CLIMATE ACTION PLAN

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INTRODUCTION

William Rainey Harper College (Harper College) is one of the larger community colleges in the State of Illinois. Harper College offers a variety of transfer options, allowing students to earn their associate's degree before transferring to a four-year college or university to complete their bachelor's degree. The College also offers career programs which grant an associate's degree or certificate and provide the skills necessary to enter the work force.

Harper College established a Green Committee in 2008. The committee consists of faculty, staff, and students. This committee has six sub-committees including Education and Outreach, Recycling and Cafeteria, Transportation, Alternate Energy Sources, Exterior Campus, and Purchasing Policy.

Under the Presidency of Dr. Kenneth Ender, Harper College decided to aggressively pursue the goals of the American College and University President's Climate Commitment (ACUPCC) in 2010. That same year, President Ender signed the Illinois Campus Sustainability Compact with Illinois Governor Patrick Quinn. The Compact includes objectives such as purchasing renewable energy, implementing green building practices, developing sustainable transportation opportunities, improving water conservation and incorporating sustainable dining practices.

As part of the ACUPCC, a Climate Action Plan (CAP) was developed to address action items leading the campus toward carbon emissions neutrality. This plan demonstrates Harper's commitment to social, global and environmental responsibility.

Harper College strives to ensure a sustainable, healthy college community for future generations of students. The College intends to promote a theme of sustainable objectives and infrastructures and to implement green community initiatives. Some of the key objectives are:

- Execute a comprehensive recycling plan
- Create alternatives to conventional transportation modes
- Utilize green products and environmentally responsible practices for building maintenance
- Educate employees, students and the community about environmental issues
- Utilize environmentally sound food service practices
- Reduce energy consumption and increase energy efficiency
- Reduce water consumption
- Create landscapes that promote the health of the local ecosystem
- Continuously implement sound and innovative environmental practices for the College
- Utilize cleaner fuel and energy sources

EXECUTIVE SUMMARY

The Harper College Climate Action Plan sets goals for future infrastructure and campus life projects while developing a preliminary timeline for achieving the College's goal of emissions neutrality by 2053.

Phase 1 (2013 – 2023)

- By 2014 achieve an interim goal of 5% energy use reduction of purchased utilities compared to the base year of 2010 and 15% offset of carbon emissions from purchased utilities via renewable energy certificates (RECs) or verified emissions reductions (VERs).
- By 2023 achieve a 25% reduction of total campus emissions through 20% energy use reduction of purchased utilities (on a per square foot basis) and 25% offset of carbon emissions from purchased utilities from renewable energy or offset via RECs or VERs.
- Perform an energy audit and retro-commissioning for each existing building to highlight applicable energy efficiency projects and their savings. Buildings to focus on are Buildings L, W, X, Y and Z.
- Each existing building on campus could be metered appropriately to measure energy usage for all sources, including electricity, natural gas and water.
- The Infrastructure Master Plan Phase 3 report could be utilized to address additional utility reduction projects, system deficiencies, recommendations and probable implementation costs.
- 100% of new buildings should be built to LEED Silver standards.
- Staff should investigate ways to encourage behavioral changes in the campus community focusing on items such as:
    - Waste management – for example composting of food waste, cutlery and tableware in cafeterias and classrooms in all situations where reusable china and silverware are not employed, including tracking savings incurred by the reduction in waste hauling charges.
    - Sustainable Commuting Practices – including making the campus bicycle friendly, installing appropriate bicycle storage areas on campus, connecting with community bicycle trails whenever possible and utilizing incentives for students, staff and faculty to utilize public transportation as outlined in the ACUPCC's tangible actions list.
- The GHG Inventory Report will be updated every other year, to reflect progress.
- For Phase 1 utility reduction projects and energy offsets, funding strategies may include:
    - Rebates/grants from energy efficiency programs from the Illinois Department of Commerce and Economic Opportunity (DCEO) and Smart Energy Design Assistance Center (SEDAC).
    - Capture and reinvestment of cost-savings resulting from sustainability programming and energy efficiency measures through the use of a revolving fund as described in the ACUPCC's Implementation Guide.
- Investigate implementing a College Purchasing Policy to specify that purchases of any category of equipment that is covered by the EPA's ENERGY STAR® program carry that designation.

Future Phases

- Phase 2 (2024 – 2032) – Achieve a 50% reduction of total emissions with 30% energy use reduction of purchased utilities and 50% offset of carbon emissions from purchased utilities from renewable energy or offset via RECs or VERs
- Phase 3 (2033 – 2053) – Achieve a 100% neutrality with 100% of purchased utilities from renewable energy or offset via RECs or VERs

CARBON EMISSIONS INVENTORY

An Emissions Inventory can be defined as the total set of greenhouse gas (GHG) emissions caused by an organization, event, product or person. The most commonly measured greenhouse gases are carbon dioxide, methane, nitrous oxide and water vapor. Carbon dioxide from burning fossil fuels and destroying forests is having the greatest impact on our climate, and, consequently, emissions volumes for combinations of GHGs are generally given in terms of equivalent amounts of CO_2. GHG emissions are measured in three scopes, based on emission source, and then converted to metric tons of carbon dioxide equivalent ($MTCO_2e$).

GHG emissions scopes 1, 2, and 3 are defined by international protocols. For Harper College, the scopes are defined as follows:

- Scope 1: Direct emissions from direct combustion of fossil fuels by equipment which is owned and controlled by the College such as boilers, furnaces, fleet vehicles, etc. This scope also includes "fugitive emissions" from on-campus releases of CFC and HCFC refrigerants and emissions from fertilizers used on campus.
- Scope 2: Indirect emissions from purchased electricity.
- Scope 3: All other indirect emissions that include faculty, staff and student commuting, air/bus/taxi travel paid for or through the college, paper purchased, solid waste generated, wastewater generated and any carbon offsets purchased for the college.

Although there are not measures currently in place to report all of the direct and indirect emissions produced by Harper College, steps are being taken to address additional inventory tracking so that future GHG reporting can become increasingly more comprehensive. These steps include utilizing the Campus Carbon Calculator spreadsheet along with utility usage currently being tracked while adding the following:

- Fiscal year budgets for total operating expenses, research (if any), and utility usage
- Annual population of full time students, part time students, summer students, faculty, and staff
- Yearly Commuting and Travel Information broken down by students, faculty and staff for each mode of transportation noting trips per week, weeks per year, and miles per trip for each group:
    - Personal vehicle/carpool including percent by carpool
    - Bus
    - Commuter Rail
- Directly Financed Outsourced travel information (including study abroad)
    - Air travel Faculty/staff miles
    - Air travel Student miles
    - Train miles
    - Taxi/ferry/rental car miles
    - Bus miles
    - Alternative fuel bus miles

- Personal Mileage Reimbursement miles (not commuting)
- Study abroad air travel miles

- Type and weight of refrigerant consumption
- Type and weight of fertilizer used
- Solid Waste in short tons, including a separate breakout for any that may have been incinerated
- Paper purchased, noting total weight in pounds and percent recycled content
- Any renewable energy offsets purchased during the year

The ultimate goal is to achieve complete neutrality.

Baseline Emissions Inventory

Using the information available, Harper College developed emissions calculations using the Clean Air – Cool Planet Campus Carbon Calculator for the baseline year of 2010 (see Table 1). This initial calculation showed that the emissions from purchased electricity are the main contributors to the campus's carbon footprint, totaling 47% (see Figure 1). This main emissions contributor needs to be targeted aggressively in order to achieve carbon neutrality goals.

Indirect emissions from commuting, air travel and wastewater are the second highest contributor at 31%. Direct emissions from natural gas combustion are the lowest scope because, in general natural gas produces about half as much CO_2 (per energy output) as electricity generated from coal.

As previously mentioned, not all of the college's emissions sources are taken into account in this baseline report. Areas within the three scopes that need to be tracked in order to achieve complete neutrality are refrigerants on campus, fertilizer applications, solid waste, paper and offsets. Although future data tracking of these items will increase Harper's total emissions, the overall scope distribution will likely not change dramatically. Reducing utility use, especially electrical energy, is expected to remain the highest priority in the greenhouse gas neutrality goal.

Table 1: Baseline GHG Emissions

	Scope 1	Scope 2	Scope 3
Sources Currently Measured	Natural gas use	Electricity purchased	Staff, faculty and student commuting and air travel Wastewater
Method	Natural gas metering	Electrical metering	Consultant calculations Water metering
Total CO2 emissions equivalent (MT) by Scope	7,156.5	15,062.7	11,547.2
Total CO2 emissions equivalent (MT)	33,766.4		

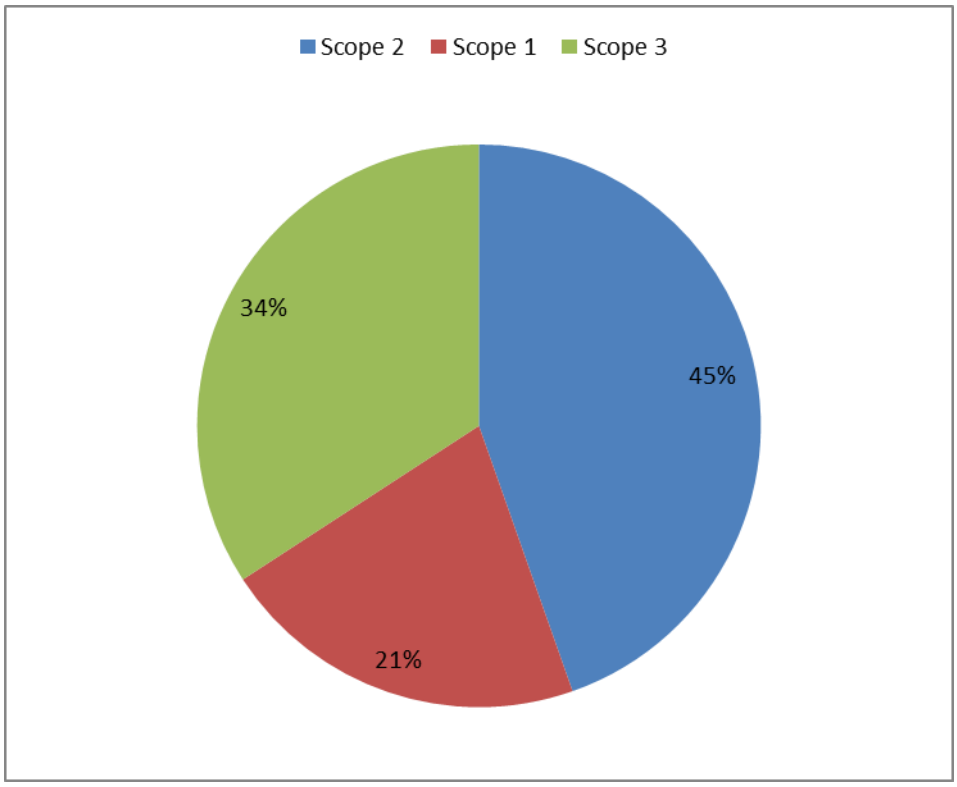

Figure 1: 2010 Baseline CO_2 Emissions Breakdown

Emissions Inventory Projection

Campus carbon emissions have generally trended upward in the last decade and a projection based on "business as usual" would also produce a generally increasing slope. The graph below describes campus emissions projected to 2022 based on a trends analysis of past and current inventories. Similar to the current inventory, the campus' energy use (purchased electricity and on-campus stationary) is the main contributor to the total projected emissions.

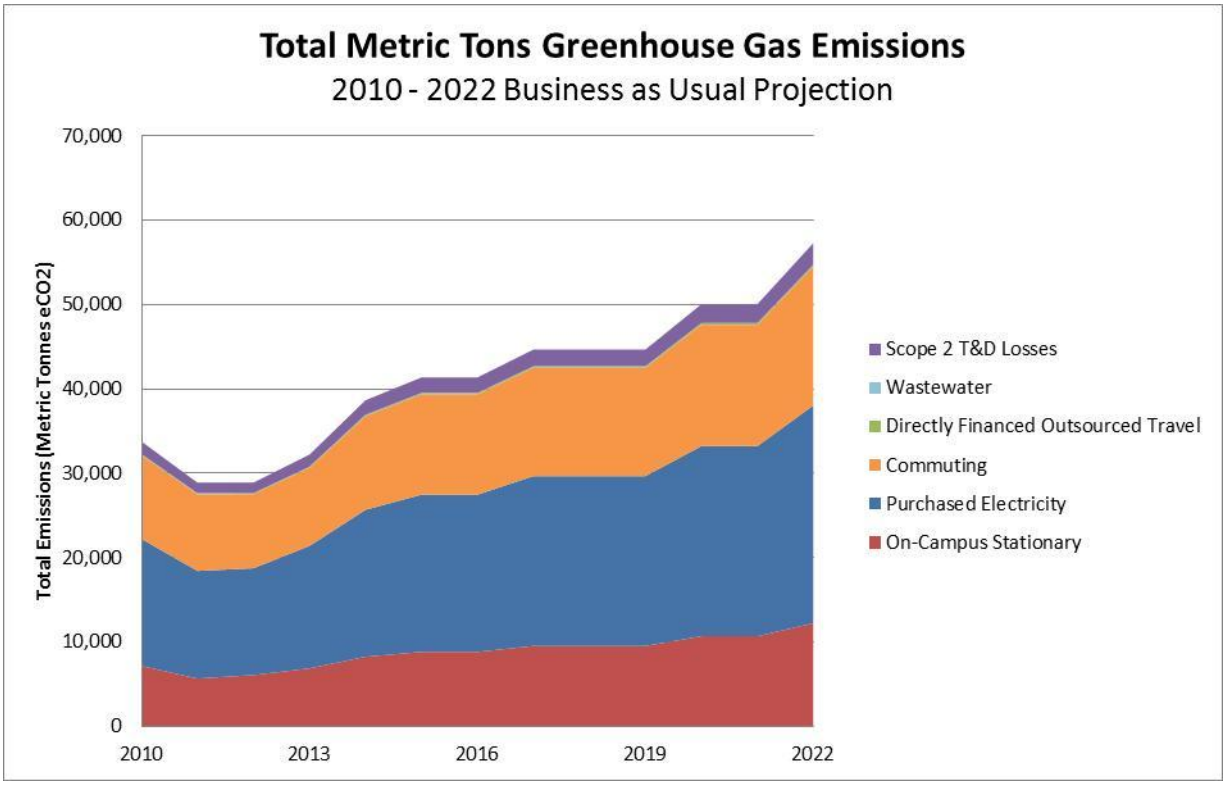

Figure 2: Business as Usual Emissions Projection

Although Figure 2 shows an increase in emissions from purchased electricity, this trend is mainly based on the campus' plan for increased building square footage. At the current campus size, efforts have been gradually implemented to increase energy efficiency. Figure 3 below shows that over the past few years, electricity consumption has been on a downward trend. Some of these energy conservation measures have included upgrading to variable primary flow for the chilled water system with custom packaged controls and variable flow air and water distribution for newer buildings.

The master plan is based on the premise that currently existing buildings will remain in service.

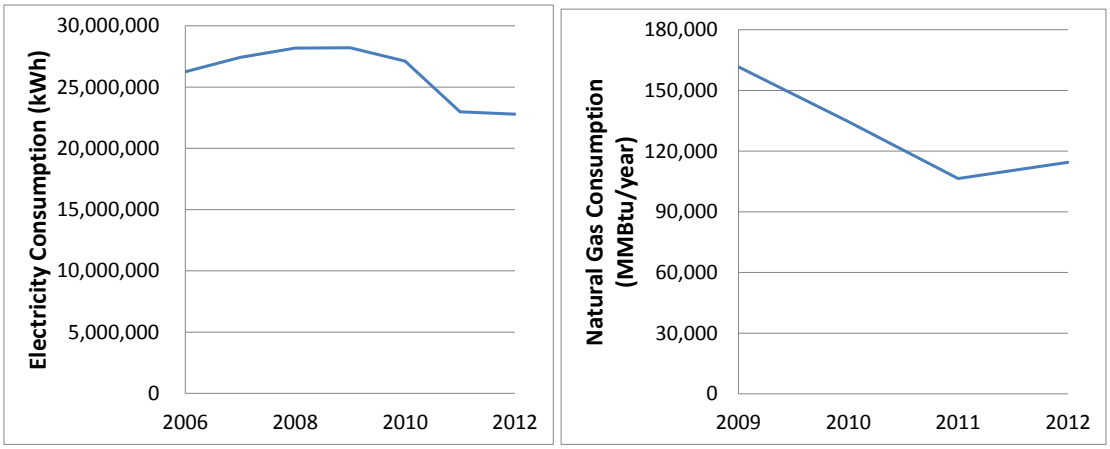

Figure 3: Total College Utility Usage

Scope 2 Additional Breakdown

Since scope 2 emissions from purchased electricity are the largest contributor to the College's emissions, reducing this energy consumption should be the highest priority. To better understand the electricity usage on the main campus, a comparison of peak versus non-peak electrical demand was evaluated. See Figure 4 below. From this graph, it appears that the baseload of approximately 1500 kW is higher than expected for a campus of this size compared to peer institutions. This baseload represents the constant electrical demand on the main campus electrical service. In order to decrease the electrical usage on campus, an effort should be made to further analyze this baseload and assign higher priority to the Master Plan's energy conservation measures that target this demand load.

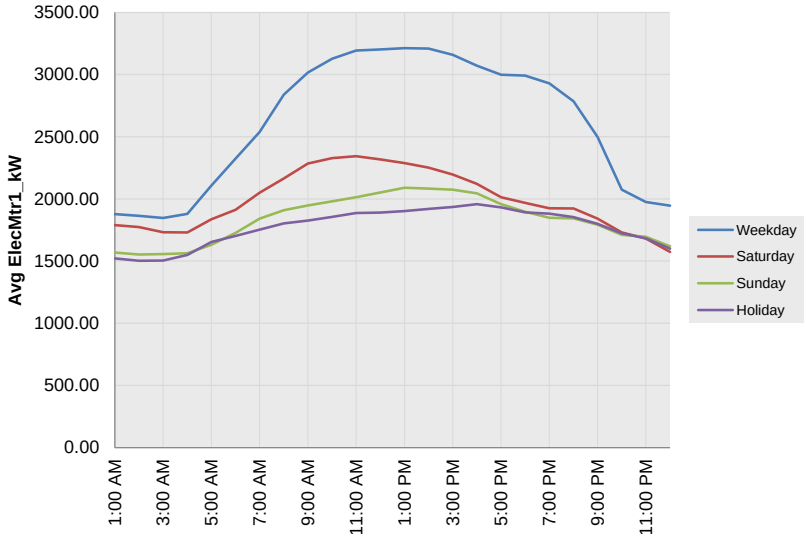

Figure 4: Main Campus Demand Loads

Electrical energy usage during peak hours could also be addressed to reduce Scope 2 carbon emissions. In this ComEd territory, the base load is from nuclear power, which produces less GHG emissions per unit power than natural gas and electricity derived from coal. Peak electricity is created at the source using less efficient generation technology.

EMISSIONS MITIGATION STRATEGIES

The Campus Master Plan addresses the physical needs of the campus over the next 10 years in the context of approximately $200 million in approved capital spending. In an effort to promote sustainability, Harper has decided as part of the Master Plan to repurpose some buildings rather than replace them.

The Infrastructure Master Plan is due to be completed in late Spring 2013 and will address green standards for any new or renovation projects as well as plans for campus wide energy conservation projects, renewable energy possibilities, upgrading bicycling infrastructure and encouraging alternative modes of commuting to campus.

The following strategies were developed to combat the significant sources of emissions found in the baseline emissions inventory. These strategies will be under constant revision as research, technology and the campus's master plan further develop.

Scope 1 and 2 Reduction Strategies

As mentioned earlier, the most feasible area of emissions reduction is in utility usage (scope 1 and 2). Some of the energy reduction strategies that Harper can investigate implementing include:

Retro-commissioning of existing buildings

- Retro-commissioning total implementation costs can range from $0.65-$1.30/square foot. Typically, retro-commissioning will result in reducing a building's energy usage in the range of 5-10%. Projects identified during retro-commissioning typically have a less than 2 year payback.
- Phases 1 and 2: Any existing building that will not be updated or expanded in the Master Plan should be reviewed for possible retro-commissioning to be brought into compliance with LEED for Existing Buildings: Operations and Maintenance commissioning requirements. This process will ensure that the building's systems and equipment are operating in the most efficient manner. Buildings to focus on would be Buildings L, W, X, Y and Z since their HVAC system are currently not scheduled for replacement. To prioritize, the buildings with the highest energy use per square foot should be focused on first.

Table 2: Estimated Retro-Commissioning Implementation Cost
Based on $1.30/sqft

Building Label	Square Footage	Approximate Retro-Commissioning Cost
L	88,860	$115,518
W	50,122	$65,159
X	98,071	$127,492
Y	53,113	$69,047
Z	141,742	$184,265

- Phases 1 and 2: Additionally, the chilled water plants at Building Z and Building P should also be evaluated.

Table 3: Estimated Retro-Commissioning Implementation Cost for Central Plants

Chiller Plant	Approximate Retro-Commissioning Cost
Building Z	$150,000
Building P	$150,000

Energy management activities for existing buildings

- Phase 1: The Master Plan will develop strategies for efficient service of utilities to campus buildings. The next step is to develop a list of investment projects specific to each building through energy audits.
- Phase 1: Install metering sufficient to monitor the energy usage of each building to inform future decisions.
- Phase 1: Perform benchmarking for the campus buildings, grouped by utility service such as chilled water plants.
- Phase 1: Develop specific energy performance goals for all major buildings.
- Phase 1: Evaluate financing opportunities to ensure implementation of energy saving projects including Illinois Green Economy Network (IGEN) and Department of Commerce and Economic Opportunity (DCEO).

Lighting retrofits/upgrades

- Phase 1: Lighting fixtures in older buildings will be replaced with lower wattage fixtures. Certain fixtures may be retrofitted with lower wattage lamps and reflectors.
- Phase 1: Occupancy sensors will be added in normally occupied areas.
- Phase 2: Integrate electric lighting including dimming and switching, where applicable, to be integrated with daylighting to reduce electricity use. Daylight control systems can save up to 60% in lighting energy.

Advanced metering / monitoring

- Phase 2: Energy consumption has been shown to decrease when people know the amount of energy they are consuming. By adding advanced metering for campus utilities at each building's energy end-use level (heating, cooling, ventilation, lighting, etc.), Harper can gain insight and understanding in each building's operations and performance. This strategy can also complement all other efficiency improvements and energy savings that are gained from retro-commissioning and other systems upgrades. Advanced metering may also include connection to a real-time dashboard for building occupants to observe energy usage patterns along with the changes in energy usage based on behavioral adjustments.
- Phase 2: Monitoring based commissioning may be used to further optimize performance of building HVAC and lighting systems.

- Phase 2: A Measurement and Verification plan could also be written to track and analyze the data gathered by the advanced metering submeters.

Central plant upgrades/additions

Investigate the following:

- Phase 1: Air-handling unit upgrades/replacements (constant to variable air volume conversions, etc.)
- Phase 1: Chiller replacements (high efficiency chillers, upgrade to variable-primary pumping, etc.)
- Phase 1: Controls upgrades (variable frequency drives, equipment load distribution, etc.)
- Phase 1: Converting laboratory fume hoods to variable volume.
- Phase 1: Convert kitchen exhaust hoods to demand-control ventilation using a Melink-type system.
- Phase 2: Boiler retrofits (burner replacement, new condensing boilers, etc.)

Energy efficient equipment purchasing policy

- Phase 1: Harper may ensure that all new equipment that is eligible is ENERGY STAR® labeled, and that older equipment be strategically replaced with new, energy efficient machines and appliances.

Renewable energy opportunities (photovoltaic, wind, geothermal, solar thermal)

- Phase 2: The use of renewable energy on campus could be explored as a way of heating domestic water. As existing water heaters on campus need to be replaced, buildings with a lower hot water temperature (buildings without kitchens) should be evaluated for solar thermal integration.
- Phase 2: A feasibility study could be completed for possible Photovoltaic (PV) or wind energy use, including meeting the power needs of the NEC facility.

Building enclosure upgrades

- Phase 1: Most of the existing buildings on campus have single pane windows. These windows may be replaced with double pane, high performance low-e coated glazing with a better visible transmittance to heat gain ratio.

Green roofs/reflective roofs

- Phase 1: Roofs with a high reflectivity help to reduce cooling loads, thus reducing electricity consumption.
- Phase 1: Investigate a rainwater collection system at strategic points around campus to use in lieu of potable water for irrigation.
- Phase 2: Green roofs can be used to restore green space on a campus with a large amount of surface parking, as well as to increase roof insulation and storm water quantity control. The green roofs can also serve as a visible symbol of the campus' environmental commitments.

In addition to the above strategies, all new buildings on campus could be required to meet LEED for New Construction Silver standards. This will ensure that although the master plan calls for increases in building square footage that the new buildings' energy consumption will have a minimal impact on the overall campus emissions.

Scope 3 Reduction Strategies

Alternative transportation

- Phase 1: Discounted Pace bus passes and opportunities for car/van pooling are promoted through Student Activities Division (whose funds offset the discounts) and Harper's Sustainability webpage. Currently there is a discount incentive (approximately 8%) for students, which is funded through the Student Activities Fee. Faculty and staff use of public transportation could be similarly incentivized.
- Phase 1: Recently, the College installed two electric vehicle charging stations in one of the parking lots to encourage the use of alternative fuel vehicles. If the response to these charging station is encouraging, then more stations can be added throughout campus in the future. All future parking lot renovations should be reviewed for including infrastructure for additional stations.

Waste reduction

- Current: Harper currently has a Waste Reduction Policy that includes source reduction, recycling the purchasing of products with recycled content and ongoing education to the campus about waste reduction measures. Currently, the campus has recycling bins/areas for batteries, books, cabs, chip board, corrugated cardboard, small electronics, glass, ink cartridges, metal, paper, plastic, and toner bottles. In addition, lawn clippings are composted on campus to reduce the landscaping waste.
- Phase 1: Future opportunities for waste reduction could be to conduct a waste stream audit and reviewing feasibility for facilities to compost food and supplies (tableware, cutlery, etc.) waste.

Bicycle master planning

- Phase 1: As part of the Master Plan and the desire to reduce commuting emissions, future developments to the College could include adding bicycle trails around campus. This would allow for alternative transportation connectivity to surrounding roadways as well as safer way finding throughout the campus.
- Phase 1: Covered bicycle storage, including in-garage options, could be placed strategically around the campus during the construction of the bicycle trails.

Wastewater reduction

- Phase 1: Plumbing fixtures in existing buildings should be systematically replaced with low-flow/high-efficiency fixtures to reduce potable water consumption and thus reducing wastewater volume.

- Phase 2: Graywater collection or recovered condensate could be reused for non-potable water reuse (flushing toilets/HVAC system make-up) in the campus buildings and could be considered for future building projects to improve the sustainability in relation to water use resources.

Renewable Energy Certificates (RECs) and Verified Emissions Reductions (VERs)

REC's and VER's are recognized by ACUPCC as a legitimate financial mechanism to reduce an institution's environmental impact outside the institutional boundaries. While they achieve a similar purpose, they act in distinct ways, defined as follows:

- A Renewable Energy Credit (REC) are tradable, non-tangible energy commodities that represent proof that 1 megawatt-hour (MWh) of electricity was generated from an eligible renewable energy resource. RECs incentivize carbon-neutral renewable energy by providing a production subsidy to electricity generated from renewable sources.
- A Verified Emissions Reduction (VER) is a credit derived from a wide-range of projects verified by a third party and represent real emissions reductions. A VER is subject to a standard, and emissions reductions must be measurable, permanent and in addition to what was already being done.

Although financial resources can be used to purchase these credits and offsets as the sole means to reach carbon neutrality, that methodology does not provide a return on investment like energy and commuting efficiency projects and programs might. The most sustainable and practical approach to carbon neutrality comes from investing in a combination of campus emissions reduction projects and offset purchasing. Offsets can impact areas where implementing reductions will be difficult and extend over a longer time period (i.e. commuting, energy production, etc.)

Emissions Reductions Goals

Once the Master Plan is complete and the College has reviewed all the recommended capital projects, a more comprehensive plan will be put together to address specific reduction projects' scope, cost and timeline. For initial CAP purposes, the following goals have been suggested as a guideline:

- Phase 1 (2013 – 2023) - Achieve a 25% reduction of total campus emissions through 20% energy use reduction of purchased utilities (on a per square foot basis) and 25% offset of carbon emissions from purchased utilities from renewable energy or offset via RECs or VERs compared to the 2010 base year.
    - By 2014 achieve an interim goal of 5% energy use reduction of purchased utilities compared to the base year of 2010 and 15% offset of carbon emissions from purchased utilities via renewable energy certificates (RECs) or verified emissions reductions (VERs).
- Phase 2 (2024 – 2032) – Achieve a 50% reduction of total emissions with 30% energy use reduction of purchased utilities and 50% offset of carbon emissions from purchased utilities from renewable energy or offset via RECs or VERs.
- Phase 3 (2033 – 2053) – Achieve a 100% neutrality with 100% of purchased utilities from renewable energy or offset via RECs or VERs.

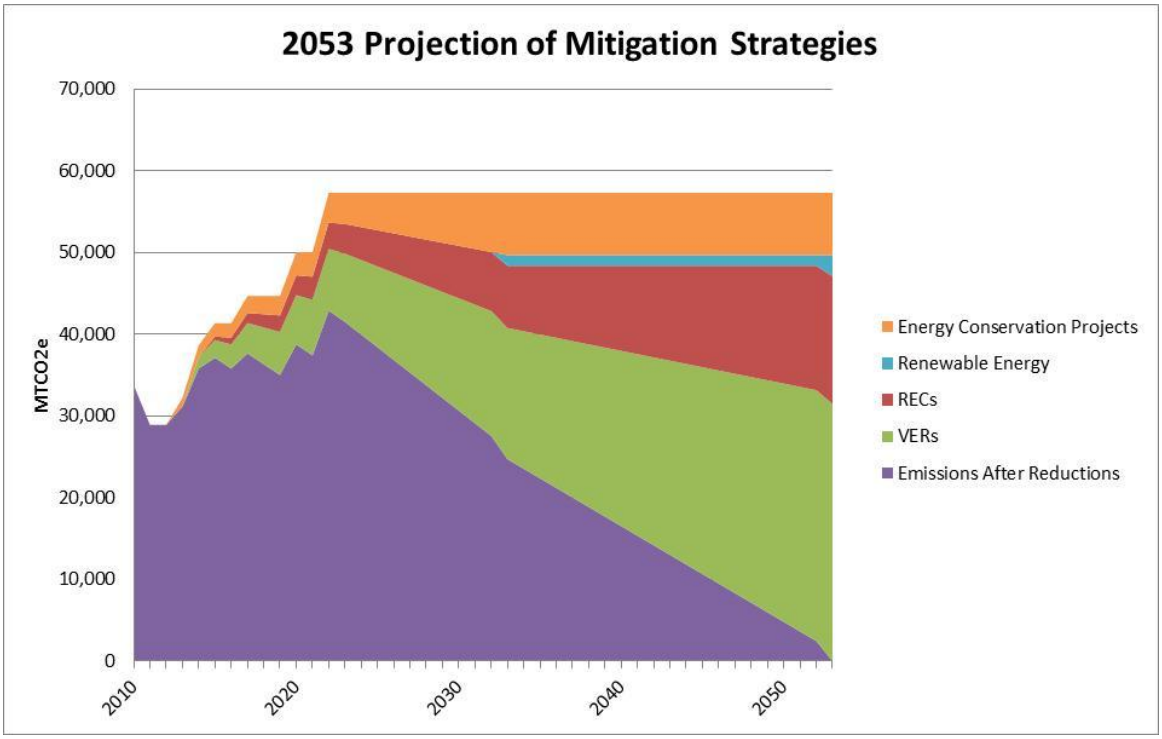

Figure 5: Graphical Representation of Mitigation Strategies

The college plans to implement mitigation strategies over the next forty years systematically, as new technologies, funding opportunities and resources become available. The College's Physical Plant department will coordinate these efforts through the Green Committee and other campus departments. The GHG Inventory Report will be updated every other year, to reflect progress toward Harper College's sustainability and climate action goals. A variety of funding strategies could be utilized, such as the capture and reinvestment of cost-savings resulting from sustainability programming.

CURRICULUM, RESEARCH AND COMMUNITY ENGAGEMENT

Climate Neutrality and Sustainability Integration into Curriculum

In 2009, the Sustainable Living Continuing Education Certificate was established as a new program at Harper College. The next year the College's first Teaching and Learning Sustainability Coordinator created a Green Resource Guide for the campus, faculty and community.

The College currently offers students 18 credit classes and 12 continuing education classes related to sustainability. Course topics range from "Tips and Tricks for Green Living" to "Environmental Ethics." Harper offers an Alternative Electrical Energy Certificate that covers sustainable electric power and an Interior Design Sustainability Certificate. There is also an associate's degree in Environmental Studies which articulates to Roosevelt University, the University of Illinois at Urbana-Champaign, Eastern Illinois University and DePaul University.

Classes for faculty are also offered for those desiring to make their curriculum relevant to issues of sustainability. There is also a well-developed Faculty Fellows program in Sustainability to encourage the development of campus-wide curriculum and activities.

Students looking to green their collegiate experience can join the Environmental Club to learn about the environment and pollution. The club encourages students to take constructive community action by assisting efforts at local, county and state levels. Students also maintain wildlife biology areas on the campus.

Research Related to Climate Neutrality

Community colleges do not routinely focus on research activities though Harper currently has a limited amount of research being conducted on campus. The Campus Master Plan addresses proposed space for a university center that could allow for partnerships with other colleges and universities offering advanced degrees and research opportunities.

Community Outreach

Outreach can incorporate two aspects of relationship building. First are the efforts of Harper College to provide a variety of educational opportunities to the community through credit and non-credit programs as well as workshops. It could also include resource sharing through the implementation of both a virtual and physical sustainability center into the Master Plan. Second, opportunities to build partnerships with community organizations in the district can include offering Harper College's facilities at low or no-cost for meetings or sustainability events.

Harper College is continually searching for ways to educate and engage its surrounding community. The College's Green Resource Guide provides current information on sustainable/green events and a wide variety of resources on sustainability to the public. The Green Committee and the student Environmental Club have offered a variety of Earth Week events for the campus and community, such as films, speakers and an environmental fair. Each fall the Interior Design Department coordinates a Sustainable Products Exhibit which is open to the campus community and the public.

Harper also promotes sustainability education for staff members. "Sustainability Flash Facts" is a series of short sustainability messages which can be utilized in many ways. Sustainability Flash Facts messages are part of the Harper News emails received by all employees and students.

Opportunities for new partnerships could be evaluated with particular attention paid to alternative modes of transportation (biking, public transportation options, etc.), education provided to schools and community groups throughout the district and utilization of new technologies on campus.

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