigation. In particular, the CAP highlights Behavior and Institutional Change as a one of its nine primary Mitigation Strategies. My project's educational strategies, including the CAP 1-pager seen in Figure 4, were directly driven by the CAP's specific strategies including:

- Behavior change drivers: Establishment of systems or programs that encourage/compel staff, students and faculty to adjust their energy consumption habits⁶.
- Behavior change actions: Those personal actions that directly save energy or can directly result in carbon emission reduction (e.g. campus commuting)⁶.

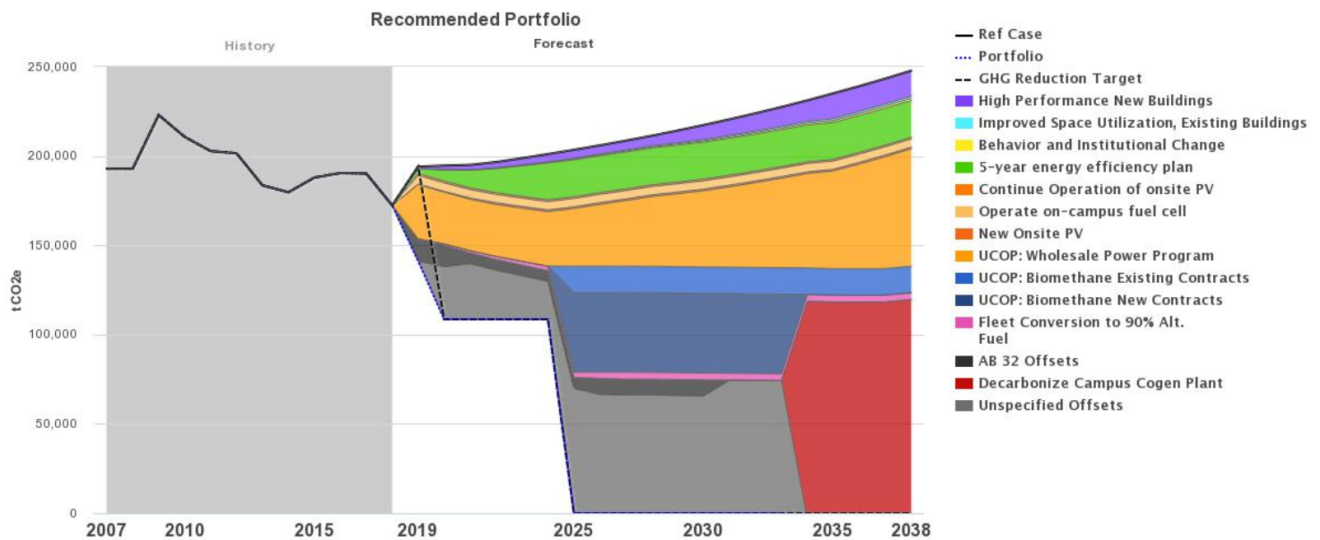


Figure 3: Scope 1 and 2 GHG Abatement Wedge from UC San Diego's Climate Action Plan

UC SAN DIEGO CLIMATE ACTION PLAN

Carbon Neutrality Initiative

The University of California aims to end the impact of fossil fuels by emitting **net-zero greenhouse gas emissions** from its buildings, vehicle fleet, and electricity purchases by 2025.



UC San Diego's Goals

- Reach its 1990 greenhouse gas emission levels by 2020.
- Buildings, campus fleet, and purchased electricity carbon neutral by 2025.
- Campus commute and business air travel carbon neutral by 2050.

Mitigation Strategies



Building Energy Efficiency

Upgrades to existing buildings and high performance standards for new buildings.



Renewable Energy

Inclusion of biogas and possible expansion of photovoltaic infrastructure.



Behavior & Institutional Change

Encourage students, staff, and faculty to adjust their energy consumption habits.



Commute Options & Air Travel

Increase public transit, campus shuttle, bicycling, and walking. Reduce air mileage.



Campus Fleet

Alternative fuel vehicles and infrastructure and electrical vehicle charging stations.



Space Utilization

Centralized space management system and redesign of inefficient spaces.

View the complete Climate Action Plan online at tinyurl.com/ucsdcap2019

Learn more at sustainability.ucsd.edu



Figure 4: A one-pager produced by the UC San Diego Sustainability Ambassadors Program which provides a high-level overview of the campus Climate Action Plan in order to raise awareness of it and inspire students to explore other campus climate initiatives.

UC San Diego's Sustainability Ambassadors Program

The Sustainability Ambassadors Program is a registered campus student organization sponsored by the UC Office of the President's CNI and the UCSD Sustainability Office. Volunteer Ambassadors work under the direction of the CNI Student Engagement Fellow and the Sustainability Program Office. I served as the 2019-20 CNI Student Engagement Fellow. During fall quarter, I recruited and trained three ambassadors through discussion-based seminars to enhance their literacy on climate change impacts and solutions so that they can begin educating and engaging the campus community in the winter and spring quarters.

The Sustainability Ambassadors Program aims to educate and engage students through peer education and programming to raise awareness of CNI and UCSD's carbon neutrality efforts while encouraging students to implement sustainable living methods. Ambassadors promote climate action and energy conservation through campus-wide presentations, an annual climate change symposium known as Green Talks, social media, and other collaborative projects. As the UC system transitioned to online learning in response to the public health crisis, we centered our focus on strengthening our online presence and ability to educate students remotely.



Figure 5: Sustainability Ambassadors toured the UC San Diego Energy Innovation Park with Campus Energy Engineer, Michelle Perez, on November 13, 2019 as part of the program training curriculum. Pictured from left to right: Qianni Huang, Alicia Tam, Bridget Rosen, and Tyler Valdes.

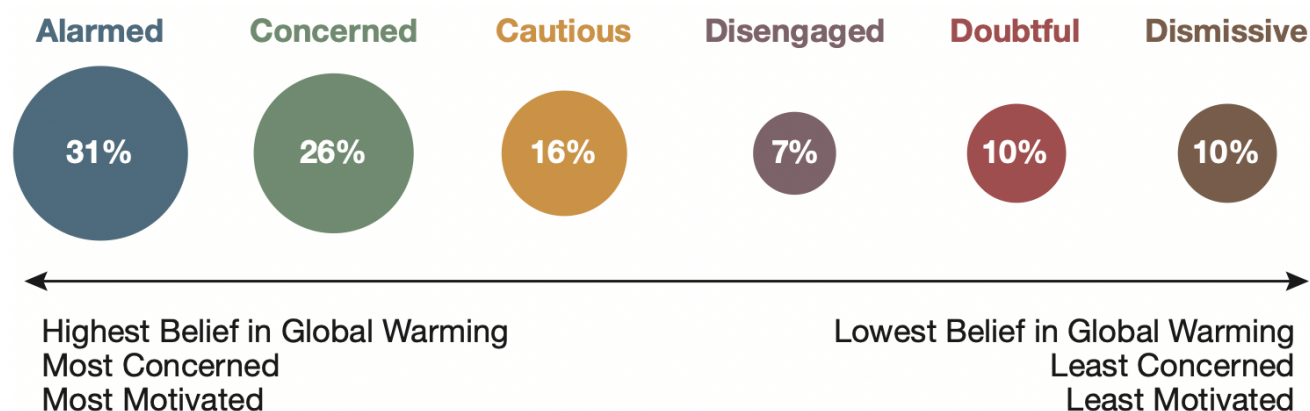
Global Warming's Six Americas

It is essential to understand your audience in order to create effective communication - this principle inspired the Yale Program on Climate Change Communication to research climate change engagement with the American public⁷. The research resulted in the identification of "Global Warming's Six Americas" or six unique audiences that each respond to climate change and engage with the issue in their own distinct way:

- **Alarmed** - fully convinced of reality and threat of climate change and are currently taking action⁷
- **Concerned** - convinced of climate change but are not likely engaging with the issue⁷
- **Cautious, Disengaged, and Doubtful** - represent various levels of understanding and acceptance of climate change, and none of these audiences are actively involved with addressing it⁷
- **Dismissive** - do not believe climate change is happening and are actively opposing efforts to address it⁷

The six audiences were first identified using a national survey on American adults in 2008 which was repeated in 2019. The survey included measures of the "public's climate change beliefs, attitudes, risk perceptions, motivations, values, policy preferences, behaviors, and underlying barriers to action"⁷. As seen in Figure 6, as of November 2019, a majority (57%) of American adults are among the Alarmed and Concerned audiences whereas 33% are among the middle audiences and 10% belong to the Dismissive audience. In comparison to the 2008 survey results, it is clear that American adults have generally shifted toward the Alarmed category.

While the Six Americas framework is utilized by climate educators across the United States, it particularly influenced my project by inspiring me to conduct a survey on UCSD students in order to gauge their attitudes toward climate change and uncover how they would like to personally engage with climate initiatives on campus.



November 2019. Base: Americans 18+ (N = 1,303).



Figure 6: Graphic by the Yale Program on Climate Change Communication which shows how American adults' are distributed among the six audiences as of November 2019.

Education and Engagement as Tools for Positive Behavior Change

The importance of individual actions is often overlooked in conversations about climate change as people tend to focus on the large-emitters such as governments and companies. However, collective action, attitudes, and behaviors can heavily influence large-emitters that have the power to make significant reductions in GHG emissions. For example, car manufacturers will stop producing traditional gasoline vehicles if people are not buying them because they have either purchased an electric vehicle or use

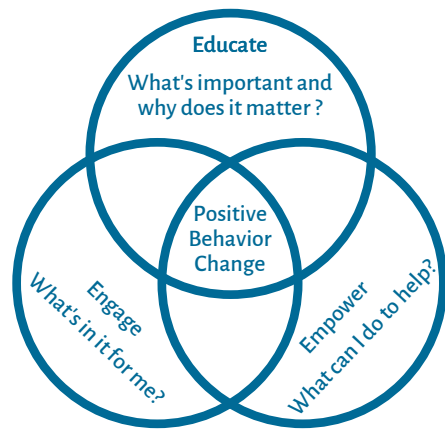


Figure 7: Venn Diagram representing the intersection of education, engagement, and empowerment

alternative modes of transportation such as public transit, biking, or walking. While students may pursue sustainable habits on their own, policy interventions coupled with education can influence behaviors that drive climate action and promote campus sustainability. For example, UCSD may invest in increasing recycling and composting infrastructure to meet zero waste goals as mandated by SPP, but if students do not properly dispose of their waste, it can result in contamination that requires all of the waste to be sent to the landfill. Community education along with proper signage can prevent contamination and improve waste diversion rates. This example can be applied to many areas of campus sustainability including energy, water, or transportation where the ultimate goal of education and engagement is to encourage

behaviors that support sustainable infrastructure and reduce resource consumption. Behavior change campaigns should focus on messaging that appeals to students' values, while also building a sense of self-efficacy in their ability to take individual action⁸. By promoting campus climate actions and solutions rather than impacts or failures, we can cultivate positive emotions that drive positive behavior changes.⁹

Moreover, the International Association for Public Participation developed a framework, as seen in Figure 8, that identifies five levels of community engagement and clarifies the role of the public, or community, in planning and decision-making¹⁰. Although the Sustainability Ambassadors Program primarily aims to directly inform students on campus climate initiatives, the framework inspired my project to include consultation in the Program's mission by obtaining student feedback about UCSD's climate action efforts through a training and survey. As key stakeholders, it is crucial that students' input are considered in climate action planning and are frequently solicited as opinions and ideas change over time.



Figure 8: International Association for Public Participation's Spectrum of Public Participation

The Transition to Online Learning

On March 9, 2020, UCSD Chancellor Pradeep Khosla announced that all spring quarter lectures and discussion courses will be delivered online and provided guidelines for gatherings and university-hosted events in response to the COVID-19 pandemic. As UC transitioned to online learning, virtually all campus events and opportunities for in-person education and engagement were cancelled or postponed. As a CNI Student Engagement Fellow, many of my plans for on-campus events and future projects were deeply effected and were required to be redesigned or postponed.

A New Path Forward

As the world entered a period of great uncertainty and organizations were challenged with detrimental economic impacts, my internship with the Port of San Diego's Energy and Sustainability department was consequently discontinued along with my original capstone project. Therefore, I transitioned my capstone project to align with the CNI Student Engagement Fellowship I completed during the 2019-20 academic year where I focused on improving the Sustainability Ambassadors Program and its ability to continue its mission remotely. Within a new and relatively short time frame, I aimed to add value to the UCSD Sustainability Program Office's engagement efforts and support CNI through my capstone project.



Photo credit: Bongkarn Thanyakij



Education and Engagement Strategies

Presentations and Workshops

Historically, the Sustainability Ambassadors Program's primary form of education and engagement has been achieved through in-person presentations and workshops. During fall quarter, I updated our educational content to introduce the problem of climate change, highlight solutions UCSD is pursuing to address it, and offer practical actions that students can take to support CNI goals. During winter quarter, Ambassadors and I hosted Lunch and Learns, presentations to various campus organizations, and a workshop for a sorority. After our programs, we invited participants to complete a feedback survey to help us improve our efforts. According to the results from winter quarter surveys, 97.5% of participants agreed to the statement "I understand how climate change impacts me", 76.9% of participants agreed to the statement "I understand what my campus is doing to address climate change, and 92.3% of students believe that their personal actions and choices can contribute to solving climate change. General verbal feedback and free response comments from the survey were notably positive and indicated feelings of inspiration and eagerness to learn more.



61.5 %

of participants heard about CNI for the first time from our presentations and workshops



Social Media



Social media serves as a primary communication channel for many student organizations and campus departments. When I began as the CNI Student Engagement Fellow, there was a Facebook page for the Sustainability Ambassadors. In January 2020, I created an Instagram account for the UCSD Sustainability Ambassadors in order to expand our reach and promote our in-person programs. I aimed to maximize our education and engagement by creating consistent branding and visually appealing content that provides information and various call-to-actions for followers. As UC transitioned to online learning, the Ambassadors and I continued to create content that included: climate change memes, energy saving tips, promotion for Green Talks, and current events related to climate and energy solutions. Through promoted posts, I used our social media platforms to drive traffic toward other projects led by my team which included the Green Talks website, UCSD Sustainability Ambassadors website and blog, and online CNI training.

Contests and Photo Challenges

During stay-at-home public health orders, students' actions and behaviors no longer impact UCSD's carbon neutrality efforts as they are not on campus. Therefore, I utilized online contests and photo challenges to encourage sustainable behaviors and attitudes that can be continued when UCSD transitions to in-person learning. We had 25 Earth Day challenge participants and 8 participants for our photo contest that encouraged our followers to partake in more activities that do not require gas or electricity.

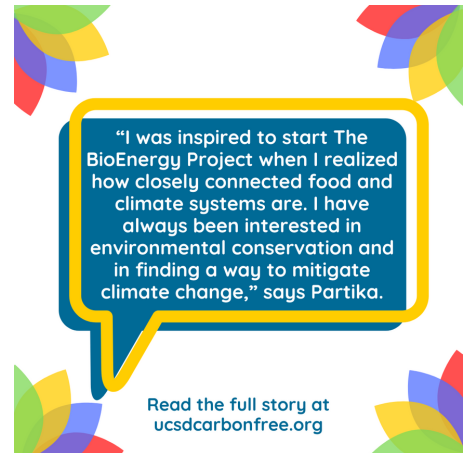
Within first 5 months of Instagram profile launch:

500+ followers

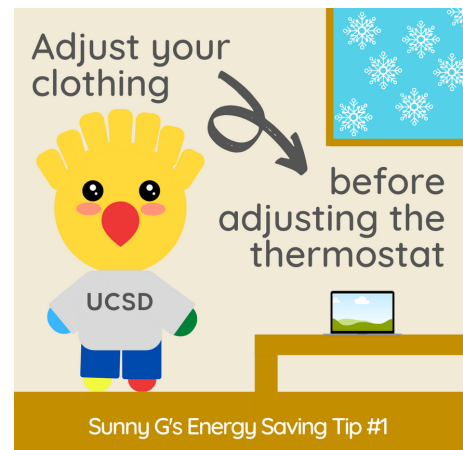
110+ views on videos

1130+ total likes

Example Posts



Today's Climate Conversations highlight! Head over to our blog to read more - link in our bio.

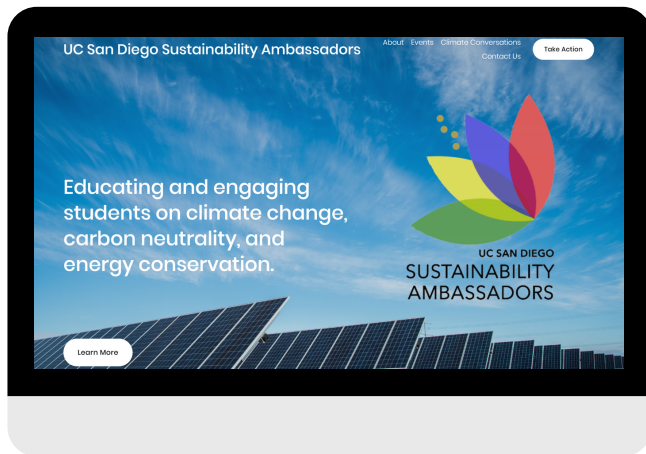


Did you know that 48% of the average U.S. home's energy usage comes from heating and cooling? Now that many of us are working or studying from home, it's more important than ever to remember to conserve energy. If you are feeling cold, put on your cozy clothes or wrap up in a warm blanket. Try wearing lighter clothing such as shorts or tank tops on warmer days. By adjusting your clothes before adjusting the thermostat, you can save lots of energy, money on your utilities bill, and the planet!

Website and Blog

I created an official website for the UCSD Sustainability Ambassadors Program which is accessible at ucsdcarbonfree.org. The website serves as a virtual home for the organization and provides avenues for Ambassadors to carry out the program's mission such as a presentation/workshop request form, link to an online CNI training, contact form, and events page. The website also highlights a *Take Action* page which walks visitors through four steps to take action on climate at an individual level:

1. **Understand what's happening** - directs visitors to our presentation/workshop request form and online CNI training so they can develop a fundamental understanding of climate change and its solutions.
2. **Discover your impact** - directs visitors to a carbon footprint calculator so they can identify areas in their life that contribute the most and least to climate change.
3. **Reduce your impact** - directs visitors to UCSD's Sustainability page where recommended actions are listed.
4. **Inspire others** - encourages visitors to share their knowledge and experience with others in order to grow the climate movement and directs them to our blog and social media.

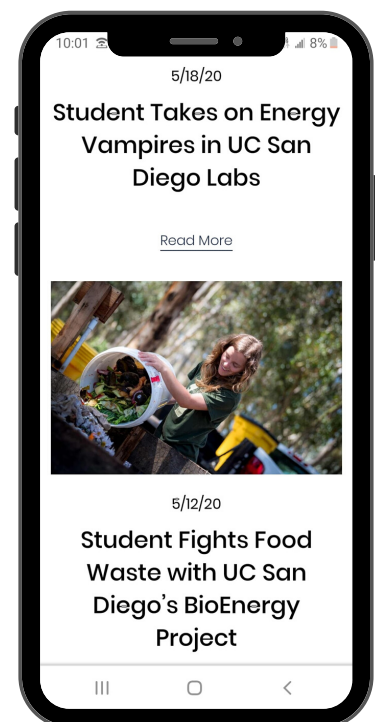


Within the first two months of website launch:

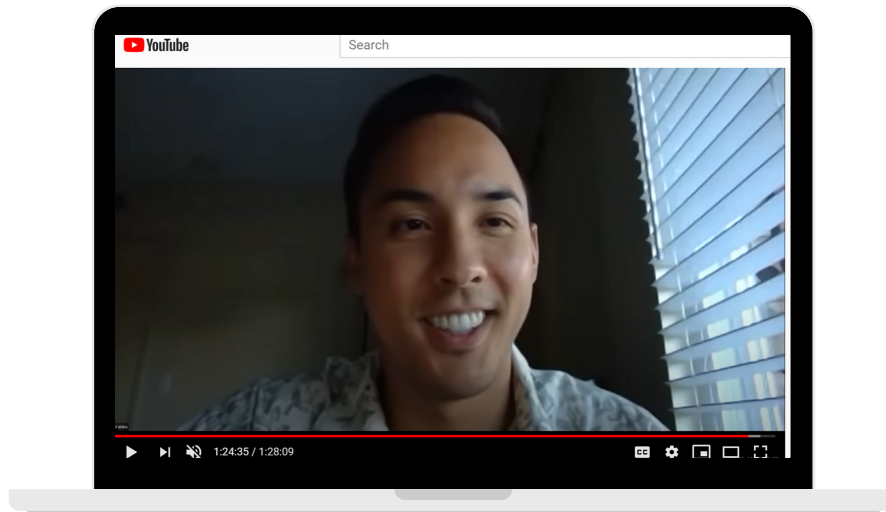
200+ unique website visitors **240+** website visits **690+** pageviews



Using the website as a platform, my team launched Climate Conversations, a blog that highlights student writings on all things climate-related ranging from food waste to energy conservation. I invited UCSD students to share their articles. The vision is to provide an online forum for healthy discussion on campus climate initiatives and to amplify student voices.



Green Talks Webinar



Green Talks is UCSD's TED-style talk that educates and engages the campus community on various sustainability issues, and inspires action toward addressing the climate crisis. Green Talks is an annual event that is directed and hosted by the Sustainability Ambassadors in collaboration with the UCSD Inter-Sustainability Council. While it is usually an on-campus event with an average attendance of about 150 community members, it went virtual in response to the public health crisis. As CNI Student Engagement Fellow, I co-directed Green Talks and led the transition to online platforms.

Rather than having speakers give live presentations in front of an audience, we requested speakers to send in recorded presentations that were uploaded to the Green Talks website and Youtube for students to watch. Presentation topics ranged from carbon negative vodka to creating a zero waste society. After watching the recorded presentations, students were able to submit questions that would be answered by speakers in a Live Q&A that took place on May 13th, 2020. I moderated the first ever Live Q&A with a panel of sustainability professionals as part of the 5th Annual Green Talks.

The Green Talks 2020 speakers and panelists included: Leah Thomas from Patagonia, Sam Chereskin from Misadventure and Company, Shawn Fettel from I Love A Clean San Diego, Dr. James Danoff-Burg from The Living Desert Zoo and Botanical Gardens in Palm Desert, Dr. Tony Pereira, PhD and Fulbright Scholar, and Enid Partika from UCSD.

The Green Talks Planning Committee also hosted an online art contest that asked students to submit their vision of climate action and sustainability in any art form. We received 8 submissions that included a graphic design, a photograph, hand crafted items, and paintings.

Engagement Results:

575+ website visits
370+ from unique visitors
 between April 30 - May 20, 2020

700+
 total views on Green Talks promo video, speaker presentations, and Live Q&A as of June 3, 2020

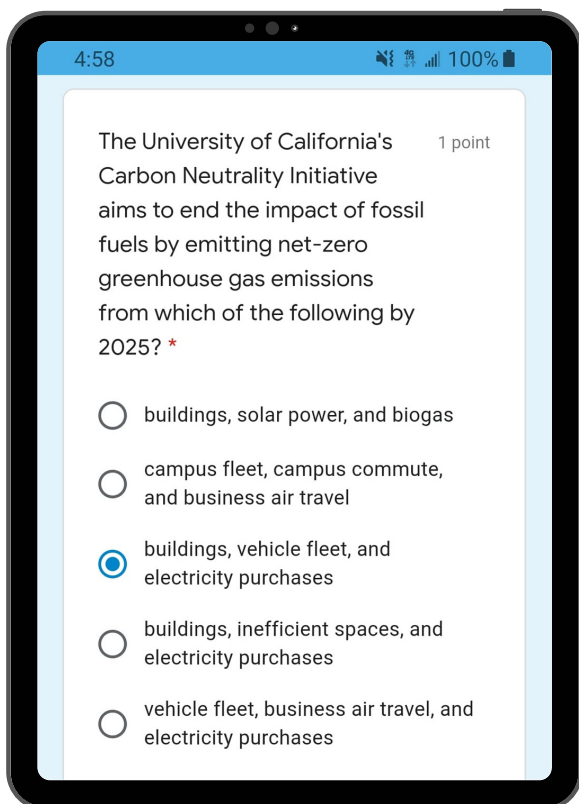
Online CNI Training and Survey

In order to overcome the challenge of virtual engagement, I created an online, self-guided training for students to take at their own pace and on their own time. The training provides a high-level overview of climate change causes and impacts, carbon neutrality and carbon offsets, UCSD's climate action plan, campus energy solution highlights, and energy conservation tips. Additionally, I included a brief, mandatory survey with several optional free response questions as I saw the opportunity to capture students' attitudes and beliefs regarding climate change and how UCSD is addressing it.

Within first 10 days,
nearly

100

students completed
online CNI training



Before launching the training and survey, I solicited feedback and input from my Capstone Advisory Committee, other CNI Fellows, and the Sustainability Ambassadors in order to make revisions and create an effective educational tool. Once it was ready to be distributed, I promoted the training on the Sustainability Ambassadors social media accounts, to my personal network, and targeted emails. In order to incentivize participation in the training and survey, I utilized funds to offer solar-powered phone chargers for those that successfully completed the training with a 90% score which also encouraged students to attentively go through the material without rushing. The training consisted of two short videos and graphics and was intentionally designed to take approximately 15 minutes to complete as it was originally planned as an online alternative to the Sustainability Ambassadors Program presentations which usually take 15 minutes.

The training is accessible at:
tinyurl.com/ucsdcarbonfree

Highlighting Campus Energy Solutions

Within the training, I promoted several campus energy solutions led by staff and students.

- **Green Labs and Green Office Programs** - help laboratories and offices reduce their resource consumption and improve efficiency.
- **Shut the Sash Campaign** - led by CNI Research Fellow Quiana Stodder, the program implements fume hood sash alarms that alert lab members when a fume hood sash has been left open to avoid wasted energy. Since fume hoods interact with the heating, ventilation, and air conditioning system, they have a high impact potential on overall building energy consumption.
- **The BioEnergy Project** - led by CNI Research Fellow Enid Partika, the project includes a small scale anaerobic digester that diverts food from landfills and produces renewable biogas. To date, the project has converted 23,000+ lbs of campus food waste into biogas and has sequestered 5.6 metric tons of CO₂.



Survey Results and Discussion

Student Demographics - Major

Students that completed the survey and training spanned across various academic majors with the largest portion belonging to environmental-related majors such as Environmental Studies, Climate Science and Policy, and Marine Biodiversity and Conservation.

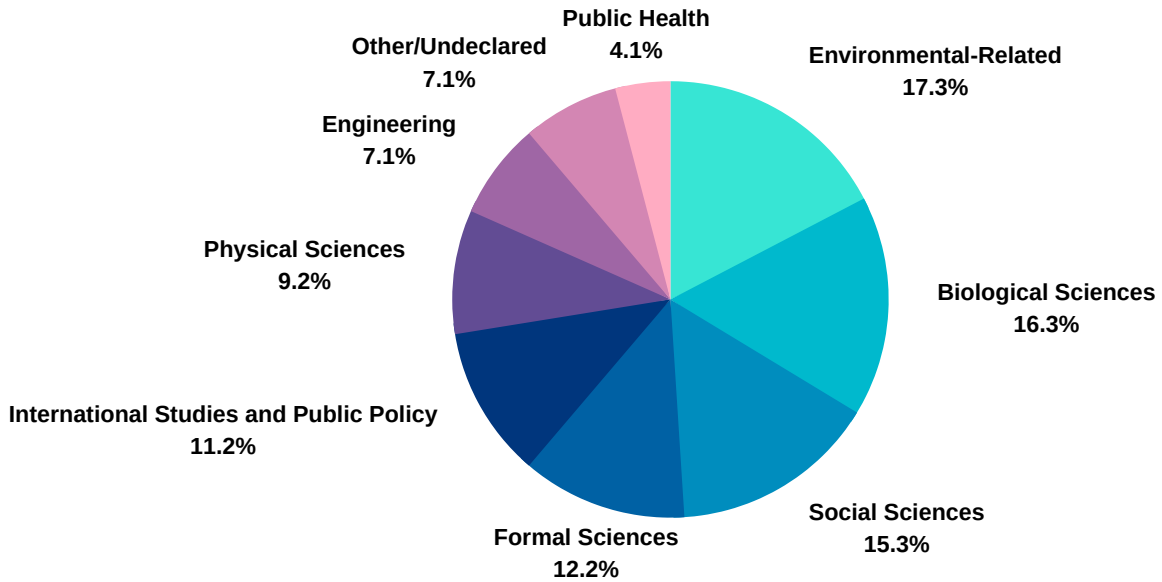


Figure 9: Response to the question "What is your major/field of study?" (n=97)

Student Demographics - Academic Level

Students that completed the survey and training also spanned across various academic levels with the largest portion being graduate students then followed by 4th year undergraduates and 3rd year undergraduates. The smallest portion belongs to a few incoming students that learned of the training, despite not starting their studies at UCSD yet.

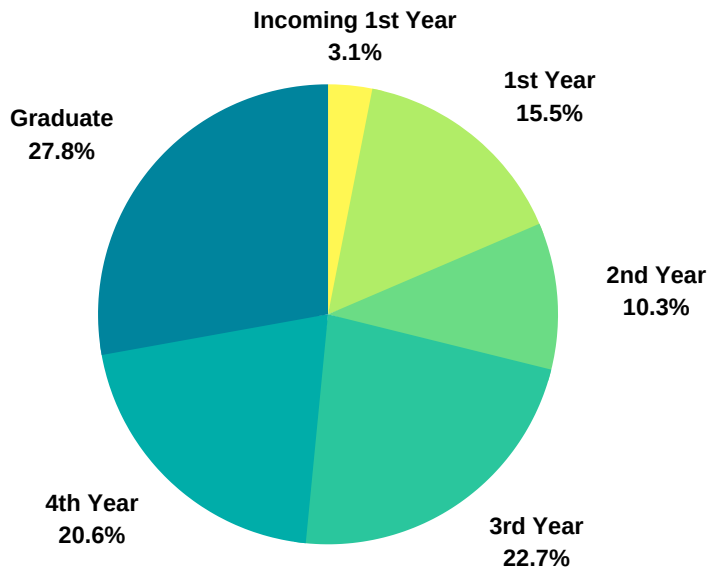


Figure 10: Response to the question "What is your academic level?" (n=97)

How Students Heard About the Online CNI Training

Students were most likely to hear about the training from Facebook where the Sustainability Ambassadors and I shared the training ad on several UCSD-related Facebook Groups and Pages. The second largest platform that informed students about the training was through their friends who likely shared it with them personally. Email was the third most common way to hear about the training as the Sustainability Ambassadors and I emailed several professors and campus departments about it to share with their networks. Instagram was the fourth most common way for students to learn about the training as we posted it on our profile as a post and on our story. The least common platform was from our website which included a link to the training.

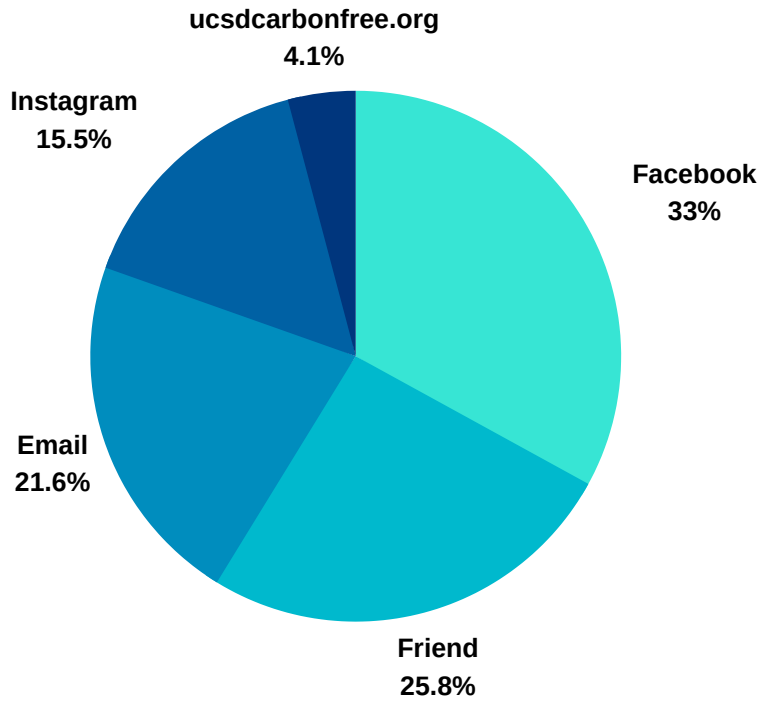


Figure 11: Response to the question "How did you hear about this training?" (n=97)

Global Warming's Six Americas

An overwhelming majority (85.6%) of students that completed the training identified with the Alarmed and Concerned audiences of Global Warming's Six Americas which are the two that believe the most in global warming, are the most concerned, and are the most motivated to do something about it. A small portion (12.4%) of the participants identified with being Cautious which do not see global warming as a personal threat or tend to worry about it.

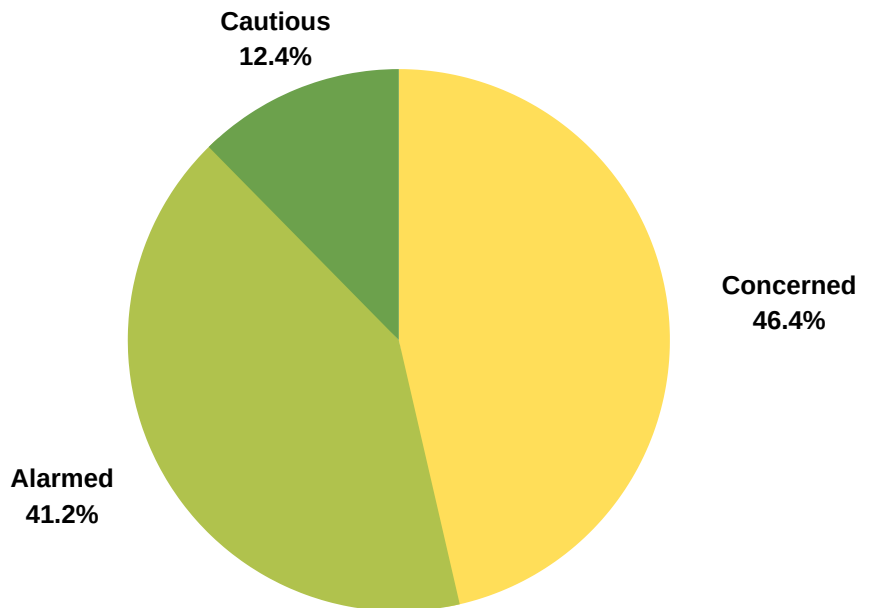


Figure 12: Response to the question "Which of the following attitudes toward climate change do you most closely identify with?" (n=97)

Level of Understanding Before Training

Before beginning the training, students were asked to rank their understanding of climate change and carbon neutrality on a scale of 1 to 5 with 1 = "Little to no knowledge" and 5 = "Very knowledgeable." According to the responses, a majority (71.1%) of students ranked themselves at a moderate to high level of understanding with 3 or 4 as their selection. A smaller portion of survey respondents ranked themselves at the high understanding end of the spectrum with 15.5% of students selecting 5 or "Very knowledgeable." Toward the low understanding end of the spectrum, 13.4% of respondents ranked themselves at 1 or 2.

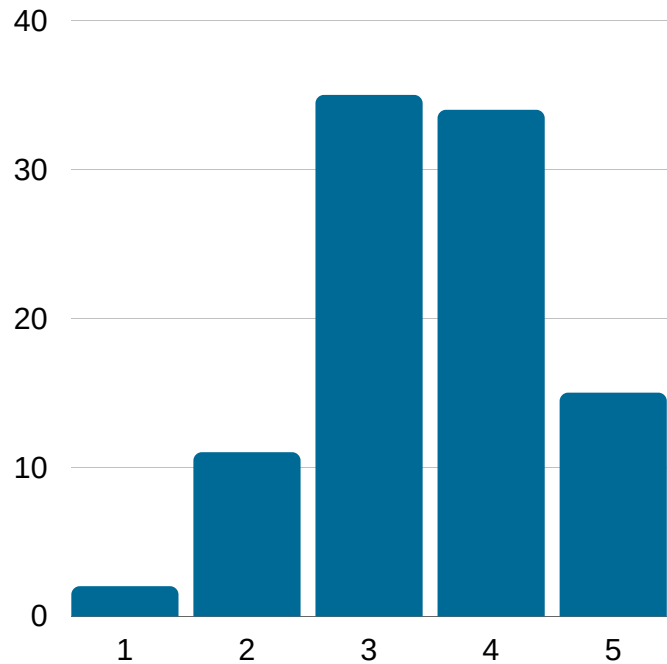


Figure 13: Response to the question "How would you rank your understanding of climate change and carbon neutrality before this training?" (n=97)

Level of Understanding After Training

After completing the training, students were asked to rank their understanding of climate change and carbon neutrality again on the same scale of 1 to 5 with 1 = "Little to no knowledge" and 5 = "Very knowledgeable." No participant ranked their level understanding as little to no knowledge and only 6.2% of participants ranked their level of understanding at a moderate to low level of understanding with 2 or 3 as their selection. A majority of students ranked themselves at a high to very high level of understanding with 4 or 5 as their selection. The clear shift in ranking of understanding toward "Very knowledgeable" indicates that the training succeeded in providing information to students that aided their understanding of climate change and carbon neutrality.

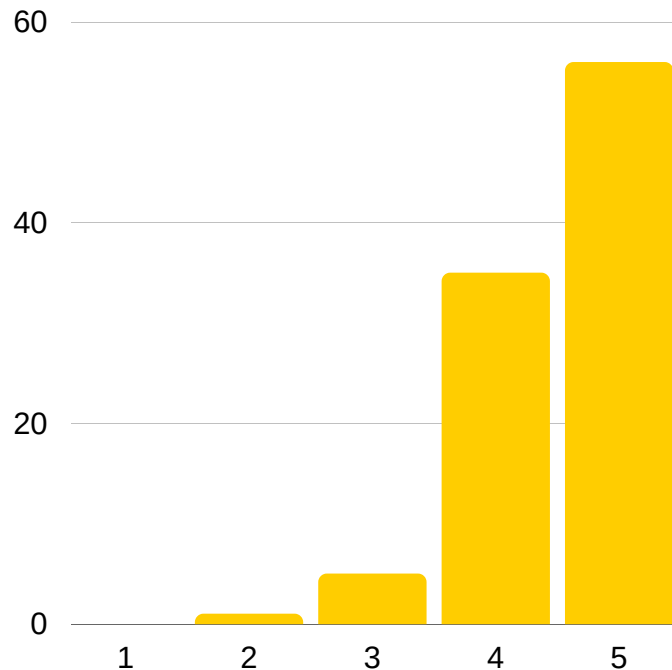


Figure 14: Response to the question "How would you rank your understanding of climate change and carbon neutrality after this training?" (n=97)

Awareness of Campus Climate and Energy Initiatives

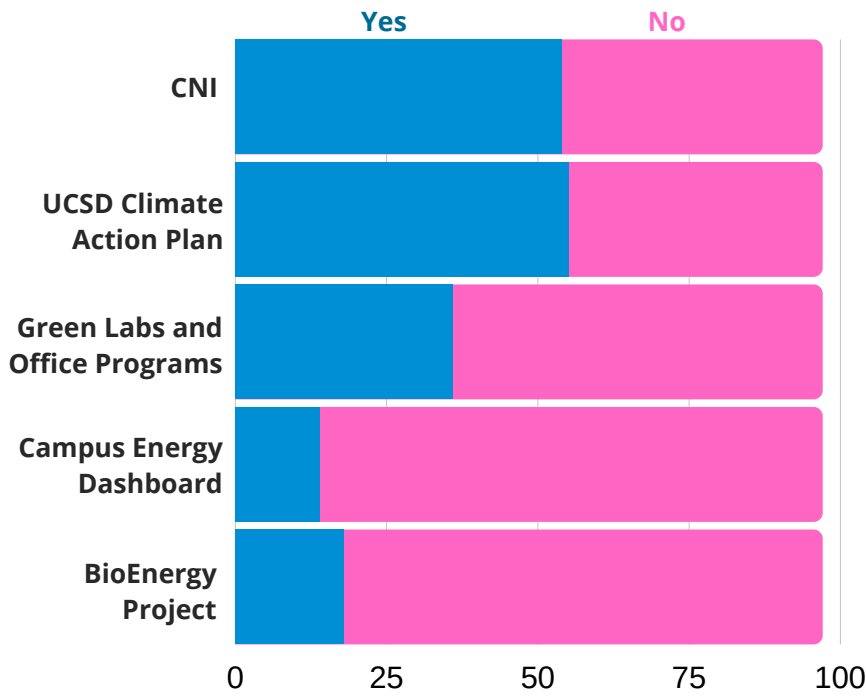


Figure 15: Response to the question "Were you aware of the following initiatives before the training?" (n=97)

After completing the training which overviewed the initiatives seen in Figure 15, students were asked if they were aware of them before the training. Both CNI and the UCSD CAP had a majority of students who have already heard of them before the training. However, the Green Labs and Office Programs; Campus Energy Dashboard; and BioEnergy Project all had a majority of students who have not heard of them before the training. Students that have heard of the initiatives indicated that they learned of them from a variety of sources with the most common being UCSD courses, student organizations, emails, flyers, and friends.

Personal Understanding and Beliefs

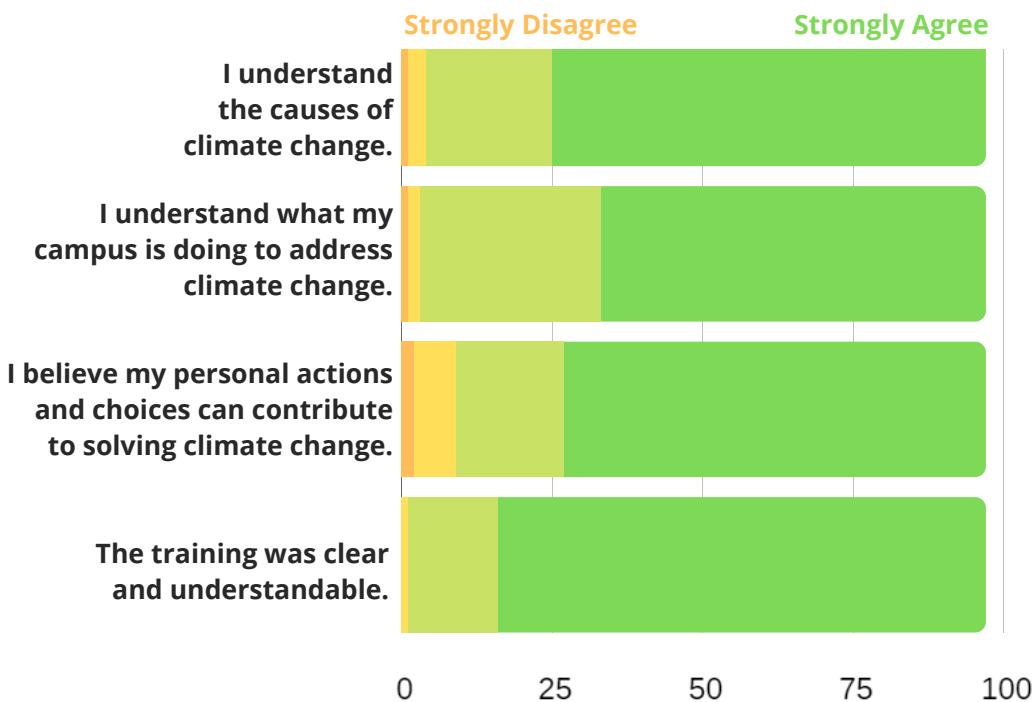


Figure 16: Likert Scale responses to various prompts. (n=97)

After completing the training, students were asked about their personal understanding and beliefs regarding climate change by ranking their agreement to the prompts seen in Figure 16 on a scale of 1 to 5 with 1 = "Strongly Disagree" (orange) and 5 = "Strongly Agree" (green). An overwhelming majority of students responded with "Agree" or "Strongly Agree" for each prompt, indicating that they understand the causes of climate change, what UCSD is doing to address it, and that their personal actions and choices can help solve it. The training was perceived to be clear and understandable by participants as 98.9% agreed or strongly agreed with the final prompt.

Climate Action Benefits that Students Value

Inspired by the City of San Diego's Climate Action Plan survey, the online CNI training survey asked students about the benefits of climate action that they value the most. Students were able to select more than one option. As seen in Figure 17, the benefit that most (92.8%) participants listed as the most important to them was "Improved natural environment" with "Improved air quality" (81.4%) and "Personal health and well being of loved ones" (78.4%) following as the second and third most important benefits, respectively. A little more than half (58.8%) of participants selected "Savings on energy and water bills" as the most important benefit to them. The bottom two benefits were "Workforce development and quality jobs" (44.3%) and "Increased mobility options for commuting to and around campus" (39.2%). Participants were able to add their own benefit of climate action that they find the most important - these responses are represented on Figure 17 by the category "Other." These benefits included: increased access to clean water in developing countries, reduced biodiversity loss, and community engagement in collaborative efforts to tackle common goals.

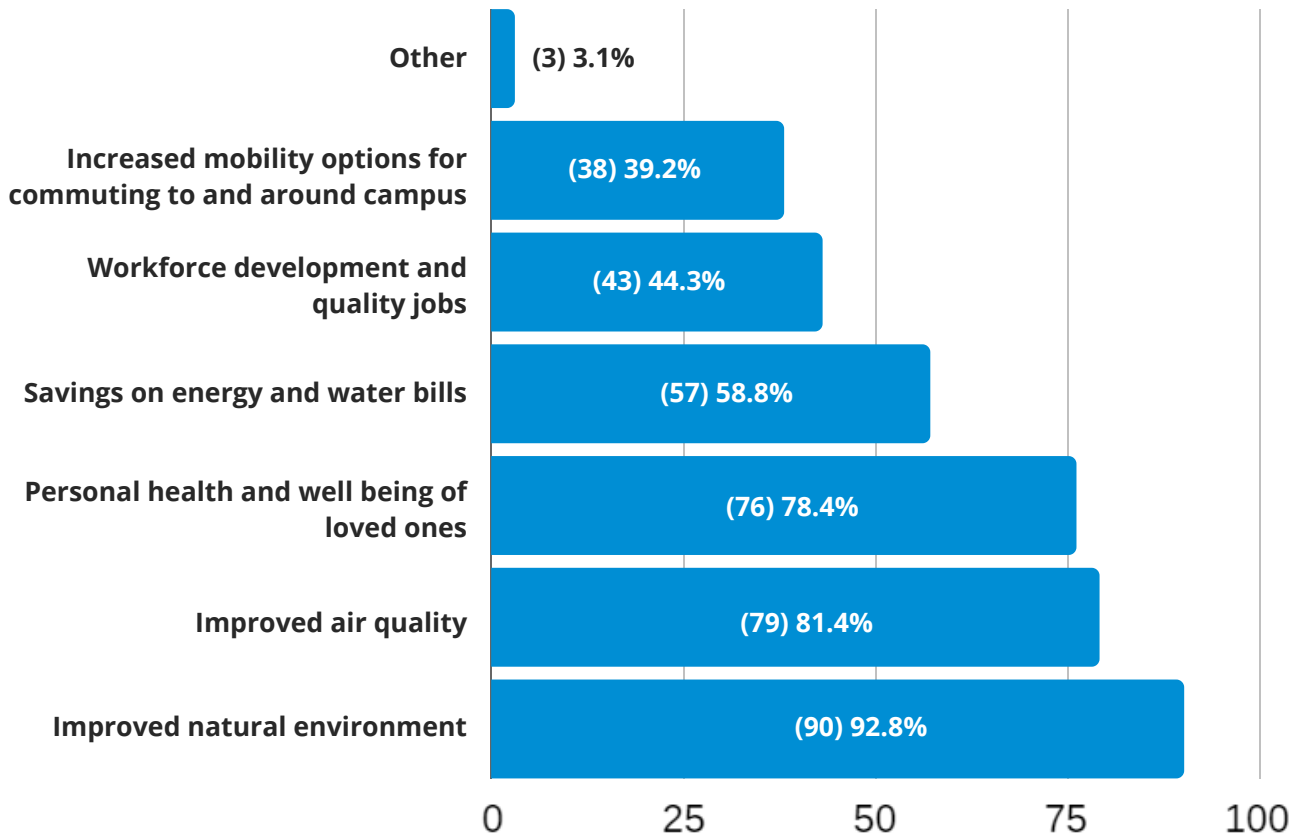


Figure 17: Response to the question "Climate action has benefits beyond reducing greenhouse gases. Which of the following are the most important to you?" (n=97)

Students' Attitudes and Beliefs Toward Stakeholder Impact

In the *Strategic Communication to Achieve Carbon Neutrality within the UC* report (Strat. Comm. report), students were asked about who should be accountable for carbon neutrality across the UC system which inspired me to gauge students beliefs on which stakeholders they think have the least and most impact on carbon neutrality efforts at UCSD. Respondents felt that the primary stakeholders that have the highest impact on campus carbon neutrality efforts were the Administrators and Highest energy emitters/energy users as they had 48.5% and 51.5% of their impact ranked as "Very High", respectively. Respondents ranked Facility Managers, Faculty or Department Chairs, and Students quite similarly in terms of their impact. "Students" were the stakeholders with the most rankings at "Low" and "Very Low", making up 14.4% of that category's ranking. Students were provided the option to explain their choices for the rankings. The most common attitude shared among respondents was that everyone has an impact and that all of the stakeholders' are responsible for taking actions that reduce our collective carbon footprint. Several responses also indicated that students' ability to reduce their carbon footprint depends on the decisions made by the other campus stakeholders. Several responses also explained their choice by describing that Administrators have the most decision-making power and can set policies that impact the rest of campus.

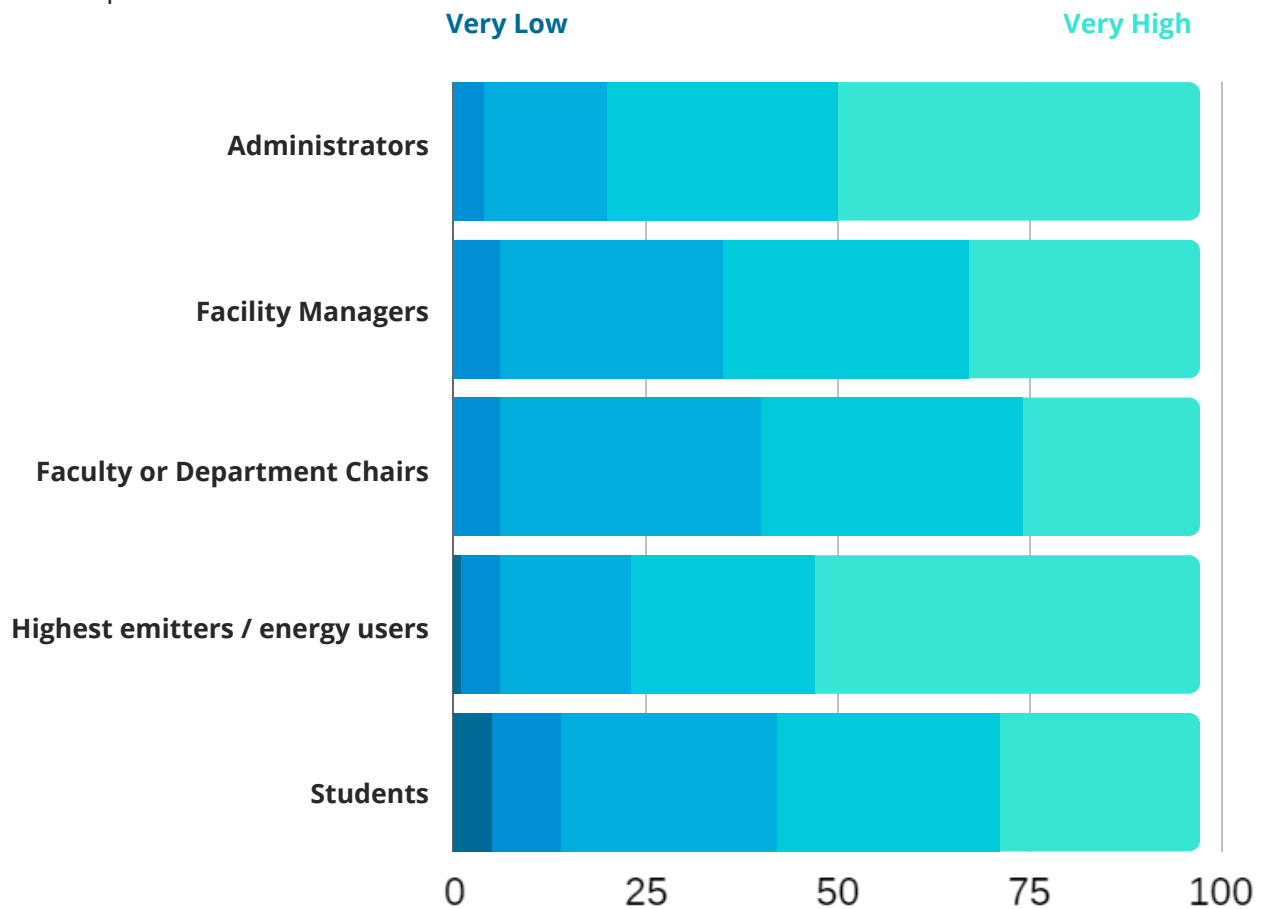


Figure 18: Response to the question "Please rank the following stakeholders by the level of impact you believe they have on campus carbon neutrality efforts." (n=97)

Students' Attitudes and Beliefs Toward Energy Policy Approaches

In the Strat. Comm. report, faculty were asked about their support for a set of energy policy approaches. In the online CNI training survey, I asked participants a similar question about energy policy approaches as seen in Figure 19. Respondents primarily were in favor for all of the energy policy approaches. Student respondents support for the policies closely align with the responses of faculty in the Strat. Comm. report with the exception of support for purchasing carbon offsets as faculty support was evenly distributed with 10% in strong favor and 14% in strong opposition. A majority (79.3%) of student participants in the online CNI training were surprisingly in favor for purchasing carbon offsets. The online training introduced participants to the concepts of carbon neutrality and carbon offsets, and described how offsets are used to achieve the title of carbon neutral. Students were provided the option to explain their choices for their selections. The most common attitude shared among respondents was that carbon offsets should be used as a last resort after implementing other carbon emissions reduction measures. Some responses also expressed a preference for local offset projects. Several responses expressed that behavior change has a low impact and is difficult to accomplish, indicating preference for other energy policy approaches.

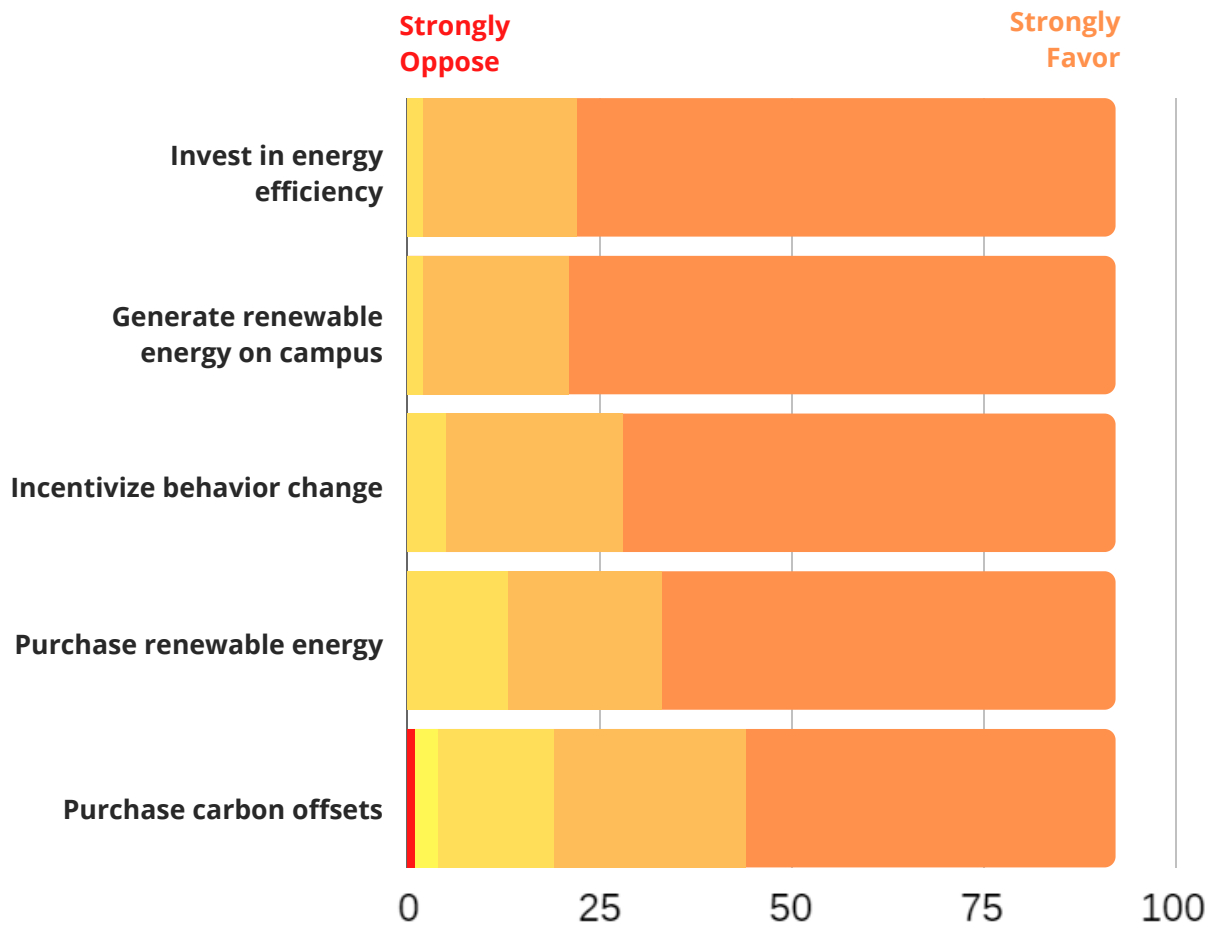


Figure 19: Response to the question "To what degree do you support or oppose the following energy policy approaches on campus?" (n=92)

Students' Attitudes and Beliefs Toward Funding Strategies

In the Strat. Comm. report, students were asked about their support for a set of potential ways to fund carbon emissions reduction projects. In the online CNI training, I asked participants a similar question about potential funding mechanisms as seen in Figure 20. While the Strat. Comm. report only offered the use of fees as options, I included an option on prioritizing existing campus funds. A majority (83.7%) of respondents were primarily in favor for prioritizing existing campus funds toward carbon emissions reduction projects while 15.2% were neutral. A majority (63%) of respondents favor imposing a carbon fee where the highest energy users pay the largest fee, 24% were neutral, and 13% oppose the strategy. These results aligns very closely to the results from the Strat. Comm. report. For establishing a student fee, 42.4% of respondents were in favor, 28.3% were neutral, and 29.3% were in opposition. These results also closely align to the results from the Strat. Comm. report. Students were provided the option to explain their choices for their selections. The most common attitude shared among respondents was that students already have many fees and should not take on additional financial burden. Several responses defended highest energy users, which are labs, and suggested behavior change should be prioritized for them instead of a fee.

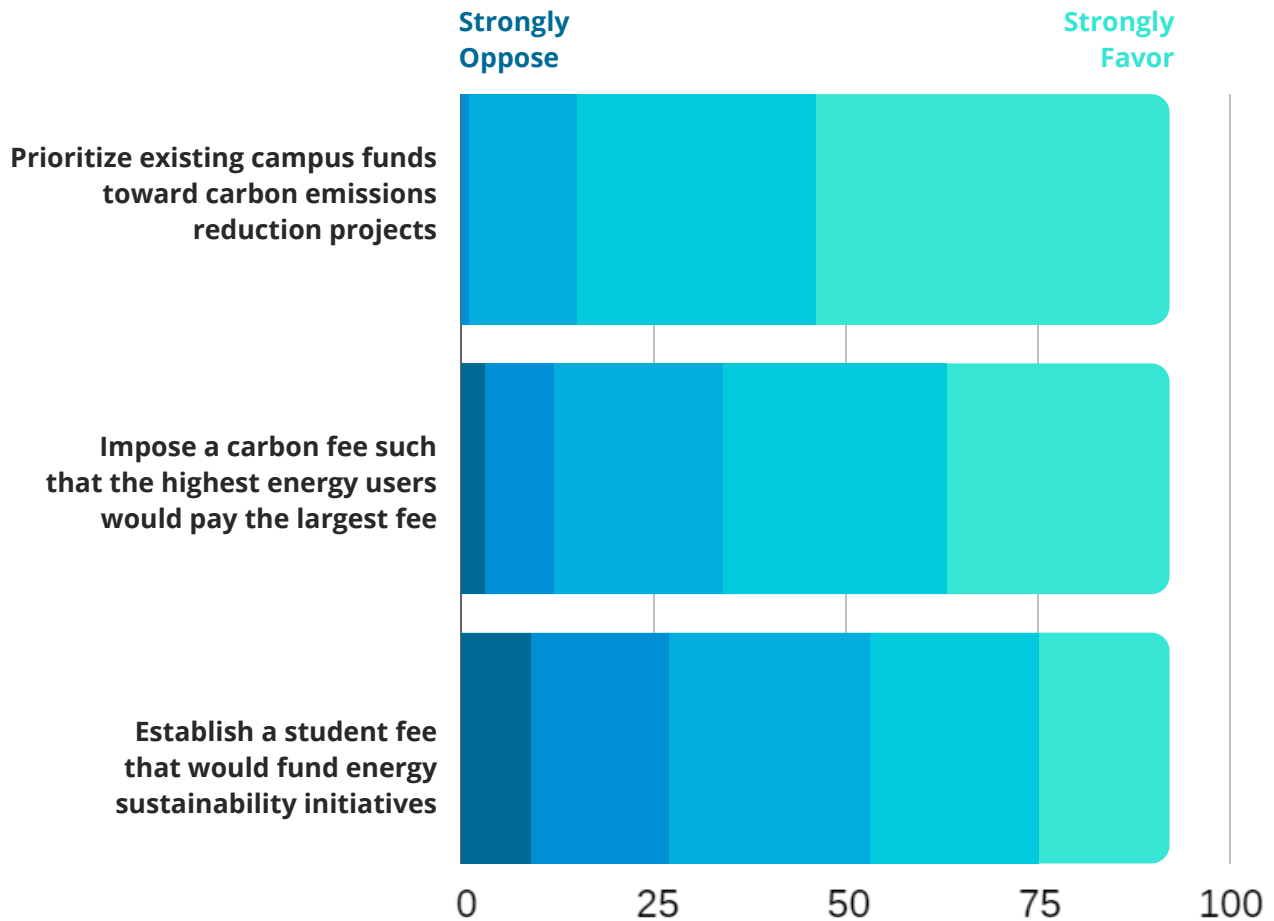


Figure 20: Response to the question "To what degree do you support or oppose the following potential ways to fund carbon emissions reduction projects on campus?" (n=92)

Students' Attitude Toward 2025 CNI Goal

After completing the training, student participants were asked to rank their attitude toward the 2025 CNI goal on a scale of 1 to 5 with 1 = "Very Pessimistic" and 5 = "Very Optimistic". Over a third (36.1%) of respondents are neither pessimistic or optimistic while a majority (50.5%) are optimistic, and a few (13.4%) are pessimistic. Students were provided the option to explain their choices for their selection. The attitudes were very mixed as some responses noted that the UC seems to be making real progress while other responses expressed concern over the short time frame and impacts of COVID-19 on progress.

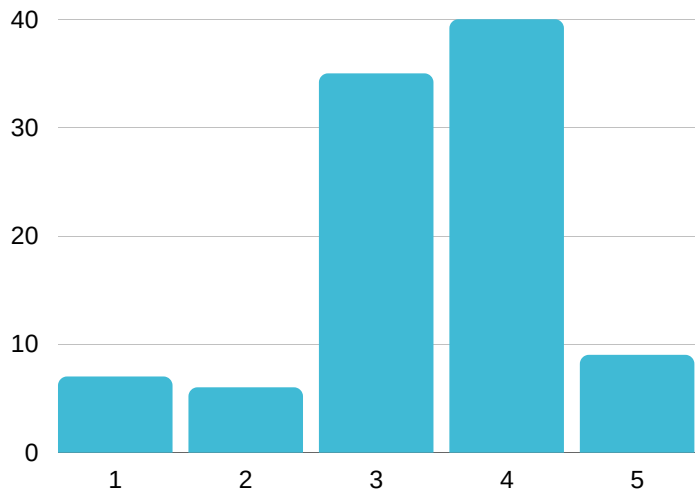


Figure 21: Response to the question "How optimistic or pessimistic are you that the campus operations across the UC-system will become carbon neutral by 2025?" (n=97)

Campus Climate Action Engagement

After completing the training, student participants were asked a free response question about how they would like to engage with campus climate action. Based on the responses, there were clear categories that are shown in Figure 22. Many (41%) of the student participants indicated interest in joining a club related to sustainability. Doing research related to carbon neutrality and climate change was the second most popular choice. The third largest form of preferred engagement was staying informed.

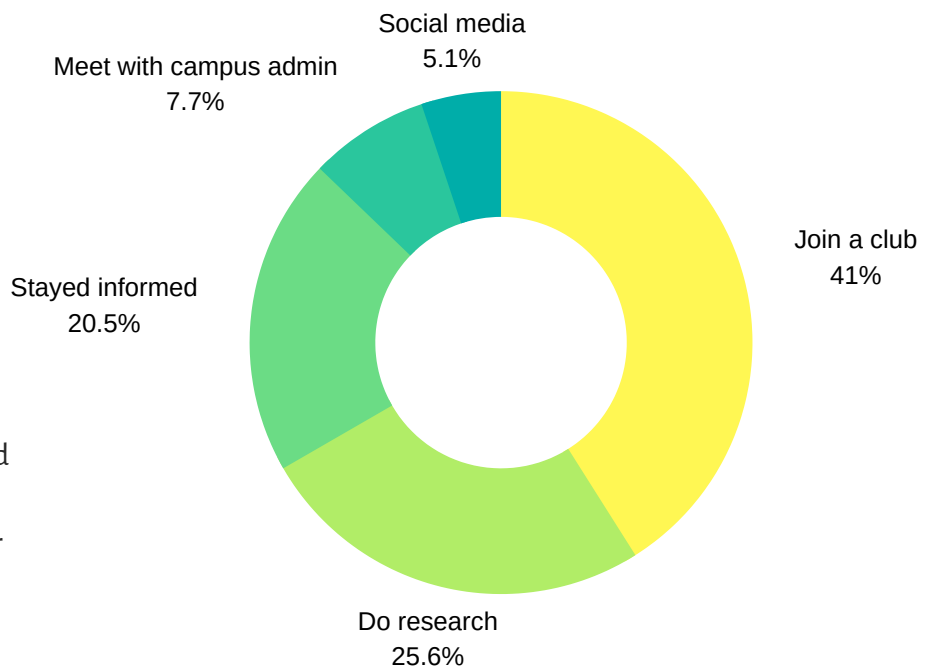
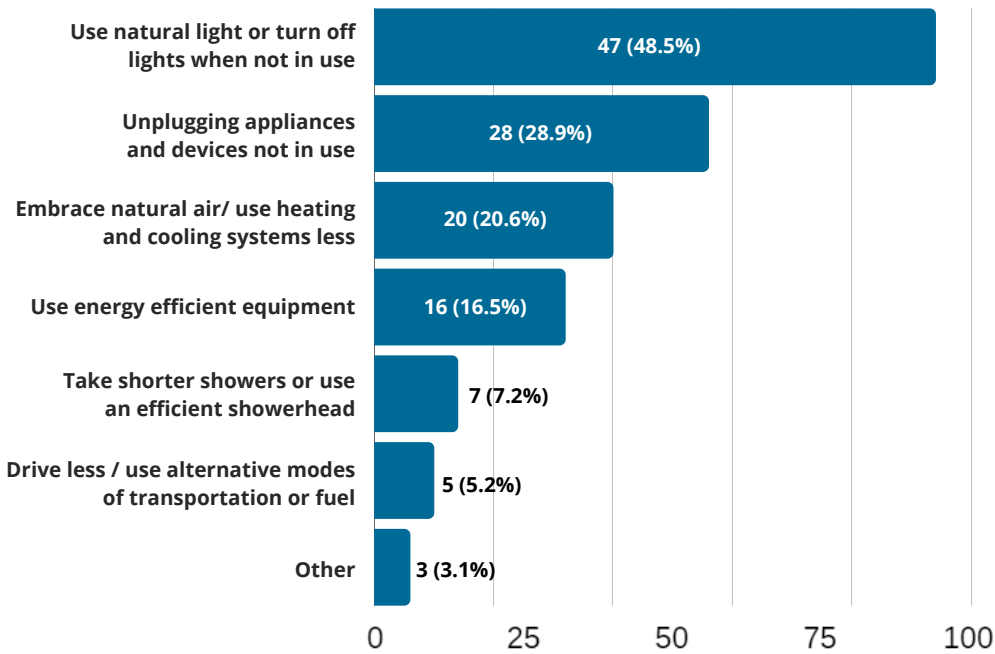


Figure 22: Main categories of free responses to the question "How would you like to engage with campus climate action?" (n=39)

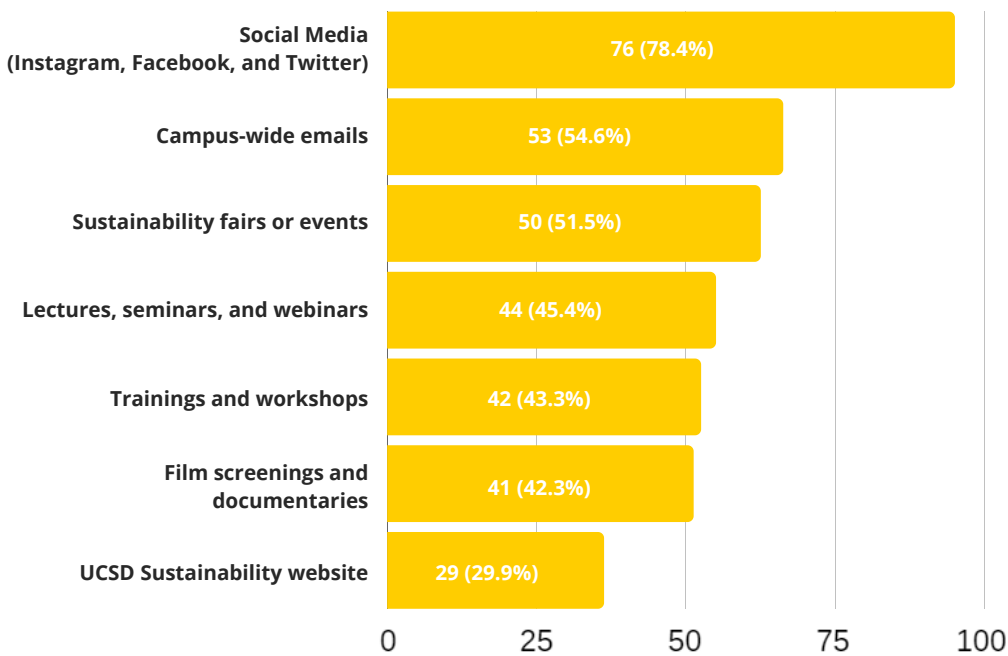
Energy Conserving Actions



During the training, student participants were provided energy conservation tips and were asked to commit to an action they will take as a free response question. Based on the responses, there were clear categories that are shown in Figure 23. The most popular actions that respondents committed to included using natural light, turning off lights, unplugging appliances and devices, and embracing natural air. The "Other" category included actions such as composting and eating less meat.

Figure 23: Response to the question "What is one thing you commit to doing to conserve energy whether it be at home or on campus?" (n=97)

Preferred Communications



After completing the training, student participants were asked a free response question about their preferred means of communications to learn about climate action initiatives. As seen in Figure 24, the most popular form of communication is social media. Campus-wide emails and sustainability fairs or events were each preferred for over half of the respondents. Despite containing a great amount of information, the UCSD Sustainability website was the least preferred form of communication as less than a third of respondents selected that option.

Figure 24: Response to the question "What are your preferred means of learning about climate action initiatives on campus?" (n=97)



Recommendations

1

Prioritize educating incoming and first year students on CNI and campus sustainability resources.

Climate change, CNI, campus solutions, courses, and sustainability resources should be integrated and highlighted in orientation programs for all incoming students.

Currently, incoming students are not required to be educated on climate change or sustainability. By educating incoming students during their introduction to campus, UCSD can foster a campus culture of sustainability and encourage sustainable

behaviors that support CNI goals. While 20.6% of the online CNI training participants were in their 4th year and nearing graduation, the training may have been the first time they heard of CNI or of other UCSD climate and energy initiatives. Particularly, 23.3% of respondents that had not heard of CNI were students in their 4th year. Students should be empowered with the information, tools, and resources to support CNI goals and campus-specific climate policies from the beginning of their studies so that they have time to pursue opportunities for engagement with campus climate action during the rest of their time at UCSD.

2

Utilize a diverse portfolio of communication channels, including official campus social media accounts and campus-wide emails, to educate students on CNI.

While there are several UCSD-related student organizations and departments focused on sustainability that already use email lists and social media, official communication channels of UCSD have a substantially larger audience and reach. The official campus Instagram account (@ucsandiego) should be utilized as a communication tool to raise awareness of CNI and encourage positive behavior change that supports campus

sustainability goals. Currently, the official campus Instagram account primarily shares photographs of views from around campus and captions that highlight campus accolades or student success stories. There is a story highlight for "Resources" and "Centers" but neither include sustainability-related resources or the campus Sustainability Resource Center as of June 2020. Boasting over 46,000 followers, the account has the capacity to become an educational communication tool that increases awareness of campus initiatives such as the BioEnergy Project and promote sustainable behavior such as using campus shuttles over single-occupancy vehicles to move around campus. Additionally, campus-wide emails should be sent periodically, such as biweekly or quarterly, with updates on UCSD's progress toward CNI goals and share opportunities to get involved with clubs or research related to sustainability. Social media and emails are very effective communication channels and should be further leveraged for CNI as 70.1% of the online CNI training participants heard of the training through those platforms. Furthermore, 78.4% of respondents selected social media and 54.6% selected campus-wide emails as their preferred communications. Moreover, existing UCSD-related sustainability social media pages and websites, including the Sustainability Ambassadors website (ucsdcarbonfree.org), should be maintained and continue to develop content that provides resources for students to engage with CNI. Future CNI Student Engagement Fellows should continue to grow and use the Climate Conversations blog to share editorial or opinion-type stories from students that provide authentic perspectives on carbon neutrality strategies or actions. This avenue can increase awareness and transparency about the challenges of CNI in order to create open discussion on how both individuals and the campus can do better.

3

Center CNI-related communications and education on local solutions that students can directly engage with and support.

According to a report on messaging strategies for Global Warming's Six Americas, people that belong to the Alarmed and Concerned audiences are likely to be interested in learning about actions that can be taken to mitigate climate change¹¹. According to the survey results, a great majority (85.6%) of student participants identified themselves as either Alarmed or Concerned with climate change. Moreover, 90.7% of student participants believe that their personal action and choices can contribute to solving climate change as seen in Figure 16. Therefore, CNI-related communications should focus on actions that students can take and solutions that they can be directly involved with or support. Furthermore, messaging should highlight how individual actions directly benefit the natural environment, improve air quality, or protect the health of loved ones as those were the top three climate action benefits that respondents selected as the most important to them. However, other climate benefits should be emphasized as well and be communicated in a way that personally relates to students. According to Figure 21, over a third of the training participants were neither optimistic nor pessimistic toward the 2025 carbon neutral target. This is a great opportunity to foster optimism and positive attitudes toward CNI by informing students on UCSD's progress and carbon emissions reduction efforts. Students should be well-informed to provide rational critiques of UCSD's progress, however, also be encouraged to directly contribute to enhancing UCSD's carbon neutrality efforts by engaging in local, on-campus climate solutions such as volunteering with the BioEnergy Project.

4

Connect CNI efforts to other campus initiatives and issues.

Student participants demonstrated clear support for a variety of energy policy approaches, including carbon offsets, with a strong preference for existing funds to be prioritized toward carbon emission reduction projects as seen in Figures 19 and 20. In order to build coalition for support toward preferred energy policies and campus prioritization of climate action, CNI education and engagement efforts should expand beyond conversations about turning off lights or using renewable energy. Future CNI Student Engagement Fellows and Sustainability Ambassadors should demonstrate how CNI intersects with other prevalent issues such as social justice and health. Educational content should be developed and shared that focuses on the impacts of burning fossil fuels on air quality and emphasize the inequities that low-income communities of color face when addressing energy access or affordability. Moreover, education campaigns could be created to raise awareness of energy equity and the opportunities that the clean energy movement creates for underserved communities to gain access to affordable and reliable energy. Future communications should also explore how carbon neutrality relates to history, art, law, and literature in order to engage a more diverse background of academic disciplines as there were no humanities students who participated in the online CNI training and survey.

5

Create a robust community-based social marketing strategy to promote positive behavior change.

Future CNI Student Engagement Fellows and Sustainability Ambassadors should focus on results-driven engagement through community-based social marketing (CBSM). Currently, the Sustainability Ambassadors Program focuses on sharing information. While information-based campaigns are popular and convenient, they often have little to no effect on changing people's behavior which is the ultimate goal. However, CBSM is an effective approach to fostering sustainable behavior as it involves direct contact among members and the removal of structural barriers to sustainable behavior¹². Although CBSM may be more effective when UCSD returns to in-person learning, it can be virtually implemented to an extent.

CBSM establishes the following framework:

1. Identify a target audience, indivisible behavior (actions that cannot be divided into further behaviors), and end-state behaviors (actions that produce a desired outcome).
2. Research, observe, survey, and conduct a focus group on your target audience in order to identify barriers to and benefits of desired behavior.
3. Develop and pilot a program to overcome the barriers with a small segment of the community.
4. Refine and implement the program across a community.
5. Monitor and evaluate effectiveness of the program.

For example, undergraduate students living on-campus can be selected as a target audience. The indivisible, end-state behavior can be defined as turning the lights off when no one is in the room. After researching, observing, surveying, and conducting a focus group on the target audience, the key barrier can be that students are busy and simply forget to turn off the lights in their dorm or apartment before leaving. A program can be developed that addresses the barrier such as putting signs up on the front door of dorms and apartments that remind students to turn off the lights before leaving. Building energy consumption can be measured and monitored as students voluntarily report on their behaviors. The overall program can be assessed and updated before being launched by Sustainability Ambassadors at other campus residential areas.

As seen in Figure 23, student participants are more likely to support CNI goals by using natural light, turning off lights when not in use, unplugging appliances and devices not in use, and using natural air over heating or cooling systems. Future behavior change campaigns should continue to encourage the most common actions that may be easily adopted across the student population while focusing on addressing the least popular actions such as driving less or using alternatives modes of transportation. Future engagement strategies can include pledges, increasing visibility of positive behavior through stickers or signs, providing students with visual or auditory prompts, or using incentives as I did with the solar-powered phone chargers for completing the online CNI training.

References

- ¹ University of California Carbon Neutrality Initiative (2018). *Request for Ideas: UC Carbon Offset Projects*. Retrieved from <https://offsets.uc-ciee.org/home>.
- ² American College and University Presidents' Climate Commitment (2012). *Implementation Guide Version 2.1*.
- ³ University of California, Energy and Sustainability Office (2018). *University of California - Policy on Sustainable Practices*.
- ⁴ Veerabhadran Ramanathan, Juliann E. Allison, Maximilian Auffhammer, David Auston, Anthony D. Barnosky, Lifang Chiang, William D. Collins, Steven J. Davis, Fonna Forman, Susanna B. Hecht, Daniel Kammen, C.-Y. Cynthia Lin Lawell, Teenie Matlock, Daniel Press, Douglas Rotman, Scott Samuelson, Gina Solomon, David G. Victor, Byron Washom, 2015: *Executive Summary of the Report, Bending the Curve: 10 scalable solutions for carbon neutrality and climate stability*. Published by the University of California, October 27, 2015.
- ⁵ R. Bales, S. Rebich-Hespanha, L. Leombruni, H. Hodges, A. Heeren, H. Gelbach, N. Van Leuvan, J. Christensen. (2018). *Strategic Communication to Achieve Carbon Neutrality within the University of California, Report of the UC TomKat Carbon Neutrality Project*. DOI:10.6071/H87D2S8W. Retrieved from <https://doi.org/10.6071/H87D2S8W>.
- ⁶ G. Matthews, Et al. (2019) *UC San Diego Climate Action Plan*.
- ⁷ Leiserowitz, A., Maibach, E., Rosenthal, S., Kotcher, J., Bergquist, P., Ballew, M., Goldberg, M., & Gustafson, A. (2019). *Climate Change in the American Mind: November 2019*. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication
- ⁸ Climate Outreach and The CASPI Project (2019). *Mainstreaming low-carbon lifestyles*.
- ⁹ George Marshall. 2014. *Don't Even Think About It: Why Our Brains Are Wired to Ignore Climate Change*. Bloomsbury Publishing.
- ¹⁰ International Association for Public Participation (2018). *Public Participation Spectrum*.
- ¹¹ Roser-Renouf, Connie & Stenhouse, Neil & Rolfe-Redding, Justin & Maibach, Edward & Leiserowitz, Anthony. (2014). *Engaging Diverse Audiences with Climate Change: Message Strategies for Global Warming's Six Americas*. SSRN Electronic Journal. 10.2139/ssrn.2410650
- ¹² McKenzie-Mohr, D., & Smith, W. A. (1999). *Fostering sustainable behavior: an introduction to community-based social marketing*. Gabriola Island, BC: New Society Publishers.

UC San Diego

