CASE WESTERN RESERVE UNIVERSITY EST. 1826

Office of Energy & Sustainability

Climate Action Plan Update

2020

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Case Western Reserve University is a world-class university with goals strongly-rooted in sustainability, student well-being, transformative research, and a strong sense of community

Acknowledgments

The CAP update committee was charged with evaluating and updating the implementation strategies and making recommendations for University investment in the next five to ten years to keep on target to achieve carbon neutrality by 2050.

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Additional thanks to the many departments, students and faculty who met with us and provided input for this Climate Action Plan. We appreciate your time and effort.

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Key Updates

We are making progress and finding new ways to reach our goals

The 2019-2020 Climate Action Plan (CAP) Update provides a review of the University's progress since the publication of the 2011 Climate Action Plan and recommends an updated set of climate neutrality solutions for the University to achieve its 2030 and 2050 goals.

The CAP Update should be considered an addendum to the 2011 CAP. Strategies have been updated but the original philosophy remains the same, striving for net carbon neutrality by 2050 with several milestone reduction goals along the way.

This plan is intended to inspire stakeholders to help us achieve these goals with large and small actions.

Initial Goal Achieved

CWRU achieved its 20% emissions reduction goal by 2020 ahead of the target year in 2017. The three primary reasons this occurred include:

- **Shifting from coal to Natural Gas**
  MCCo retired their coal boilers for steam production and shifted to natural gas as a fuel source
- **Switch to Natural Gas for Ohio electricity**
  Across the country and in Ohio, grid electricity production has shifted away from coal to natural gas generally, which lowered the greenhouse gas footprint of electricity. Natural gas is of course still a non-renewable fuel source, not a permanent solution
- **Energy Efficiency**
  University's investment in energy efficiency in existing buildings

221,066 $MTCO_2e$

2009
Baseline Greenhouse Gas (GHG) inventory year

158,519 $MTCO_2e$

2019
A reduction in 62,547 $MTCO_2e$ from 2009 baseline year
28% reduction

CLIMATE ACTION PLAN TARGET MILESTONES

Initial Goal Achieved

20%

GHG emissions reduction from 2009 levels by
2020

Next Goals

50%

GHG emissions reduction by
2030

70%

GHG emissions reduction by
2040

80%

GHG emissions reduction by
2049

Ultimate Goal

Carbon Neutrality 2050

CWRU assumes that in 2049-2050 having achieved approximately an 80% reduction in greenhouse gas emissions that the University will need to purchase carbon offsets or renewable energy credits to achieve carbon neutrality. Until then, the University feels it is important to direct investments to lower the energy intensity of existing buildings on campus.

CWRU Climate Action Milestones

Second Nature

2008

University President Barbara R. Snyder signed the American College and University Presidents' Climate Commitment, now called the Climate Leadership Network Carbon Commitment, a signature program of Second Nature. This commitment informed the vision of a **carbon neutral campus by 2050** and drove the creation of the **2011 Climate Action Plan**, the first formal outline launching strategies to reduce carbon emissions.

2009

Baseline greenhouse gas (GHG) inventory year - fiscal year 2009 GHG footprint - 221,066 $MTCO_2e$.

2010

A 100 kw wind turbine near the Veale Athletic Center and 60 kw solar array on top of Adelbert Gym installed for research.

2011

- First Climate Action Plan was published in 2011
- First full-time Director of Sustainability hired
- First temperature settings policy was endorsed by President Snyder
- Chilled water expansion from MCCo's plant to extend service to KSL, Millis and Crawford buildings
- The Great Lakes Energy Institute (GLEI) was created

2012

Tomlinson Hall's major renovation was certified LEED Silver by the U.S. Green Building Council (3rd LEED certification at CWRU)

2014

- A compressed natural gas shuttle bus was purchased to transport classes and volunteers from campus to the University Farm in Hunting Valley
- Tinkham Veale University Center opened (LEED Gold)
- Wyant Athletics and Wellness Center opened (LEED Silver)
- Assistant Director of Sustainability and Certified Energy Manager positions created

2015

- Updated University Master Plan - CAP goals included
- Launched the first annual residential hall electricity reduction contest, called CWRU Unplugged
- CWRU Sustainability Ambassador Internship Program launched
- Linsalata Alumni Center achieves LEED Gold

2016

LEED Silver certification achieved for Dental Medicine at Health Education Campus

2017

- First AASHE STARS benchmark published, CWRU was rated Silver
- LED lighting retrofits - Case Quad and Mather Quad exterior lighting
- CWRU awarded Arbor Day Foundation's Tree Campus USA certification

2018

- MCCo transitions from coal to natural gas for steam plant operation (completed in Jan 2018)
- The first Sustainability House cohort lived in Wade Manor, a themed residential experience where students make a sustainability lifestyle commitment

2019

- Burke Center for Environmental Law launched
- Reached below 20% emissions reduction target
- The CWRU Office of Energy & Sustainability worked on update to 2011 Climate Action Plan
- President Snyder convened the Climate Action Plan Update committee to recommend solutions to help the University achieve the 2030 goal

2020

- Culture Change for Climate Change Seed Sprint funded resulting in the creation of the CWRU Climate Action Network
- CWRU transitioned to single stream recycling with new bins throughout most of campus in January 2020
- CWRU participates in Better Building Higher Ed Benchmarking Initiative

CAP Update Process

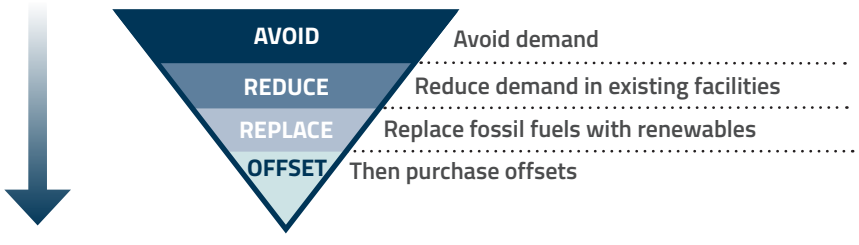
The CAP update committee evaluated progress on the published 2011 goals, reflecting on which commitments had turned out to not be viable, where priorities had shifted and whether there were new opportunities to consider. [See Appendix A for a review of the update process.]

While some of the strategies and commitments had detailed implementation plans in 2011, such as steam line improvements and MCCo central chiller plant expansion, others such as green information technology and reduced air travel GHG footprint needed further vetting and development that was not prioritized by the University.

While many strategies were successfully implemented and resulted in GHG reductions others still need further development and funding to come to fruition.

2011 Carbon Mitigation Strategies Outlined in the CAP	Outcome Achieved
Behavior Change Campaign	Partial
Draft Green Building Design and Construction Standards	Yes
Space Management with Sustainability in Mind	No
Energy Conservation	Yes
Green Information Technology	Partial
Steam Line Improvements	Yes
Reduce Air Travel GHG Footprint	No
Reduce Automobile Reliance and GHG Footprint	No
Waste Reduction & Recycling Improvements	Yes
MCCo Central Chiller Plant Expansion	Yes
MCCo Coal Conversion to Natural Gas	Yes
Increase Building-Scale Renewable Energy Systems	Partial

The CAP Update reaffirms the hierarchy of emissions reduction strategies committed to in the 2011 CAP



Realities of Progress

In the years since the 2011 CAP was published, important progress has been made. While some strategies worked well, others turned out to have unforeseen obstacles or were not as effective as we envisioned.

The energy sector in particular has delayed progress in part due to realities of the Ohio grid and renewable energy marketplace, including the Ohio Statehouse's rescinding of the renewable portfolio standard.

Meanwhile, we have been observing and experiencing increasing effects of climate change. The university feels a strong urgency to forge ahead with even greater determination to achieve the carbon neutral goal by 2050.

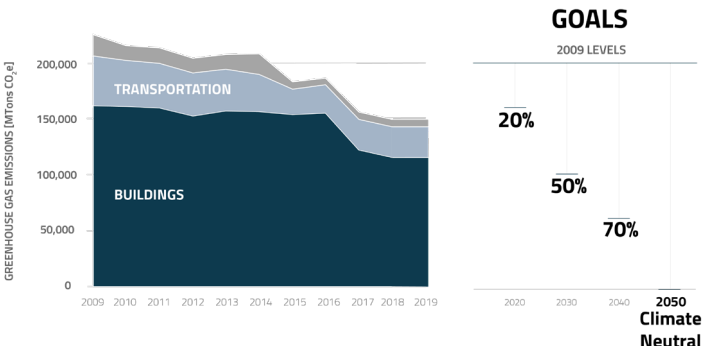
[See Appendix B for what we mean when we talk about carbon emissions & carbon neutrality, and Appendix C for what we measure, what we don't and why.]

As of 2020, Northeast Ohio's electrical grid sourced about half of its electricity from coal and a total of 68% from fossil fuel sources, according to US (EIA) figures.

GHG Inventory

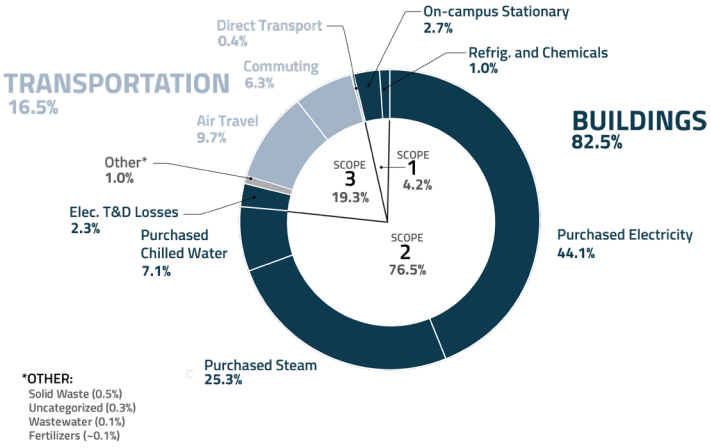
To communicate CWRU's greenhouse gas emissions inventory succinctly to a wider variety of stakeholders the CAP Update committee came up with the following three, simple categories - **buildings, transportation, and other -** and will use these instead of identifying emissions by scope 1, 2 and 3. [See Appendix D for definitions of scope 1, 2 and 3 emissions.]

The 2019 emissions (158,519 $MTCO_2e$) are below our target of 20% reduction by 2020. CWRU's emissions totaled 149,584 $MTCO_2e$ during 2018 from the categories previously mentioned. The 2011 CAP referenced emissions through scopes, a way in which emissions are categorized according to source.



2018 EMISSIONS

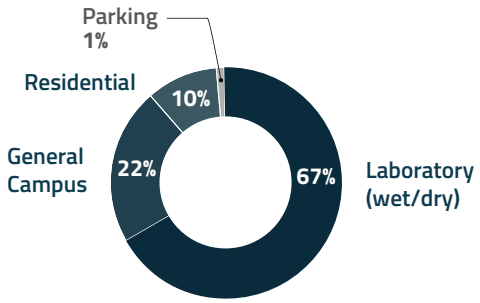
PERCENTAGE OF REPORTED INVENTORY ($MTCO_2e$)



Buildings and Infrastructure

Building energy use from electricity, purchased steam, purchased chilled water, and transmission losses make up 77.3% of campus emissions. Most of our emissions come from purchased energy, heavily due to energy intense research needs. Lab buildings are approximately 30% of square footage but use over 60% of the energy on campus, followed by academic and office, residential, and parking and other auxiliary spaces. MCCo acts as a conduit for electricity from the grid and produces steam from natural gas boilers that were transitioned from coal in January 2018. This shift led to a substantial drop in our campus carbon emissions.

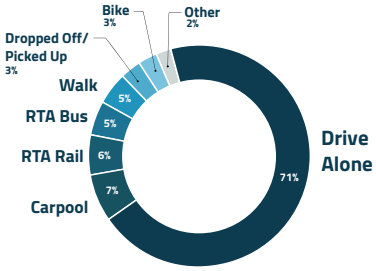
BUILDING GHG BY TYPE



Transportation

Emissions from transportation make up 22% of the total and are primarily from air travel. Though advances have been made in video conferencing and connecting worldwide in real time, academia thrives on the ability to travel for direct collaboration and learning. The university also offers study abroad programs and athletics resulting in heavy air travel for faculty and students.

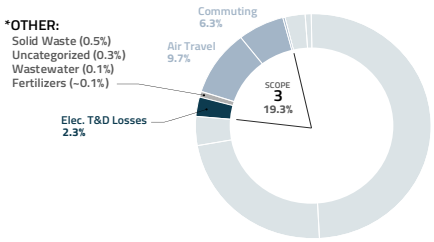
Other factors in transportation are commuting to and from campus. In the 2017 CWRU Employee Commuter Survey data shows that 71% of respondents drive alone to campus, and 55% of those who live within 5 miles of campus drive alone. CWRU also owns a fleet of vehicles for staff, faculty, and student use. Of close to 180 vehicles, the majority are vans or trucks that have not transitioned to electric.



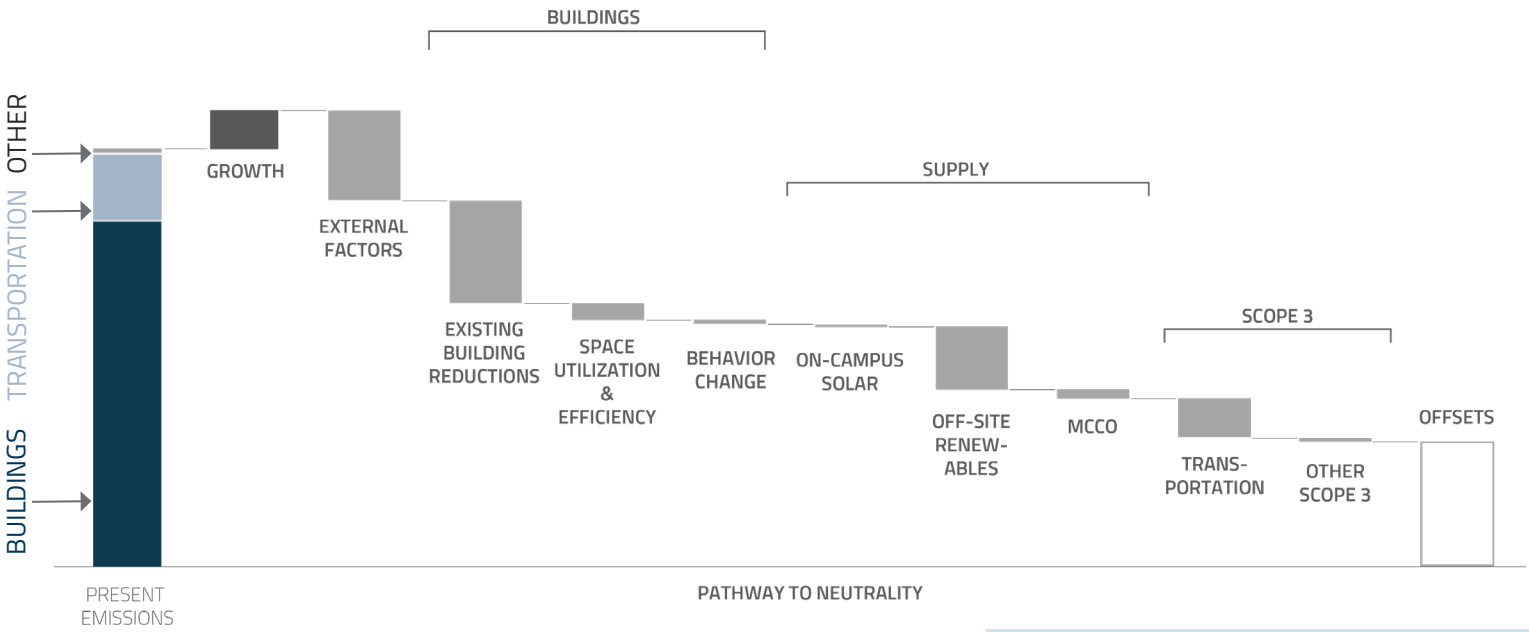
Primary Mode to Campus from 2017 Employee Commuter Survey

Other

Emissions from Other category make up 1% of the total and the majority are from solid waste disposal.



Future



Emissions Reductions by Strategy

The CAP Update committee and consultants focused on solutions that would help CWRU stay on track and **reach a 50% reduction from baseline by 2030**.

The waterfall chart above illustrates a pathway that CWRU could invest in to meet our emissions reductions goals. The graphic highlights the relative carbon reduction of each solution by the depth of the bar but no timeline or prioritization is intended as displayed.

The CAP update committee recommended the following 10 solutions.

Updated CAP Solutions Recommended

1. **Existing Building Energy Efficiency Reductions for Lab Buildings**
2. **Existing Building Energy Efficiency Reductions for Non-lab Buildings**
3. **CWRU Micro Combined Heat & Power (3.0MW)**
4. **Off-Site Renewables (such as a Virtual Power Purchase Agreement)**
5. **Transportation Management Solutions**
6. **Space Utilization & Efficiency**
7. **Behavior Change Investment & Activities**
8. **On-Campus Solar**
9. **Infrastructure and MCCo Improvements**
10. **Other Scope 3 Small Scale Opportunities**

Investment in the future

The University continues to invest staff and financial resources towards the carbon neutrality commitment and will continue to prioritize investments in solutions that most cost-effectively reduce emissions.

Growth

As of 2020, CWRU expected a relatively small net growth in space and student population, which is factored into the CAP model. Square footage, population growth and energy intensity are estimated to increase GHG emissions by 9.4%. If growth expectations change the CAP model will be updated.

Aligning University and Regional Goals

As scientific evidence of global climate change mounts, it is easy to overlook past improvements, as well as efforts being made in the present. CWRU was established during Cleveland's historic industrial past and the institution has been contributing to world-changing breakthroughs since then. But such cutting edge research has a carbon price tag. The higher education sustainability community as a whole continues to engage in finding creative solutions to reduce the carbon impact of our industry's world changing research.

Priority Solutions

Existing Buildings

Keeping pace with deferred maintenance upgrades and energy conservation measures (ECMs) for existing building stock is an extremely important part of Case Western Reserve meeting our energy and emissions goals. Buildings will require an investment of $3 - $4 million annualy, over the course of 10 years, in order to achieve a 25% reduction in emissions. Subsequent utility savings could exceed $150 million. [See Appendix E for building energy conservation measures estimates and methodology]

Case Western created an energy improvement plan (EIP) in 2017 that outlines processes to make decisions for building upgrades. Processes have been partially utilized but streamlining this system to include more people for succinct collaboration could result in decreased redundancy of efforts. We estimate that three additional full-time staff will be needed to help usher this effort over time but would decrease emissions with a positive return on investment when paired with other administrative processes.

The cost estimates below were vetted by internal and external team members but will need more detailed scoping for more accurate projections:

- Energy efficiency in existing building - $32+ million
    - Lab buildings - $13+ million
    - Non-lab buildings - $12+ million
        - 3-Megawatt micro combined heat & power installation (co-generation) - $7+ million

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	$120.57
Average Annual GHG Avoidance	35,395
Average Savings (Cost) per Avoided $MTCO_2e$	$238.91
Percent Reduction toward 2050 Neutrality	25.0%

Off-Site Renewables

A virtual Power Purchase Agreement (VPPA) would most likely be struck with an out of state renewable energy development. It is an accounting transaction, not direct procurement of the generated electricity. The electricity generated would be sold in its local market and CWRU could receive some small revenue or be required to pay a small amount depending on the local sale. Several other Universities and many large corporations have struck these agreements and so far these transactions have been cash neutral or cash positive for those Universities.

Although we have and will continue to invest in on-site renewables, this energy will only be able to supply a small portion of our consumption. Some higher education institutions and corporations utilize virtual VPPAs to meet their renewable energy goals when they can't on their own property. This mechanism provides a way for the University to maintain our relationship with MCCo and Cleveland Public Power while procuring renewable energy. While it is not risk free, we will continue to evaluate the trend and opportunities. See Appendix E for details on how VPPAs function. VPPAs can be created on any scale and established through financing such as fundraising, public private partnerships, or other means.

If Case Western Reserve pursues this route, there would be opportunities to prioritize an investment location and the value it would bring that local economy and renewable energy type. For the purposes of this CAP, a 90,000 MWh generation assumption was modeled. There are institutions that have preferred to pay utility providers the extra cost to source renewable energy that feeds into the grid. This shifts away from fossil fuels and limits carbon emissions, but potentially comes at a higher price than a VPPA. There is also the option of purchasing offsets, which will be more expensive and will not provide the same benefits as actively creating renewable energy. [See Appendix F for basic overview of virtual power purchase agreements (VPPAs)]

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	$10.44
Average Annual GHG Avoidance	25,299
Average Savings (Cost) per Avoided $MTCO_2e$	$26.27
Percent Reduction toward 2050 Neutrality	15.0%

Priority Solutions

Transportation

Purchase transportation offsets for University funded air travel could cost as little as $50,000. Because transportation offsets are still low-cost this would be a relatively inexpensive way to achieve neutrality for one moderate piece of our GHG inventory that will otherwise be difficult to reduce through behavior change. We do not want to discourage travel for research, study abroad or athletics. Other transportation investments to consider:

- Financially reward or incentivize staff use of transit
- Evolving the CWRU fleet towards electric vehicles

Commuting

Case Western Reserve is in University Circle, a hub where 50,000 employees commute daily during the academic year. About 7,000 of these commuters come to campus. Our sustainable transportation committee is an active part of transportation planning in University Circle, collaborating to help understand our commuter patterns and provide alternatives to single occupancy vehicle travel. Of the respondents to the 2017 Commuter Survey, about 35% of our employees come from within five miles of campus.

If Case Western Reserve maintained current practices, there would be small decreases in emissions due to the earlier mentioned fuel efficiency and electric vehicle (EV) increase. However, the university could consider engaging targeted groups in carpooling and alternative modes of transit or pursue incentives like providing further discounted transit passes. Some of these measures might require a culture shift toward an ability for more staff to work remotely and initial onboarding and hiring discussions to encourage alternate modes of getting to campus.

Air Travel

One of the most viable actions for the university to mitigate air travel is not to mandate its limit, but to purchase offsets for flights. If we were to purchase a voluntary $2.90 per offset for our current amount of air travel emissions, 14,438 $MTCO_2e$, this would be around $45,000 a year as of 2020 offset prices. The dollar amount is based on current offset prices and the steady progression of starting from 0% offsets in 2020 to 50% offsets paid in 2030, to all travel offset by 2050.

The administration will need to discuss the mechanism in place to make this viable, but options include distributing funds across departments or reimbursing on a per travel basis.

Campus Fleet

As mentioned earlier, electric vehicles (EVs) are expected to become more prolific and cheaper. Utilizing EVs over traditional gasoline vehicles will decrease tailpipe emissions, but will shift emissions and the carbon accounting to purchased electricity for charging.

In 2018, Case Western flew between 22 and 23 million miles. About 55% of this travel is paid via travel agency, while the remaining 45% is reimbursed to individuals.

Space Utilization & Efficiencies

The 2018 Master Plan called for CWRU to demolish older building stock as new square footage is added, so that there will be no net growth in square feet to help the University meet its carbon neutrality goals. But to accommodate anticipated growth of the annual first-year class and improve the quality of campus spaces, the University has decided that adding square footage will be needed. The decision to demolish end of life building stock is still under review.

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	$11.02
Average Annual GHG Avoidance	3,541
Average Savings (Cost) per Avoided $MTCO_2e$	$256.79
Percent Reduction toward 2050 Neutrality	4.4%

Priority Solutions

Behavior Change

Throughout the campus engagement process of refreshing our Climate Action Plan in the Fall of 2019 and Spring of 2020, we heard a resounding willingness from students, faculty and staff to change their behavior to decrease campus emissions. We can catalyze this effort through different campaigns and programs to build awareness. For example, it was suggested that we showcase physical translations of what the amount of $MTCO_2e$ means. We can also help campus members understand energy implications for actions, such as forgoing an extra desktop printer, while also creating a better pipeline for them to voice energy concerns to the division of Facilities Services & Campus Planning.

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	$5.41
Average Annual GHG Avoidance	1,639
Average Savings (Cost) per Avoided $MTCO_2e$	$209.57
Percent Reduction toward 2050 Neutrality	1.1%

On-Site Solar

Case Western Reserve currently has a 156-foot 100 kW wind turbine and about 150 kW of solar on campus. This does not include the Sun Farm, a solar installation on West Campus that is part of the Solar Durability and Lifetime Extension Center's research. The university could invest in additional solar and possibly host third-party ownership to limit capital costs. Figures below are for an additional 1.5 MW solar photovoltaics (PV) across campus.

The Solar Durability and Lifetime Extension (SDLE) Center is connected to the CWRU School of Engineering and run by Roger French. In March of 2019 it was announced that the SDLE would receive a $1.35 million grant from the Department of Energy to fund research to improve the efficiency and lifespan of PV panels.

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	$.65
Average Annual GHG Avoidance	813
Average Savings (Cost) per Avoided $MTCO_2e$	$46.84
Percent Reduction toward 2050 Neutrality	.4%

MCCo

MCCo has identified efficiencies that could result in cost savings and lower emissions for their clients. If the company chooses to invest in targeted infrastructure upgrades, there would be a small reduction in emissions for campus and cost savings for all parties.

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	$3.09
Average Annual GHG Avoidance	3,338
Average Savings (Cost) per Avoided $MTCO_2e$	$59.62
Percent Reduction toward 2050 Neutrality	2.4%

Other

Other steps toward neutrality are through advancing programs around waste reduction and water use. Case Western Reserve currently provides mixed recycling across campus and has been composting pre-consumer food waste for 10 years. Our current goal is to reduce waste by 50% and wastewater by 30% by 2030 .

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	($1.47)
Average Annual GHG Avoidance	9,310
Average Savings (Cost) per Avoided $MTCO_2e$	($12.22)
Percent Reduction toward 2050 Neutrality	10.0%

Offsets

Following these recommendations for strategies and amount of investment, about 29% of the remaining emissions will need offset by 2050. The price will be based on what offset costs are at the time, likely close to 2050 based on Case Western Reserve's value of investing in other means first.

Financial (Millions of Dollars in 2019 Dollars) and Carbon Snapshot	
Net Present Value	($1.26)
Average Annual GHG Avoidance	367
Average Savings (Cost) per Avoided $MTCO_2e$	($241.33)
Percent Reduction toward 2050 Neutrality	.3%

Appendix A

Process

The consultant team of SmithGroup and Fovea, Inc. provided expertise and services to help make this plan possible. Over the course of five months, consultants engaged with the Office of Energy and Sustainability on a continual basis, visited campus three times for in-person meetings, and held an open town hall for feedback and recommendations.

Following the development of the CAP Refresh, the Office of Energy and Sustainability held a series of internal meetings to roll out the plan. This period provided the university an opportunity for thorough review and to ensure alignment with the new strategic plan.

Appendix B

What We Mean When We Talk About Carbon Emissions & Carbon Neutrality

This document will discuss carbon emissions in terms of MTCO2e — metric tons of carbon dioxide equivalent. This is the measurement for the six greenhouse gases contributing to climate change named in the 1992 Kyoto Protocol. The term "equivalent" is how each of these gases are normalized to express the amount of emissions if it solely CO2, which is the gas that Case Western Reserve tracks. For more information, visit: https://unfccc.int/process/the-kyoto-protocol.

Appendix C

What We Measure, What We Don't and Why

Institutions that have set goals toward a Carbon Commitment submit a carbon inventory to Second Nature, an organization that aggregates higher education carbon reporting. With more than 940 institutions of higher education, Case Western Reserve University also reports our emissions and sustainability practices to the Association for Advancement for Sustainability in Higher Education (AASHE). Their standards cover a range of items that underscore the triple bottom line of sustainability, including academics, engagement, operations, planning and innovation. Recommended standards for reporting with these platforms have guided how we account for emissions.

Fovea Services, LLC supports institutions of higher education and companies with corporate campuses with facilities, energy, and environmental decisions making. Case Western Reserve University worked with Fovea during the 2019 CAP for assistance in analyzing our most recent greenhouse gas inventory and projecting future emissions through scenario planning. Fovea's tool provides a platform that measures energy, emissions, costs, and savings according to each strategy explored in this document, starting with the business-as-usual case and quantifying the impact of each measure.

Numbers and figures have been modeled to the best of our knowledge based on current commodity pricing, regional and local energy trends, and campus energy use.

Appendix D

Definition of Scope 1,2 and 3 Emissions

The GHG Protocol Corporate Standard classifies an organization's GHG emissions into three 'scopes'.

Scope 1

Emissions are direct emissions from owned or controlled sources.

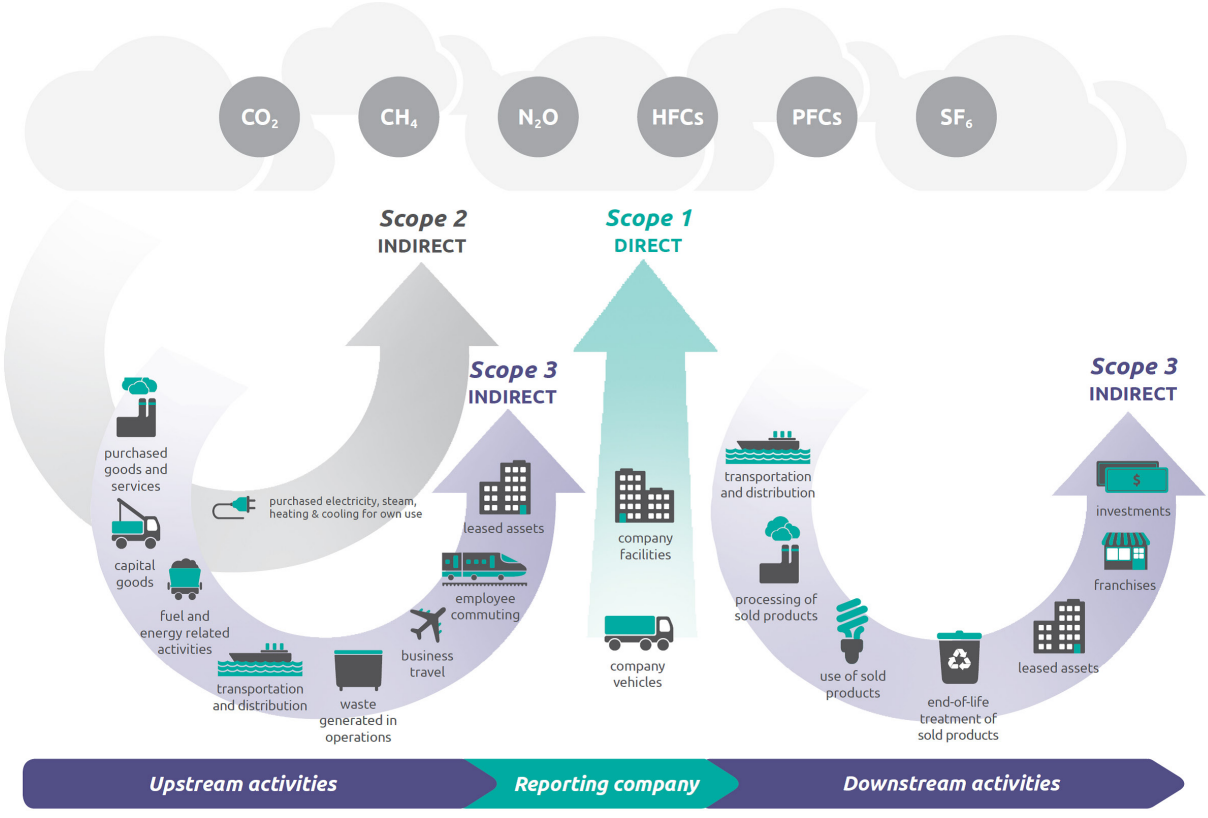
Scope 2

Emissions are indirect emissions from the generation of purchased energy.

Scope 3

Emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting organization, including both upstream and downstream emissions.

Overview of GHG Protocol scopes and emissions across the value chain



Source: WRI/WBCSD Corporate Value Chain (Scope 3) Accounting and Reporting Standard, page 5.

Appendix E

Building Energy Conservation Measures Estimates and Methodology

The most recent building audit was conducted in 2012. The building audit provided tables for each building showing the ECM type, estimated investment, estimated return, and estimated emissions avoided among other figures. Extrapolating from a set of buildings from this audit, we were able to create high level averages for energy saved in MMBtu per dollar invested and gross square feet affected.

Aggregated across six different ECM categories—lab HVAC, HVAC, plug loads, lighting, façade, and other —energy saved could be converted to dollars saved based on current energy prices. Below is a simple chart of those assumptions and projected outcomes.

Audit Results			
	Campus Scale Applicability	Rough Order of Magnitude (ROM) First Cost	Total Energy Saved
	1,000 GSF	$ (millions)	MMBtu
Lab HVAC	2,241	$14.2	254,219
HVAC	4,878	$9.5	103,704
Lighting	7,119	$2.3	18,145
Façade	7,119	$3.0	7,341
Other	7,119	$1.6	37,393
Plug Loads	7,119	$1.9	29,429
Total		$32.4	450,232

	% of MMBtu Reduction by Utility Type			Reduction by Utility Type		
	Purchased Electricity	Heating (Purchased Steam)	Cooling (Purchased CHW)	Purchased Electricity	Heating (Purchased Steam)	Cooling (Purchased CHW)
	%	%	%	MWh	Klb	ton-hrs
Lab HVAC	30%	41%	29%	22,352	95,162	6,106,249
HVAC	33%	38%	29%	9,937	36,260	2,492,893
Lighting	100%	0%	0%	5,318	0	0
Façade	0%	57%	43%	0	3,834	260,304
Other	67%	20%	12%	7,381	6,856	388,946
Plug Loads	100%	0%	0%	8,625	0	0

Appendix F

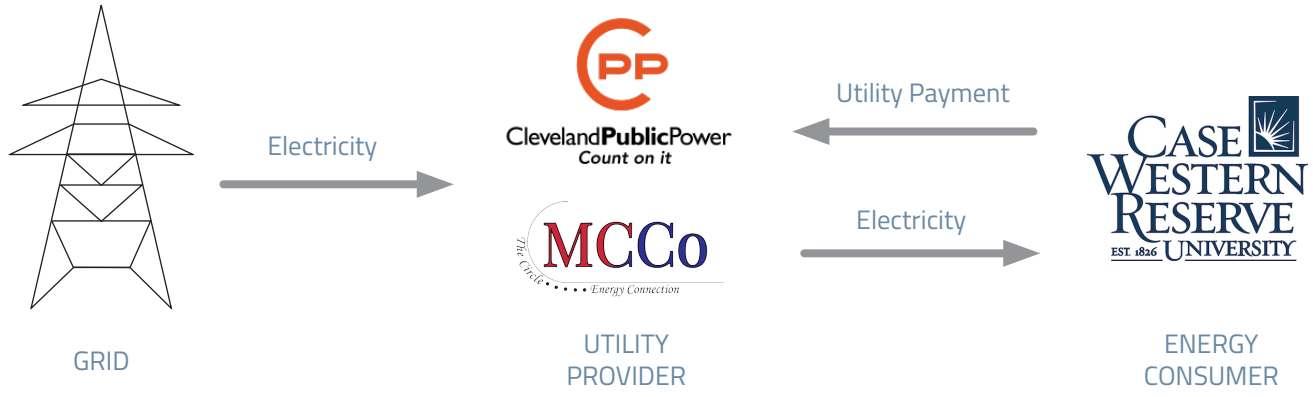
Basic Overview of Virtual Power Purchase Agreements (VPPAs)

Currently, Case Western Reserve University engages in a traditional model of electricity supply and consumption. Energy producers create electricity via fossil fuels or other sources. This is managed by the regional grid and flows to the utility provider. Utility providers then distribute power to customers, such as our campus, for which we pay the market price based on our consumption.

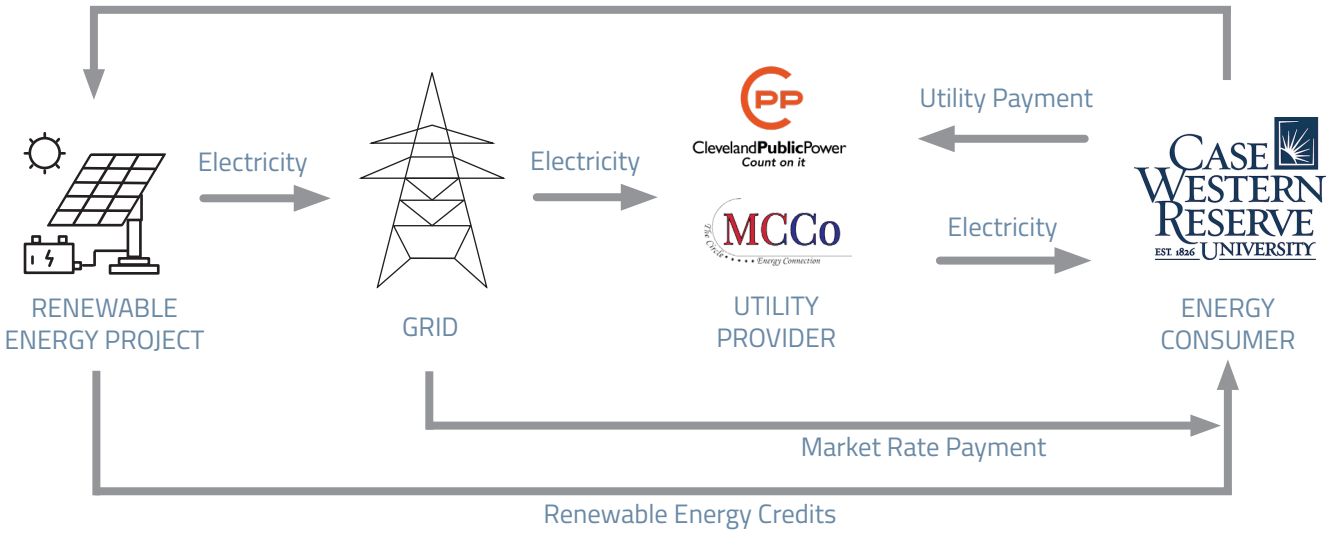
A VPPA allow customers to invest in and own renewable energy that goes to the grid. For instance, if Case Western Reserve University engaged in a solar VPPA, the university would pay a fixed rate for the ownership and operation of the solar PVs at the size we choose. That energy would flow into the regional grid local to the solar PVs, to the local utility providers, and CWRU would receive a floating market rate (which varies day to day based on economic indicators) for the energy produced.

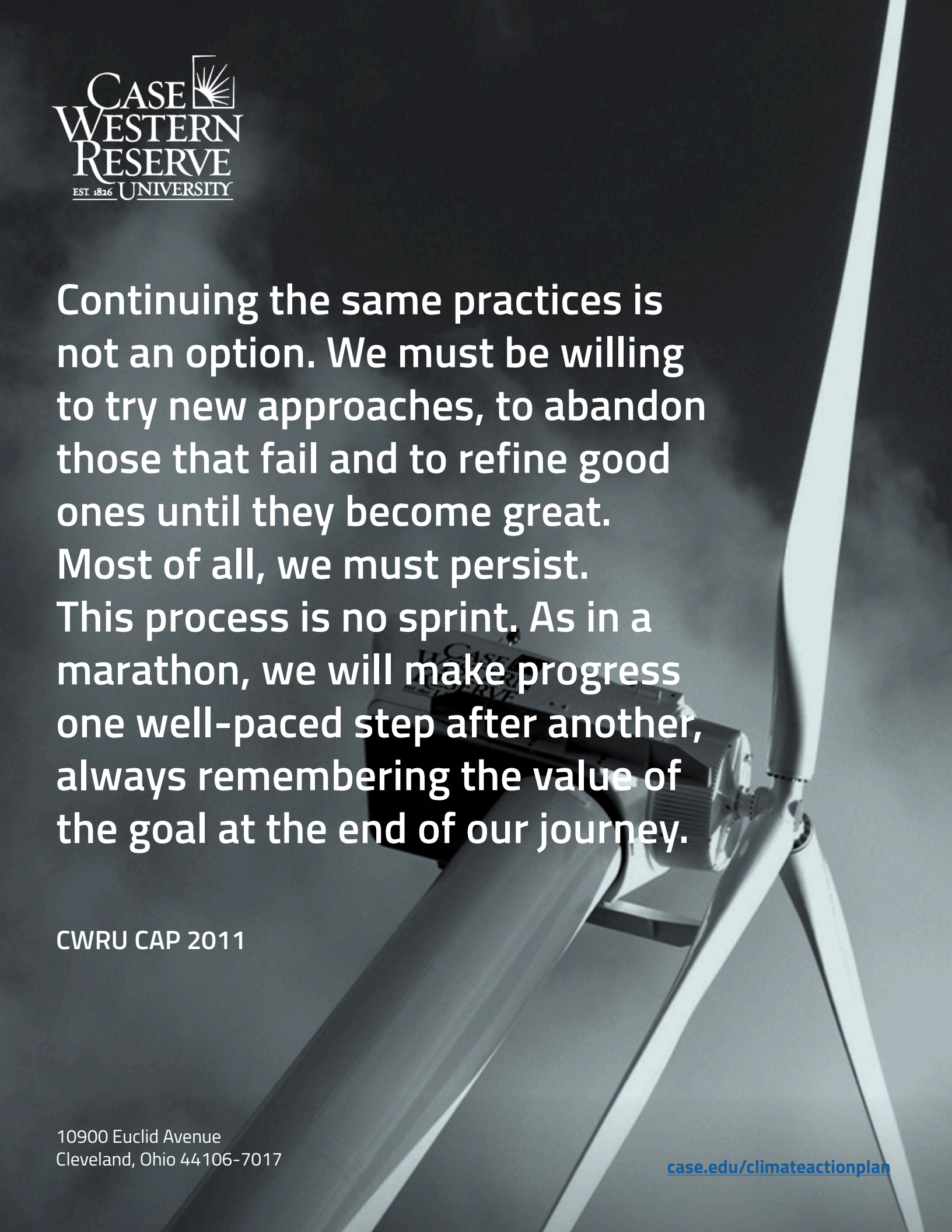
Case Western Reserve would continue to receive our energy from MCCo and CPP, but we would be receiving regular payments for an asset that creates clean energy.

Traditional Energy Purchase Model



VPPA Model




Case Western Reserve University
EST. 1826
Continuing the same practices is not an option. We must be willing to try new approaches, to abandon those that fail and to refine good ones until they become great. Most of all, we must persist. This process is no sprint. As in a marathon, we will make progress one well-paced step after another, always remembering the value of the goal at the end of our journey.
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