UCONN GOAL: CARBON NEUTRAL BY 2030

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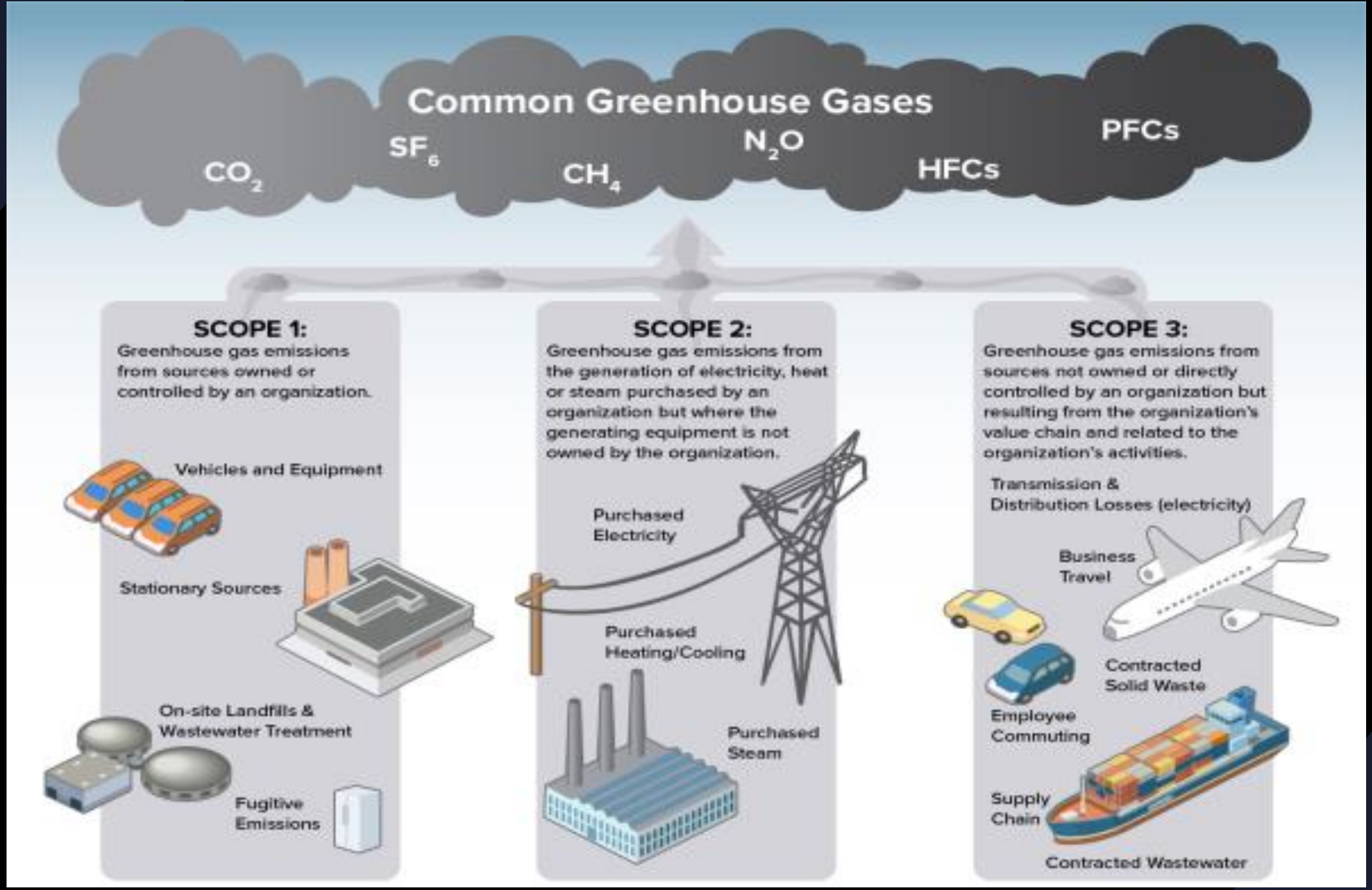
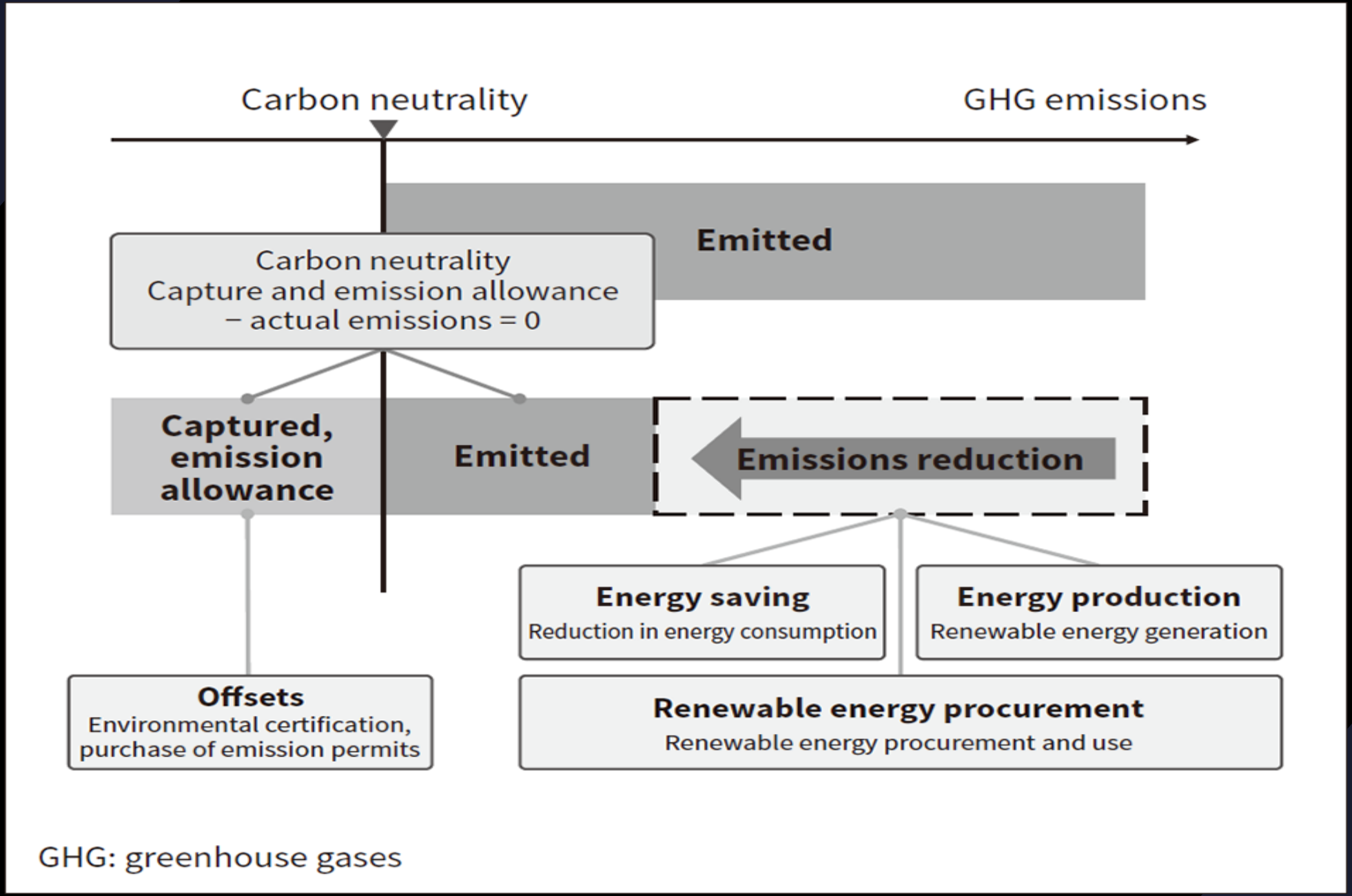
Approaches to Achieving Carbon Neutrality

- There are two main approaches a university can take:
  - market-based
  - non-market-based
- Market-based instruments work by providing economic incentives like carbon taxes and emissions trading systems that put a price on carbon, as well as subsidies for low-carbon technologies
- Non-market-based instruments work through imposing obligations like emissions standards or technology mandates, as well as non-monetary incentives like public information campaigns
- This binary distinction between market-based and non-market-based instruments simplifies the complexity of policy tools, which often contain elements of both approaches
- Using a hybrid of both market-based and non-market-based instruments can help overcome the limitations of each approach alone



Retrieved from https://www.epa.gov/sites/default/files/2018-03/documents/gpp_guide_recs_offsets.pdf, September 2023



GHG: greenhouse gases

Retrieved from https://www.hitachi.com/rev/archive/2023/r2023_01/01b02/index.html?WT.mc_id=ksearch, October 2023

Overview of Market-Based Instruments for Carbon Neutrality

Examples include carbon taxes that put a price on emissions, cap-and-trade to limit and price carbon, and subsidies like rebates for low-carbon technologies

Market-based instruments provide flexibility in how entities choose to meet environmental goals in the most cost-effective way

Challenges can include accurately pricing carbon, managing price volatility, and addressing competitiveness concerns

Market-based policies are a major component of comprehensive strategies to achieve carbon neutrality globally

Overview of Market-Based Instruments

- Market-based policies leverage economic incentives to drive sustainability actions
- Harness market dynamics to motivate emissions reductions in a flexible, cost-effective way based on their circumstances
- Strategies include carbon pricing via taxes or trading systems that put a price on emissions
- Price signals incentivize entities and individuals to reduce their carbon footprint

Non-Market-Based Instruments for Carbon Neutrality

Examples include technology and emissions standards, government procurement policies favoring low-carbon goods and services, and mandatory disclosure of emissions data

These instruments provide certainty in specific environmental outcomes but can lack flexibility and economic efficiency

Non-market-based policies are necessary complements to market-based instruments in plans to achieve neutrality

Ambitious building codes, vehicle emissions standards, and clean electricity standards are key non-market-based policies

Market-Based Instruments for Carbon Neutrality

- Market-based environmental policies leverage economic incentives to promote sustainability
- Reminder of Market-Based Instruments
  - Harness market dynamics to motivate emissions reductions in a flexible, cost-effective way based on circumstances
  - Strategies include carbon pricing via taxes or trading systems that put a price on emissions
  - Price signals incentivize entities and individuals to reduce their carbon footprint
- Instruments include mechanisms such as carbon trading and carbon taxation

Economic Incentives

- Financial (Monetary or Non-Monetary) rewards provided to alter consumption and production patterns
- The main purpose is to influence behavior to produce desired results naturally
- They can be intrinsic or extrinsic, depending on the source of motivation
- Macro-economic benefits such as:
  - Allows government to keep control of the economy
  - Stimulating commercial activity
  - Increasing public participation
  - Increases Business sales

Economic Incentives

- Some common economic incentives include:
  - Salaries
  - Bonuses
  - Tax Credits and Rebates
  - Subsidies
  - Discounts
- Some downsides to economic incentives:
  - Difficulty in ascertaining effectiveness
  - Increased tax burdens

Carbon Pricing Mechanisms as an Instrument

- Carbon Taxation: Directly sets a price on emissions by defining a tax rate on greenhouse gases
  - More commonly applied to carbon content of fossil fuels like coal, oil, and natural gas
- Carbon Trading: Establishes a limit on total emissions and allocates tradable permits up to that cap
  - Entities can buy/sell permits based on their emission reduction costs vs. permit price
- Successful examples like RGGI cap-and-trade in Northeastern US

What are Carbon Credits?

- Carbon credits (CCs) are tradable permits that allow the holder to emit the equivalent of 1 ton of carbon dioxide (CO_2)
- Issued to entities covered under an emissions trading system (cap-and-trade)
- Total credits issued limited by the overall emissions cap
- Entities must surrender credits to cover their emissions
- Credits can be traded on secondary markets

How Do Carbon Credits Work?

- Carbon trading creates a market for carbon credits
- Entities that can cost-effectively reduce emissions below their limit can sell extra credits
- Entities that face high reduction costs can buy credits as needed
- Creates financial incentive to cut emissions
- "Polluter Pays Principle" - makes emitters bear cost of managing emissions
- Carbon credit price drives private sector emissions reductions

UCONN's Rural Campus Presents Challenges for Carbon Neutrality

Rural location means most students/staff must commute long distances by car, increasing transportation emissions

Long winters with heavy snowfall require enormous amounts of heating via natural gas boilers in dispersed buildings

Spread out campus with open spaces necessitates an extensive intra-campus bus system running on diesel

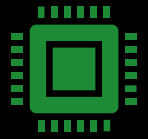
Heating systems and buses rely on fossil fuel infrastructure requiring high investment to transition

While the large campus area provides potential for on-site renewables like solar PV farms, this requires substantial upfront costs

UCONN's Rural Campus Presents Challenges for Carbon Neutrality

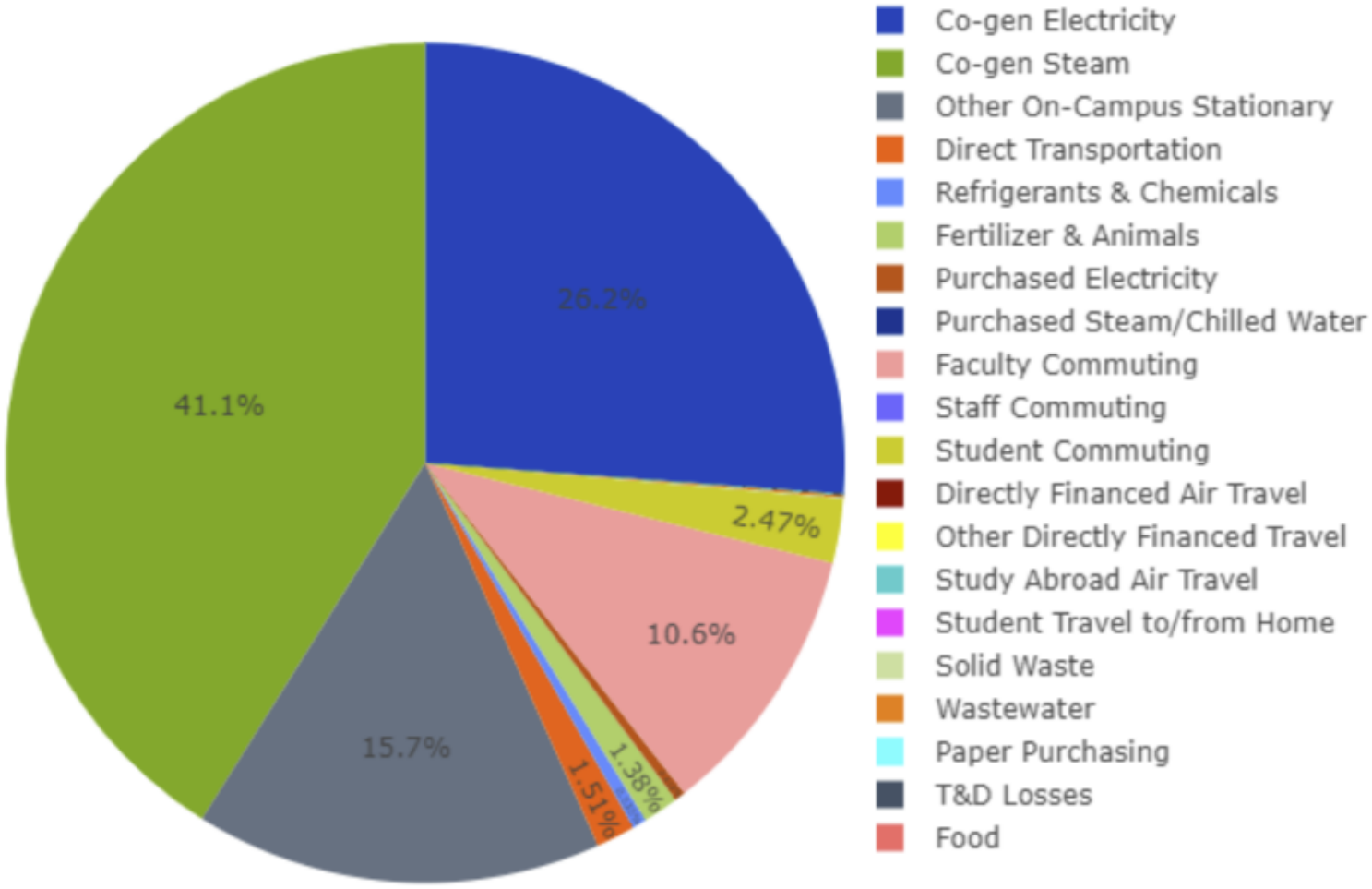
Isolated settings limit ability to tap into lower-carbon district energy systems available in urban areas

Decarbonizing a rural campus like UCONN faces higher costs and barriers than urban campuses due to location



Unique strategies and significant investment needed to eliminate emissions embedded in remote, spread-out infrastructure

UCONN'S CARBON EMISSION SOURCES



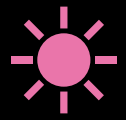
As of 2020
From: https://sustainability.uconn.edu/2020-uconn-greenhouse-gas-inventory/

Areas to Prioritize to Reduce Direct Emissions

Upgrading heating/cooling systems, insulation, lighting, appliances to maximize energy efficiency in buildings (On-going)

Switching heating systems from oil/gas to lower carbon options like geothermal, biomass, etc

Electrifying vehicles/fleets and installing EV charging infrastructure (On-going through integration of bus fleet with WTRD)

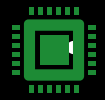


Increasing on-site solar energy generation

Areas to Prioritize to Reduce Direct Emissions

Providing better transit access and incentives for lower carbon commuting

These initiatives will contribute significantly to reducing UConn's carbon footprint



There are practical limits to what emissions can realistically be eliminated directly by 2030 based on technology, budgets, and operational constraints

UConn's 3 Emissions Tracking Scopes

- UConn stores and tracks greenhouse gas information through 3 different scopes
  - Scope 1 (Direct Energy Usage): Stationary and Transport Fuels (including Co-Gen), Fertilizers, Animals, Refrigerants
  - Scope 2 (Indirect Energy Usage): Purchased Non-renewable Electricity, Heat, and other Utilities
  - Scope 3 (Other Indirect): Commuting, Purchasing, Waste and Wastewater, etc

UCONN 2019-21 Sustainability progress report van be found here:

2019-21 Sustainability Progress Report

The Challenge of Scope 3 Emissions

- Major Scope 3 sources for UCONN include commuting, air travel, upstream energy, food purchases, waste
- Commuting is the largest Scope 3 source - most students/staff drive long distances given rural location
- Business air travel emissions are hard to track and reduce without impacting operations
- Food purchases depend on complex supply chains with high embedded emissions
- Waste management is constrained by limited capabilities as a small rural community

The Challenge of Scope 3 Emissions

Can't directly control Scope 3 emissions from individual behavior and purchased goods/services

Strategies like incentives, education campaigns, supplier engagement can help influence Scope 3 emissions

But fundamental lack of control and data makes Scope 3 very difficult to accurately measure and reduce

Reaching carbon neutrality requires addressing Scope 3, even with limitations

Market-based instruments can provide broader incentives to address these difficult to reduce emissions

Carbon Credit in the Context of a University

- Carbon Emissions from Universities
  - Emissions result from a range of activities, including facility operations, transportation services, and waste management
- Using Carbon Credits to Offset Emissions
  - Carbon credits provide a way for universities to offset their emissions
  - By purchasing credits linked to renewable energy or carbon reduction projects, universities can neutralize their carbon footprint
  - This allows continued campus operations while supporting lower-carbon development
  - Carbon offsetting enables universities to claim progress towards carbon neutrality goals, though does not eliminate source emissions
  - Credits should complement direct emission reduction efforts on campus and beyond

The Path to Carbon Neutrality for UConn

UConn's commitment to becoming carbon neutral requires a multifaceted approach along several paths including:

- Mitigating - Directly reducing carbon emissions from university operations
- Adaptation - Changing practices and behaviors to lower the university's footprint
- Offsets - Investing in external projects to neutralize unavoidable emissions
- A combination of mitigation, adaptation, and offsets provides a comprehensive framework for carbon neutrality

Mitigation: Reducing Emissions at the Source

Mitigation focuses on directly reducing carbon emissions from operations

Strategies include improving energy efficiency in buildings and shifting to renewable energy sources like solar or wind

Requires upfront investments but provides longer-term savings and sustainability

Essential to address major campus emission sources like energy use and transportation

Adaptation: Changing Practices to Lower Emissions

Adaptation involves altering institutional and individual practices and behaviors to reduce emissions

Examples are promoting public transportation, cycling, ride sharing to reduce commuting emissions

Also includes operational changes like virtual learning and meetings to limit air travel

Relies on community engagement and education to drive voluntary actions

Offsets: Funding External Emission Reductions

Carbon offsets involve investing in projects that reduce emissions elsewhere to neutralize unavoidable campus emissions

This compensates for emissions that cannot yet be eliminated through mitigation and adaptation

Allows continuity of campus operations while directing funds to advance sustainability

Challenges and Critiques of Carbon Credits

- Efficacy and Efficiency of CCs
  - Debate around efficacy - unclear if credits produce real, additional emission reductions
  - Depends on accuracy of monitoring and enforcement to ensure integrity
  - Efficiency relies on strict oversight and transparent accounting
  - Credits must represent new reduction projects, not 'business as usual'
- Equity Issues and Greenwashing Risks
  - Credits can enable 'greenwashing' without changing underlying operations
  - Universities must combine with on-campus reductions to avoid this perception
  - Potential for inequitable distribution of costs from credits
  - Credits shift focus of reductions off-site rather than driving local action
  - Cannot replace need for universities to address sources under their control

Comparison of Carbon Credits to Other Mechanisms

- Carbon Credits vs. Carbon Taxation
  - Carbon credits offer more flexibility but may be less predictable than carbon taxation
  - Carbon taxation is more straightforward but may not incentivize overachievers

- Carbon Credits vs. Direct Regulation
  - Carbon credits can encourage innovation and be more cost-effective, but direct regulation may be more reliable in achieving targeted emission reductions

The Role of Offsets in UConn's Climate Action Plan

UConn can leverage carbon offsets to address emissions that cannot feasibly be eliminated directly through on-campus action over the next 7 years

This includes, but is not limited to:

- Air travel - the primary way to mitigate flight emissions in the near term
- Transportation - for commuting, fleet vehicles that cannot be electrified
- Agriculture - for campus food/farming activities
- Outsourced services - life cycle emissions from contractors
- Study abroad – for students travelling internationally

Ensuring High-Quality, Impactful Carbon Offsets

When procuring carbon offsets, UConn should:

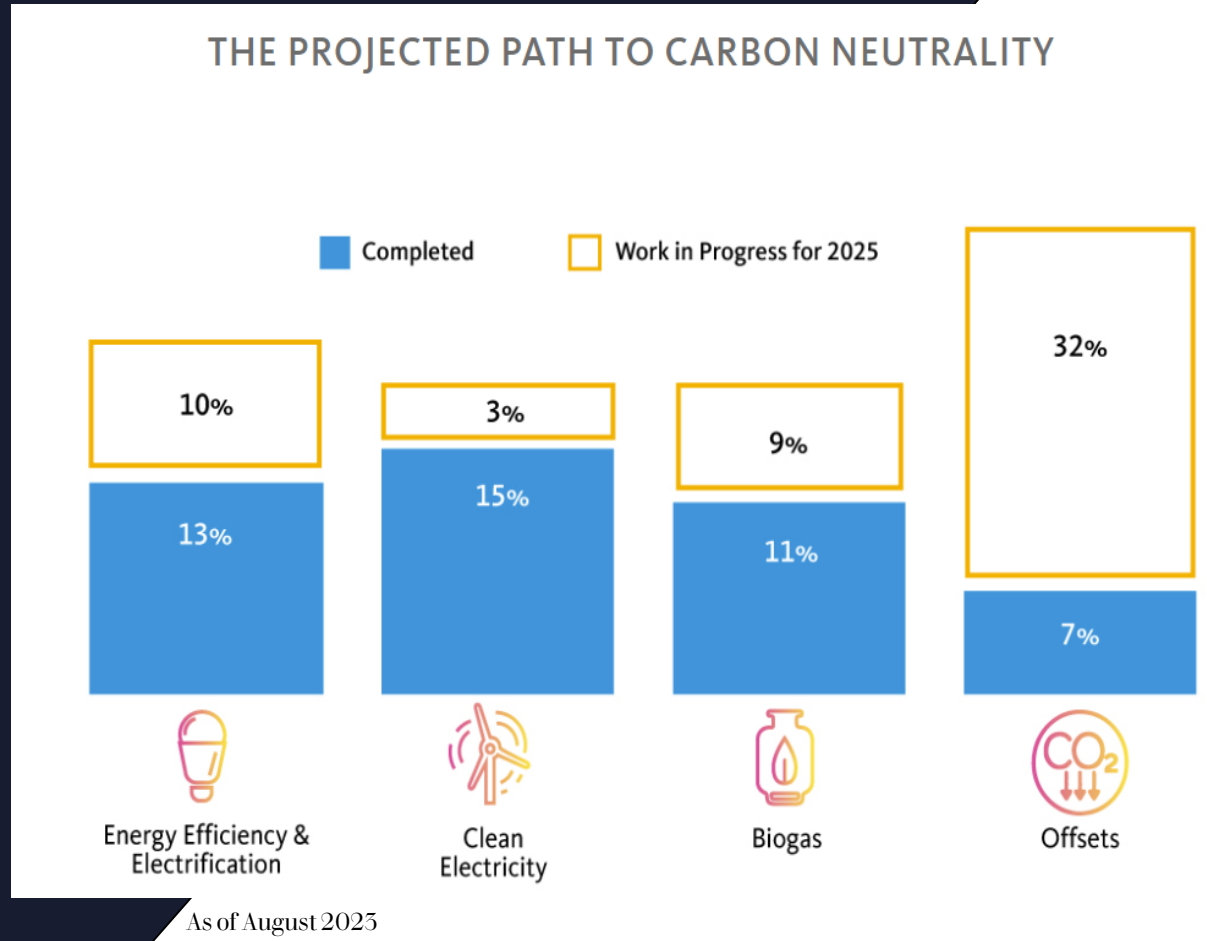
- Prioritize projects verified under stringent standards like Gold Standard or CARB to ensure real, permanent emission reductions
- Look for projects that offer social or environmental co-benefits beyond just greenhouse gas mitigation
  - For example, projects that also conserve biodiversity or support sustainable community development
- Consider supporting local projects where possible to also benefit communities in Connecticut and the surrounding regions

Ensuring High-Quality, Impactful Carbon Offsets

- Local projects can aid public engagement and provide opportunities for student project involvement
- Focus on offset types that permanently sequester or destroy carbon dioxide such as reforestation or methane capture
- Avoid over-reliance on temporary offsets or those with disputed climate benefits like some forest management practices
- High-quality, impactful offsets should be part of a comprehensive carbon neutrality strategy

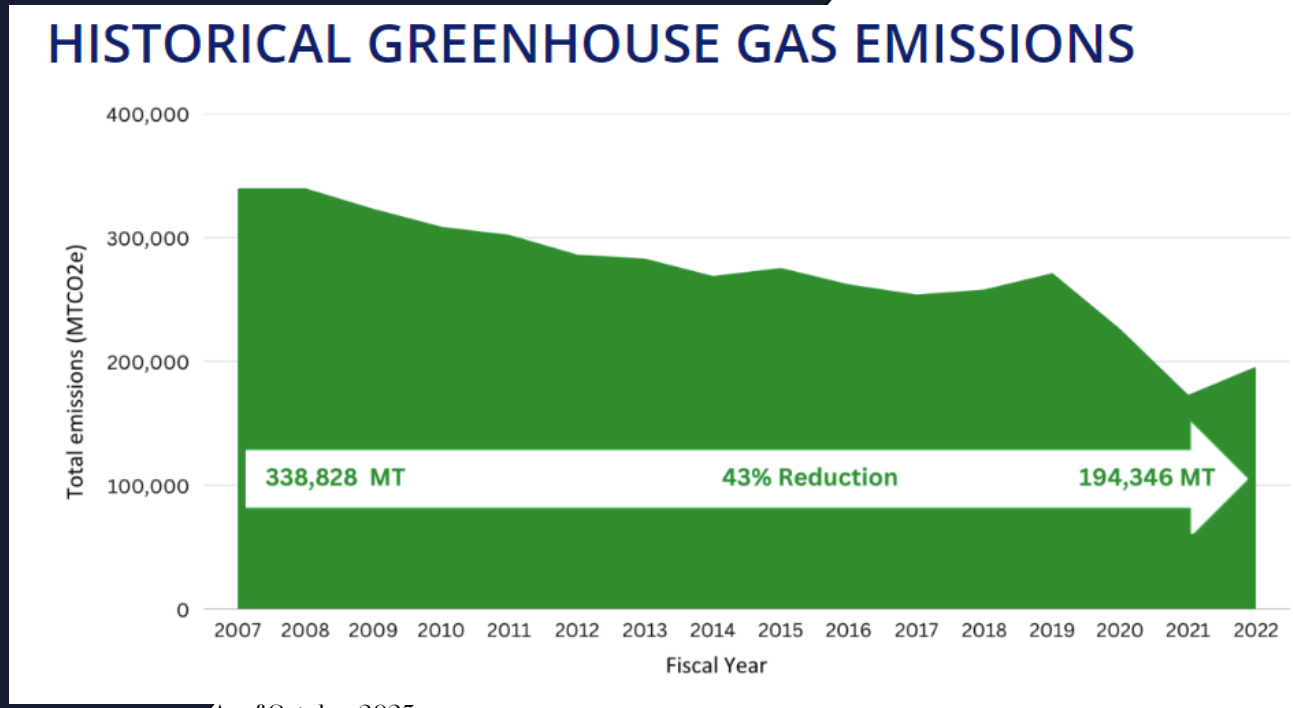
Case Study 1: University of California System

- Commitment to Carbon Neutrality
  - In 2013, the UC system pledged to become carbon neutral by 2025
- Investments in Renewable Energy
  - The university invested in solar and wind projects that not only supply power to the campuses but also generate surplus power for sale to other entities
- Use of Carbon Credits
  - To offset remaining emissions, the university system has invested in forest conservation projects that generate verified carbon credits
- For more information click on this link



Case Study 2: Duke University

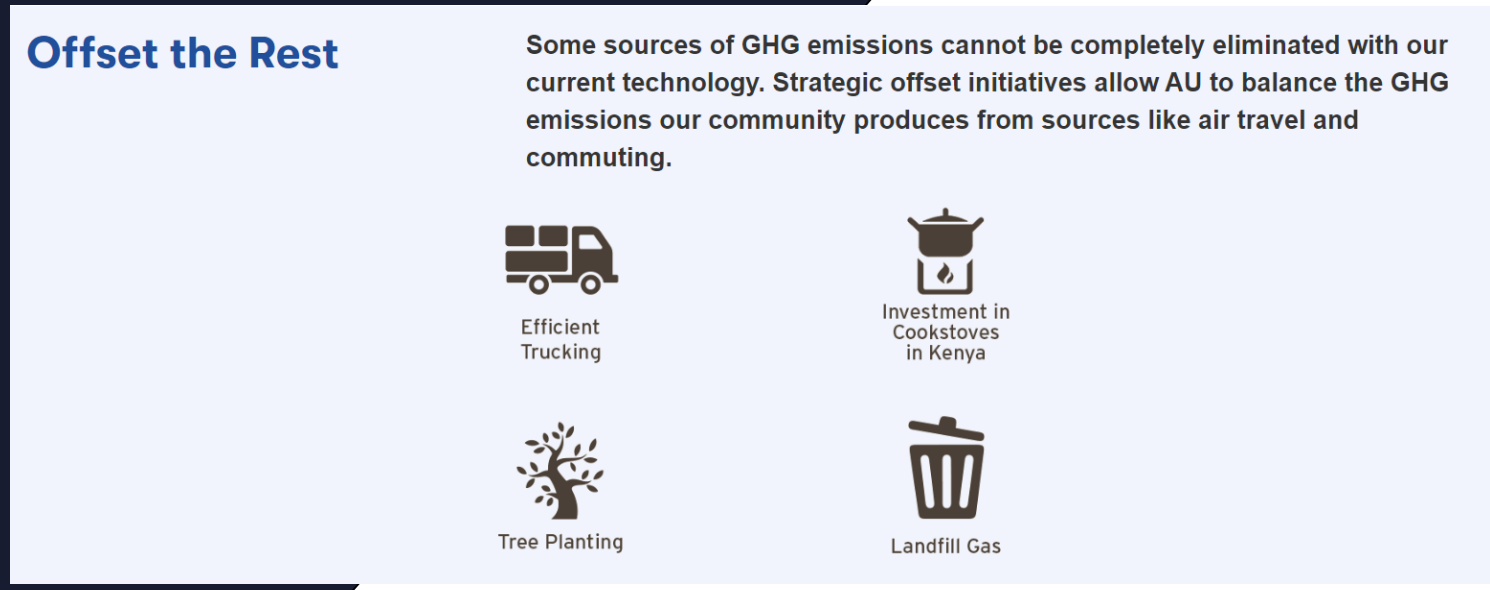
- Carbon Neutrality by 2024
  - Duke University plans to be carbon neutral by 2024, fulfilling a commitment made in 2007
- Green Energy and Efficiency
  - Duke has implemented energy efficiency measures across campus and shifted to renewable sources
- Carbon Offsets Initiative
  - The university's carbon offsets initiative involves investing in local and global projects, including methane capture from hog waste, energy-efficient cookstoves, and urban forestry projects
- For more information click on this link



As of October 2023

Case Study 3: American University

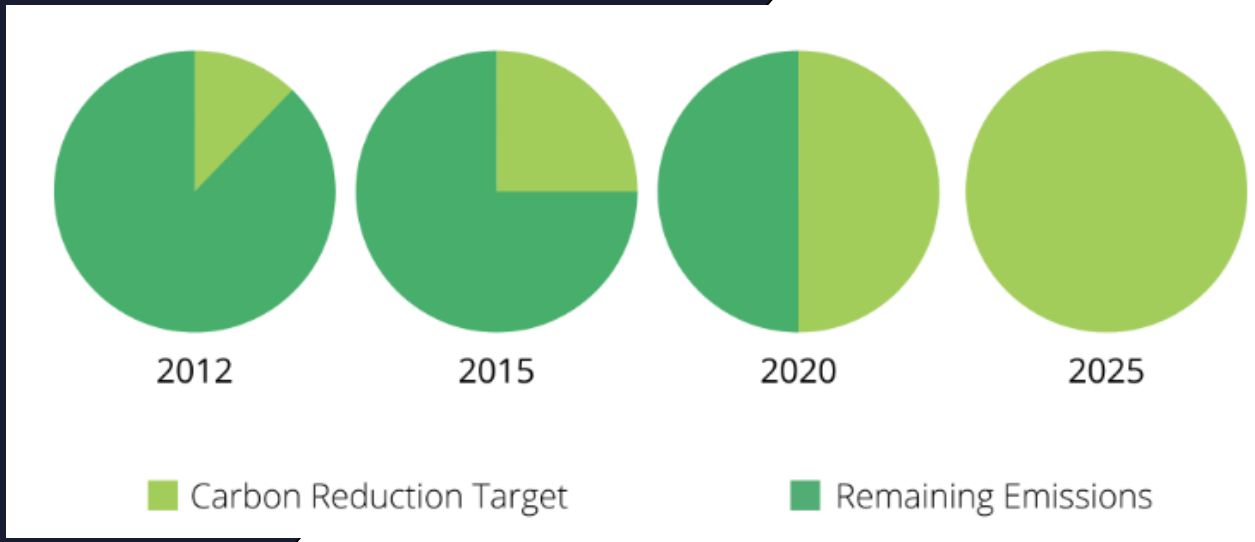
- Achieving Carbon Neutrality in 2018
  - American University became carbon neutral in 2018, two years ahead of its initial 2020 goal
- Solar Power Purchase Agreement
  - The university entered into a solar power purchase agreement that provides more than half of the campus's electricity.
- Carbon Offsets
  - For remaining emissions, American University invests in carbon offset projects, including a landfill gas capture and destruction project.
- For more information click on this Link



As of October 2023

Case Study 4: University of Maryland

- Achieving Carbon Neutrality in 2025
  - American University became carbon neutral in 2018, two years ahead of its initial 2020 goal
- Carbon Neutral New Development Initiative
  - Negate new greenhouse gas emissions resulting from new construction, renovations, building occupancy changes, and major program changes that begin construction in 2016 or later by designing buildings to strict energy-efficiency standards and using energy from renewable sources
- Carbon Offsets
  - Since 2017, the university has offset 100% of the university's air travel emissions associated with faculty, staff and student travel
- For more information click on this Link



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Case Study 5: Colgate University

- Committed to Carbon Neutrality in 2008
  - Colgate University became carbon neutral in 2019, the first higher education institution in New York State
- Carbon Neutral New Development Initiative
  - Colgate's baseline 2009 campus carbon footprint was 17,393 metric tons of CO2 equivalent (MTeCO2). Since then, Colgate has reduced its footprint by over 50% and has remained under 8,000 tons annually since 2020
- Carbon Offsets
  - The carbon offset project decisions are determined by student, staff, and faculty representatives after receiving feedback from groups and individuals on campus about the most important carbon offset factors to the Colgate community.
- For more information click on this Link

Achieved Carbon Neutrality

Commitments:

- Climate Commitment
- Race to Zero

Specific Goals:

- Carbon neutral by 2019
- 40% reduction of Total Carbon by 2020 relative to 2009 ✔

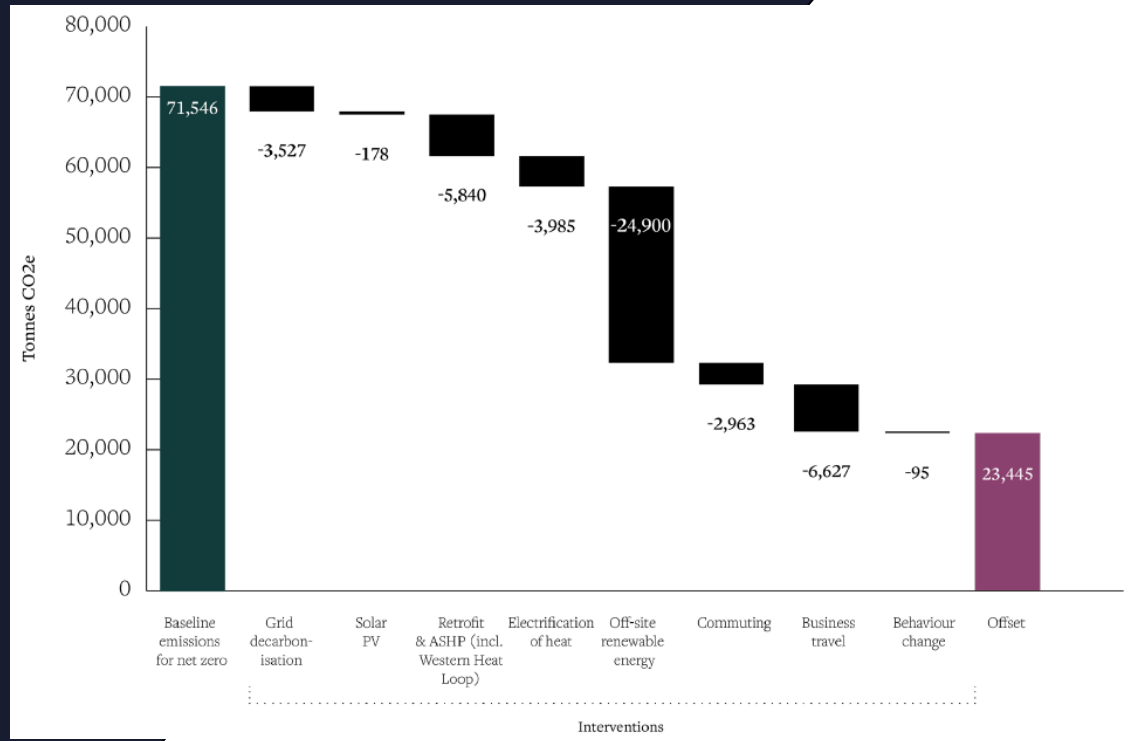
Change in Emissions from 2009 to 2022:

- Scopes 1 and 2: -19%
- Scope 3: -65%
- Gross emissions: -39%
- Net emissions: -101%

As of August 2023

Case Study 6: Leeds University

- Committed to Carbon Neutrality by 2030
  - In 2019, the University of Leeds set a target to achieve net zero greenhouse gas emissions by 2030
- Decarbonizing Energy
  - Some of the heat load to be removed from the heat network, reducing the requirement for gas-generated heat. To be done by retrofitting buildings and installing building level air source heat pumps, initially proposed in seven academic buildings and one large residence
- Carbon Offsets
  - Where emissions are unavoidable (e.g. unavoidable air travel) we will offset by 2030
- For more information click on this Link



As of August 2023

Lessons Learned from Case Studies

- Each university has adopted a unique approach to achieving carbon neutrality, reflecting their specific circumstances and opportunities
- Carbon offsets and credits have played a crucial role in each of these strategies, underlining their potential utility for other universities seeking to achieve carbon neutrality
- These examples also underscore the importance of comprehensive strategies that combine direct emission reductions, changes in operational practices, and the purchase of carbon credits.
- Some apply offsets more broadly to address heating, commuting emissions
- Internal carbon pricing programs can generate funds

Key Considerations for UConn

Determining UConn's optimal offset purchasing strategy will require analyzing several factors:

- Projecting emissions that cannot be eliminated directly by 2030 under different scenarios of action in buildings, energy supply, transportation, aviation, agriculture thus estimating total offset investment needed to neutralize residual emissions
- Joining existing offset cooperatives like The Regional Greenhouse Gas Initiative, California Air Resources Board
- Establishing partnerships directly with offset providers
- Exploring funding mechanisms such as internal carbon fees or green revolving funds to cover offset purchases
- Creating institutional processes for sourcing, procuring, tracking and retiring offsets
- Monitoring offset purchases and residual emissions annually to assess progress

Carbon neutrality is not the end...

A study of eleven higher education institutions that have already announced achieving carbon neutrality found that it is a potentially useful milestone

Colleges and universities cannot view carbon neutrality as the end goal if we want to respond effectively to the climate crisis

- Refocus on plans to stop burning fossil fuels
- Must think about what we burn and what we buy
- Actively promote new clean electricity
- Clear-eyed about the risks and trade-offs with offsets
- Must move faster

Thank you