



CLIMATE ACTION PLAN 2016



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1. Executive Summary

Background

On Earth Day 2013, USFSP became a signatory of the American College and University Presidents' Climate Commitment (ACUPCC) in recognition of the real problem of global climate change and its inevitable impacts on waterfront communities. We are committed to exercising leadership in responding to this challenge with a comprehensive vision of campus sustainability including education, research, operations, administration, and finance. Meeting ACUPCC expectations and ranking in the Princeton Review Green Colleges guide are measured as key performance indicators within the USFSP Strategic Plan, Vision 20/20, and this emissions reduction plan is instrumental in satisfying both. This Climate Action Plan (CAP) serves as a guide for USFSP's endeavor to reach its sustainability goal of carbon neutrality. This CAP reflects an extensive analysis of the campus' 2014 GHG inventory and business as usual (BAU) forecast, which in turn helped to develop goals and select strategies to reduce carbon emissions for the next twenty years and beyond.

Key Elements and Recommendations

This Climate Action Plan includes, but is not limited to, the following key elements and recommendations:

- An analysis of current GHG emissions from USFSP activities found that the largest contributors to the campus carbon footprint are electricity consumption and commuter vehicle fuel use.
- A menu of 20 direct mitigation strategies was prioritized and narrowed down to 9 strategies for initial development and analysis in the Energy Supply & Demand (ESD), Transportation, and Waste Management Sectors.
- Overall, the current set of CAP strategies is estimated to reduce baseline emissions by over 50% by 2035. Most of these reductions are attributed to ESD strategies (about 87%).
- In addition to the direct CAP strategies, a number of indirect strategies were developed to help generate awareness, knowledge, and ideas needed to create a culture engaged in protecting the environment and creating a just and sustainable society for all. The indirect strategies make the implementation of the direct strategies easier as there will be more campus-wide support and awareness.
- Based on the work conducted and data available for this initial CAP, **USFSP pledges to reduce its baseline GHG emissions by 50% by 2035 and to achieve carbon neutrality by 2050**. Additional work to update the CAP and monitor implementation progress could result in the need to adjust these goals (either up or down).

USFSP GHG Emissions Inventory and Business as Usual (BAU) Forecast

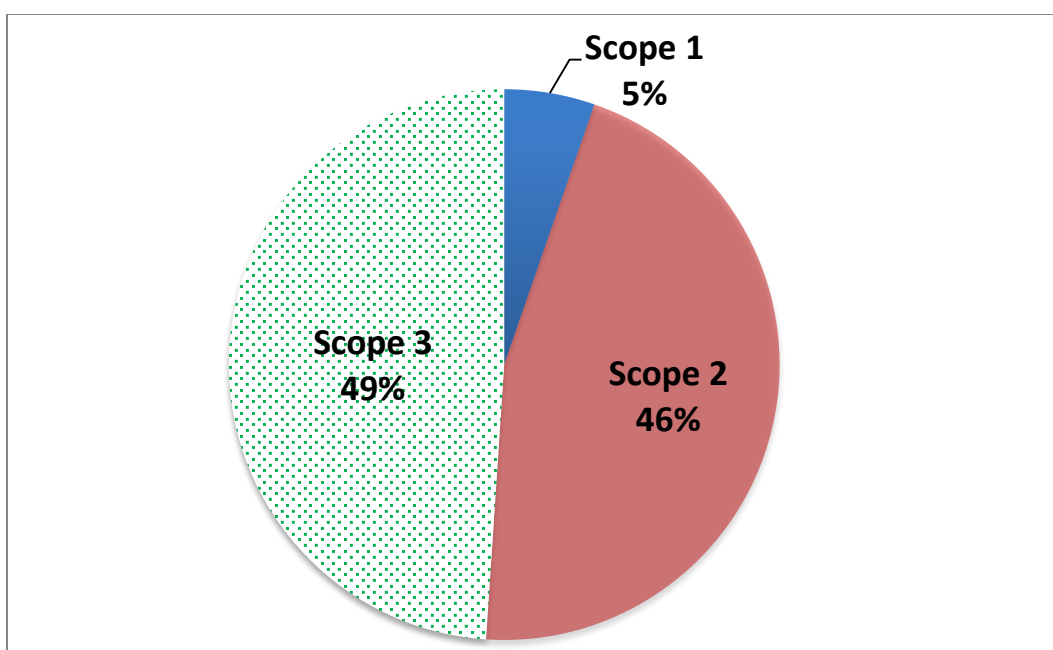
The GHG baseline provides a campus' carbon footprint in terms of metric tons of carbon dioxide equivalent emissions per year (tCO₂e/yr). The GHG inventory includes:

- Direct emissions from sources owned or controlled by an institution, known as Scope 1 emissions (e.g. emissions from combustion of fuels in campus vehicles or buildings);

- Indirect emissions from purchased electricity, steam, heating, and cooling, known as Scope 2 emissions; and
- All other indirect emissions associated with USFSP carrying out its activities, such as commuting by students, faculty and staff to and from campus, management of solid waste generated on campus, and “embedded” emissions within the fuels consumed and waste materials produced on campus, known as Scope 3 emissions.

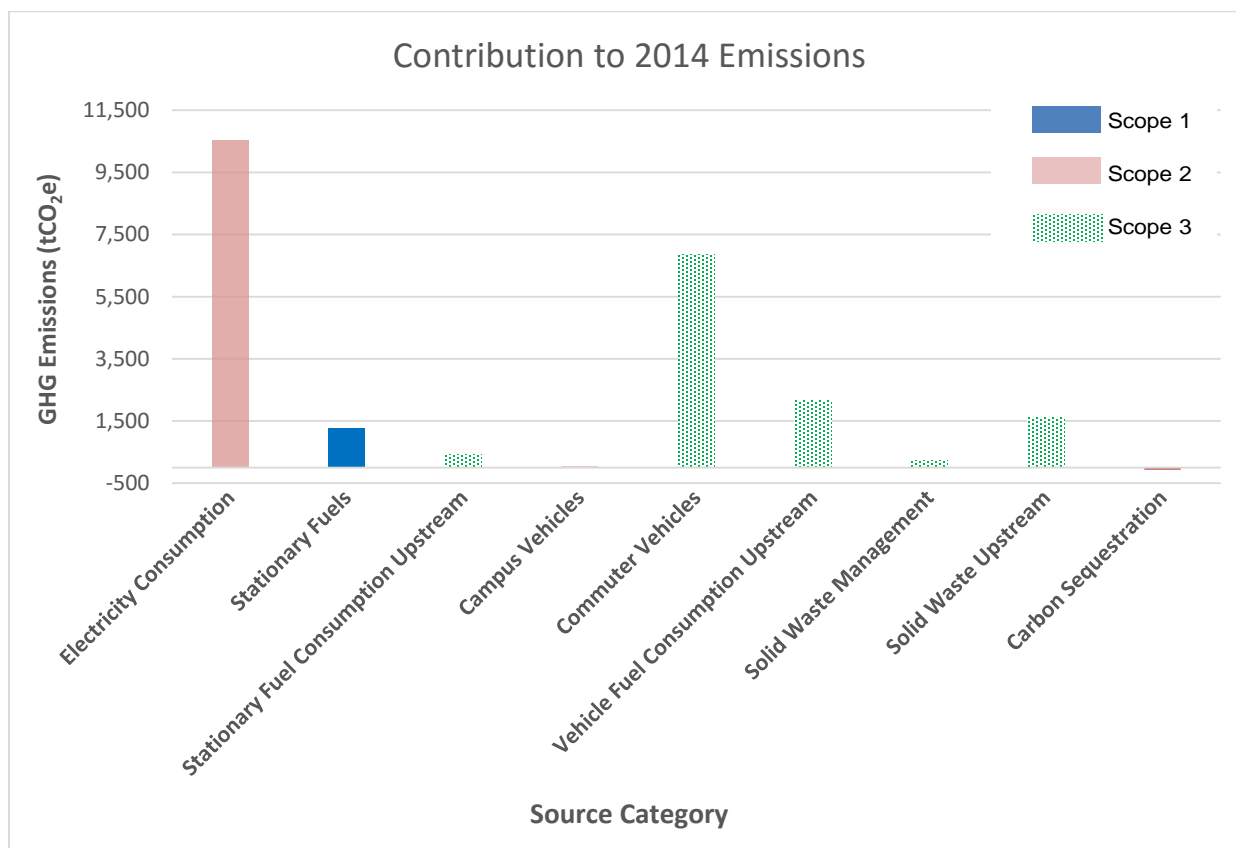
Figure ExS-1 summarizes the 2014 GHG contributions from Scope 1, 2, and 3 sources. Scope 1 emissions (e.g. fuel combustion from campus vehicles) are small relative to Scope 2 sources (purchased electricity) and Scope 3 sources (e.g. campus commuting, waste management).

Figure ExS-1. Breakdown of USFSP Emissions by Scope for 2014



As shown in Figure ExS-2, emissions from use of campus vehicles and carbon sinks through sequestration in campus trees have little impact on the GHG baseline (“campus carbon footprint”). While there may be opportunities for some GHG emission reductions from these source categories, strategies aimed at them are not expected to have a significant impact on USFSP’s carbon footprint which is primarily driven by electricity consumption and commuting by students and staff.

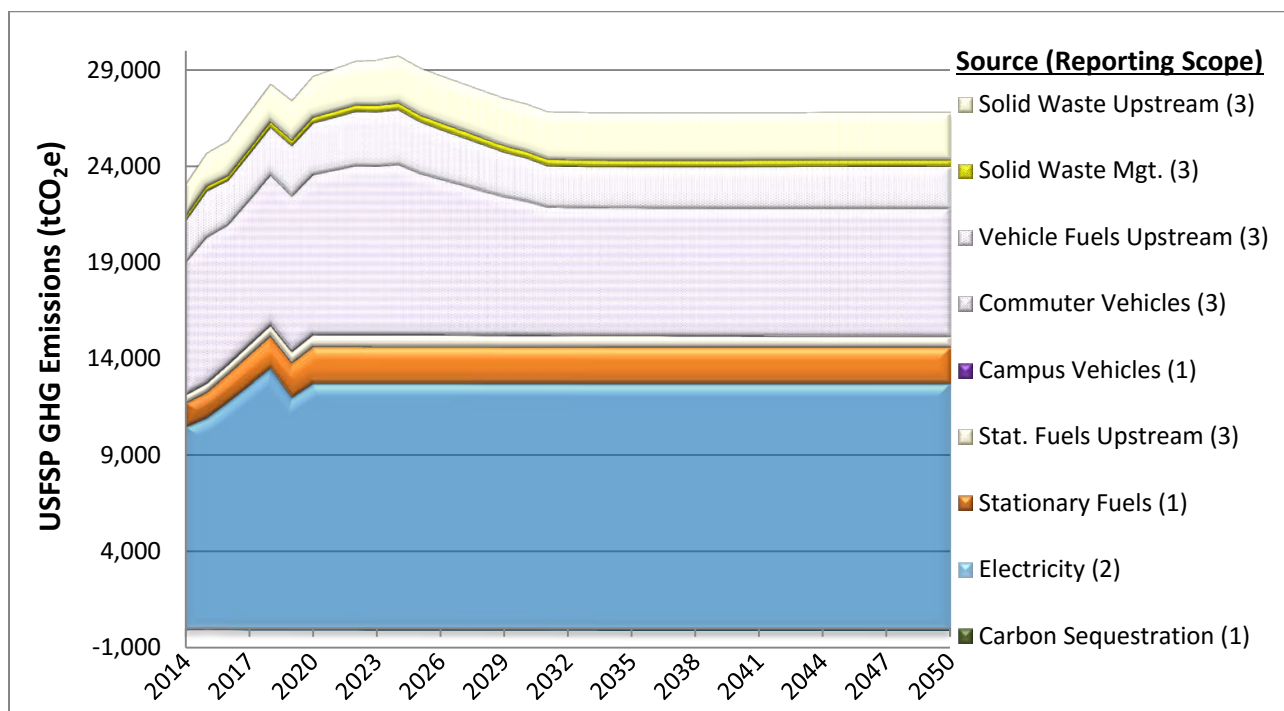
Figure ExS-2. Breakdown of 2014 USFSP Emissions by Source Category and Scope



The USFSP GHG baseline includes a business-as-usual (BAU) forecast out to 2050, which is based on current plans for new building space and enrollment consistent with the strategic and master plans. Figure ExS-3 provides a summary of the baseline (“baseline” refers to the combination of the 2014 historic inventory and the forecasted estimates out to 2050). Emissions are expected to peak in the early 2020s at which time campus enrollment reaches maximum capacity. A key assumption for the forecast is that USFSP’s ability to grow any further in terms of both student/faculty populations and building space is limited through 2050 (i.e. to the 10,000 students identified in the “10 by 20” goal; 10,000 students by 2020).

As shown in Figure ExS-3, some reductions are expected into the early 2030s as a result of more efficient vehicles entering the commuter fleet. However, after 2030, the baseline remains flat as a result of the expected growth cap, minimal incorporation of energy efficiency, and no changes in commuter habits under BAU conditions.

Figure ExS-3. USFSP BAU Emissions: 2014 - 2050



Direct Mitigation Strategies

A menu of options for USFSP CAP strategies was compiled through research by the CAP team. These options were organized into each of the three main sectors for focus of the CAP: Energy Supply/Demand; Transportation; and Waste Management. Table ExS-1 provides a summary of the 20 initial CAP strategies identified for further assessment.

Table ExS-1. Initial Set of Direct CAP Strategies

ID	Direct CAP Strategy
T-1	Reduced Commuter VMT
T-2	Mode Shift: Carpooling
T-3	Mode Shift: Walking/Biking
T-4	Mode Shift: PSTA Campaign
T-5	Mode Shift: Shuttle
T-6	Higher Efficiency Commuter Vehicles

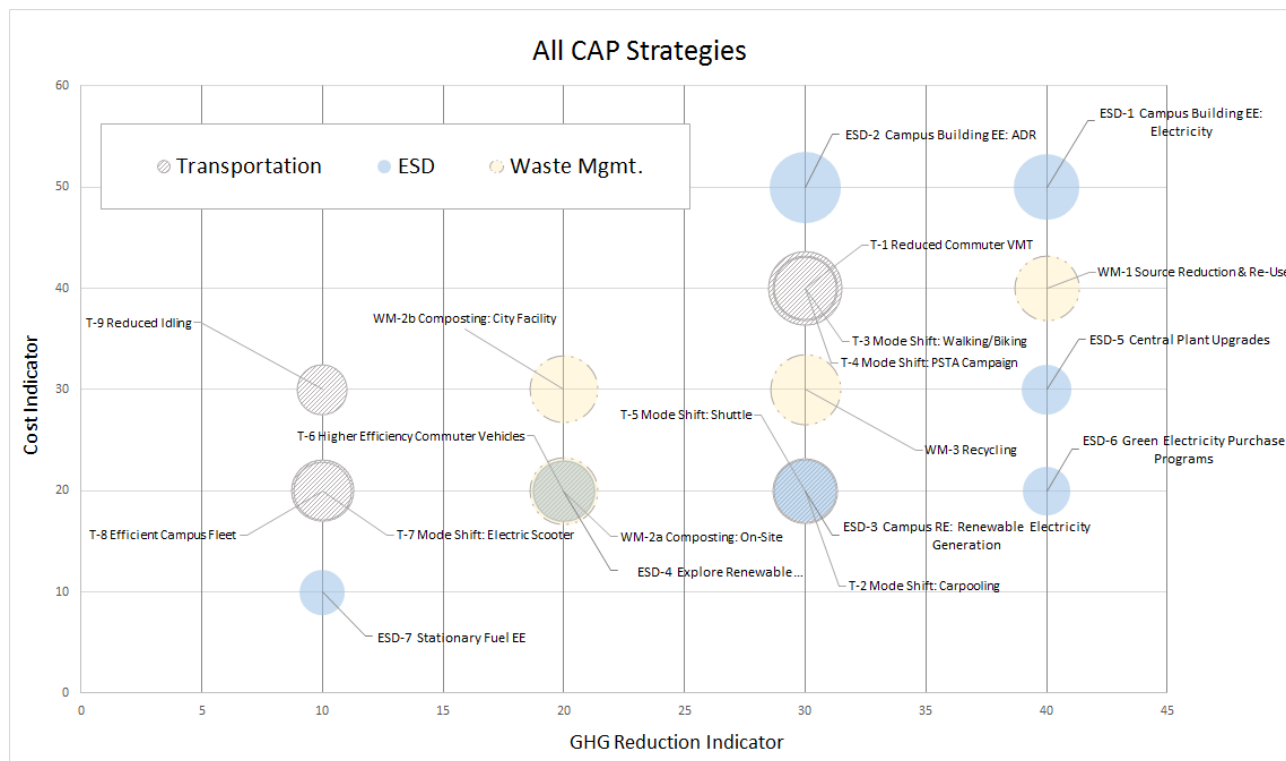
ID	Direct CAP Strategy
T-7	Mode Shift: Electric Scooter
T-8	Efficient Campus Fleet
T-9	Reduced Idling
ESD-1	Campus Building EE: Electricity Projects
ESD-2	Campus Building EE: Automated Demand Response
ESD-3	Campus RE: Renewable Electricity Generation
ESD-4	Explore Renewable Energy Opportunities
ESD-5	Central Plant Upgrades
ESD-6	Green Electricity Purchase Programs
ESD-7	Stationary Fuel EE
WM-1a	Source Reduction & Reuse - Paper and Plastic
WM-1b	Source Reduction & Reuse - Other Waste
WM-2a	Composting: On-Site
WM-2b	Composting: City Facility
WM-3	Recycling

A prioritization rubric for the initial set of strategies above was developed to prioritize CAP strategies for development and analysis. The rubric was based on the following criteria:

- *GHG Reduction Potential*: low to high;
- *Implementation Costs*: expected negative to low cost effectiveness (CE) and/or high return on investment (ROI); and
- *Other Criteria*, including externalities, visibility, curricular impact, research, equity of impact, alignment, time, resources, and limitation.

Each CAP strategy criterion was assigned a value of 1 to 5, and then charted in a bubble chart as shown in Figure ExS-4. Large bubbles in the upper right-hand portion of the chart represent the highest priorities for development and analysis.

Figure ExS-4. Prioritization of USFSP CAP Strategies



Based on the prioritization assessment, the following CAP strategies were selected for initial development and analysis:

- **Energy Supply & Demand (ESD):**
 - ESD-1. Reduce Electricity Consumption;
 - ESD-2. Increase On-Site Renewable Generation;
 - ESD-3. Clean Power Purchases
- **Transportation (T):**
 - T-1. Carpooling;
 - T-2. Walking and Biking;
 - T-3. Shuttle and Transit
- **Waste Management (WM):**
 - WM-1. Source Reduction;
 - WM-2. Increase Solid Waste Recycling;
 - WM-3. Composting

Figure ExS-5 summarizes the expected GHG impacts from full implementation of the nine priority CAP strategies. Emission reductions estimated for each of the CAP strategies are detailed in the main body of this report. Overall, the current set of CAP strategies is estimated to reduce baseline emissions by just over 50% by 2035. Most of these reductions are attributed to ESD strategies (about 87%). This is due to cumulative nature of each ESD strategy, which builds on top of the other to achieve completely carbon neutral electricity consumption by 2035.

This is more clearly shown in Table ExS-2 below. Each of the dotted shifts against the baseline shown in Figure ExS-5 overlaps with one another. This is the result of the reductions associated with T and WM strategies being fairly modest, as compared to ESD.

Figure ExS-5. GHG Impacts from Implementation of CAP Strategies

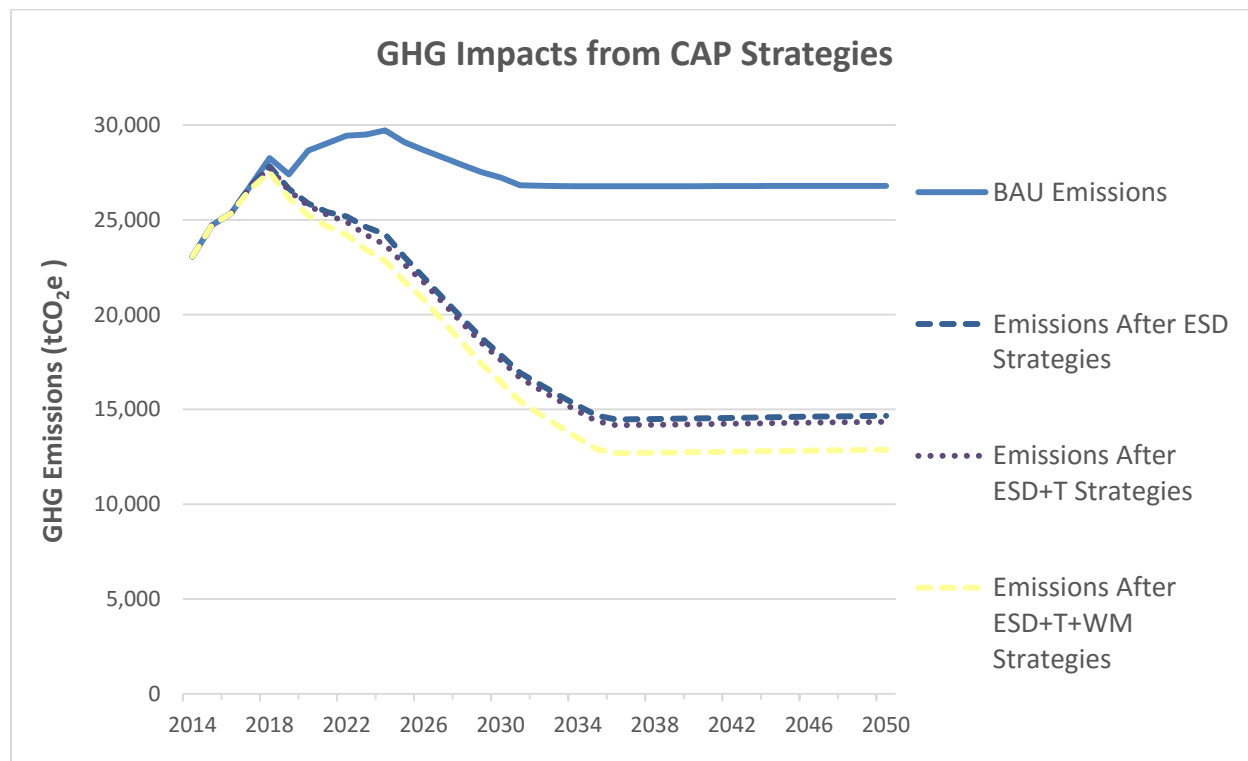


Table ExS-2. GHG Impacts from CAP Strategies

GHGs in tCO ₂ e	2015	2020	2025	2030	2035	2050
Campus BAU Emissions	24,716	28,660	29,098	27,233	26,777	26,795
ESD-1 Reductions	0	(1,296)	(3,241)	(5,186)	(6,482)	(6,482)
ESD-2 Reductions	0	(334)	(878)	(1,462)	(2,385)	(2,407)
ESD-3 Reductions	0	(1,167)	(1,945)	(2,723)	(3,241)	(3,241)
T-1 Reductions	0	(91)	(330)	(196)	(233)	(233)
T-2 Reductions	0	(1)	(2)	(4)	(7)	(7)
T-3 Reductions	0	(26)	(65)	(67)	(64)	(79)
WM-1 Reductions	0	(357)	(717)	(968)	(1,284)	(1,284)
WM-2 Reductions	0	(158)	(188)	(188)	(188)	(188)
WM-3 Reductions	0	(0.1)	(0.3)	(0.4)	(0.3)	(0.3)
Total CAP Reductions	0	(3,431)	(7,366)	(10,793)	(13,884)	(13,921)
CAP Scenario Emissions	24,716	25,229	21,732	16,440	12,892	12,874
% Change from Baseline	0%	-12%	-25%	-40%	-52%	-52%

By 2050, the initial CAP strategies are expected to continue reducing baseline GHG emissions by about half. This is due to the scope of ESD strategy coverage which addresses all electricity demand-related emissions by 2035 through a combination of energy efficiency, on-site renewable generation, and clean electricity purchases. GHG emissions that remain are mostly from campus commuting (i.e. those that have not yet been addressed through this initial set of strategies). About half of the solid waste management emissions also remain in the campus' carbon footprint in the future; however, these emissions are fairly small as compared to electricity consumption and transportation. The solid waste management emissions are mainly those associated with the embedded (upstream) energy use in waste materials production and transport (see the Baseline section for more details).¹

While it is possible that the existing set of CAP Transportation strategies could produce higher GHG reductions than initially estimated here, to support a long-term goal of carbon neutrality (e.g. by 2050), USFSP will need to identify new strategies to reduce commuting trips and to make the remaining trips greener. Opportunities may include more telecommuting, more on or near campus housing, and promotion of low to zero carbon transportation modes (e.g. electrified vehicles charged by renewable electricity).

Indirect Mitigation Strategies

Although the direct strategies discussed throughout this report are critically important in reducing USFSP's environmental impact, they are by no means the only strategies that should be implemented. The following topics are considered indirect strategies because they don't have detailed and estimated emissions reductions like the direct strategies do. Instead these strategies help generate awareness, knowledge, and ideas needed to create a culture that is engaged in protecting the environment and creating a just and sustainable society for all. These indirect strategies will help create a conscious culture at USFSP, making the implementation of the direct strategies easier as there will be more campus-wide support and awareness. Table ExS-3 lists these indirect strategies, which have were organized into the following categories: Education (ED), Research (R), Campus Engagement (CE), and Public (PE).

Table ExS-3. Indirect CAP Strategies

ID	Indirect CAP Strategy
ED-1	Improve Sustainability Curriculum
ED-2	Offer more Immersive Experiences
ED-3	Enhance the Campus as a Living Laboratory

¹ As mentioned in the Baseline Report, future improvements to coverage of the GHG baseline include adding in GHG emissions associated with the use of water and for wastewater treatment at USFSP. Those emissions are also expected to be fairly modest as compared to electricity consumption and transportation.

ID	Indirect CAP Strategy
ED-4	Provide Sustainability Literacy Assessment
R-1	Inventory of Faculty Sustainability Research
R-2	Enhance Support for Research
CE-1	Assess Sustainability Culture
CE-2	Sustainability at Student Orientation
CE-3	Create Student Educators Program
CE-4	Enhance Outreach Materials and Publications
CE-5	Hold Outreach Campaigns
CE-6	Create Employee Educators Program
CE-7	Green Office Certification Programs
CE-8	Sustainability in New Employee Orientation
CE-9	Employee Professional Development
PE-1	Community Partnerships
PE-2	Improve Inter-Campus Collaboration
PE-3	Improve Continuing Education
PE-4	Community Service
PE-5	Participation in Public Policy

Next Steps

Below are several near term projects that address energy supply and demand, waste management, and transportation that USFSP will implement:

- USFSP is in the process of incorporating an Energy Management System (EMS) to monitor and control real-time energy usage, allowing for control of inefficiencies such as automatically turning off lights and adjusting the thermostat in unused rooms. The EMS will also be used as an educational tool by displaying real-time data online and on our campus kiosks.

- USFSP is in the process of developing an expansion of the solar photovoltaic system (PV) on the campus parking garage. USFSP will also begin assessing the potential for and costs of additional PV systems on campus (e.g. rooftop, parking areas).
- USFSP will begin discussion with Duke Energy Florida (DEF) about green power purchasing programs that the campus could take part in along with other large power consumers, such as the City of St. Pete.
- SGEF recently passed a project to increase the amount of recycling bins around campus, both inside and out. The project also includes purchasing recycling labels, to be placed on all new and existing bins, to better educate individuals about what is recyclable and what is not.
- USFSP is working with the City of St. Pete towards developing a Citywide Bike Share program with bike stations located throughout the downtown region, including two on campus.
- USFSP will continuously monitor the progress of this plan using several key procedures:
 - Conduct a bi-annual GHG inventory for our waste, energy, and transportation beginning from the initial baseline inventory conducted in 2014.
 - Conduct a progress report every 24 months (2 years) regarding any development related to this plan.
 - Hold a bi-monthly CERCC meeting to discuss any updates regarding this climate commitment.
 - Keep in constant communication with the Center for Climate Strategies (CCS), regarding any questions related to measuring emissions.
 - Update this CAP every three years highlighting the milestones we hope to accomplish along the way, as well as making adjustments towards more clearly reaching our long-term goal of carbon neutrality by 2050.

2. Introduction

According to the National Oceanic and Atmospheric Administration (NOAA),² the year 2015 was the hottest year ever recorded; however, 2016 is on track to easily break that record. In fact, 14 of the 15 hottest years ever recorded have occurred during the 21st century. Researchers from all over the world have concluded that these rising temperatures will lead to several catastrophic events including sea level rise, severe weather patterns, drought, biodiversity loss and species extinction, coral bleaching, environmental degradation, disease and an increase in famine and poverty. In 2013, the Intergovernmental Panel on Climate Change published a report stating the severity of rising temperatures and highlighted that global warming and changing climates are a direct effect associated with greenhouse gas (GHG) emissions from human-induced behavior.³ The rise of the industrial revolution in the 1950s gave way to the burning of fossil fuels for energy, travel, and socio-economic development. Along with the burning of fossil fuels, several other factors such as deforestation/land clearance, synthetic fertilizer use for agriculture, unsustainable sourcing and disposal of raw materials have all contributed to GHG emissions.

As the human population continues to expand, reaching nine billion inhabitants by 2050, the growing global demand for resources such as water, food, and energy will lead to further GHG emissions. This will only worsen the effects of climate change unless immediate changes in behavior and the implementation of sustainable development are enacted accordingly. In 2015, at the United Nations Climate Change Conference in Paris, France (COP21), 195 countries pledged that they will take immediate action in reducing their carbon footprint. The U.S., being a major GHG emitter, was one of those countries. Many organizations have begun to produce climate actions plans (CAP) as a way to pledge their commitment, measure their carbon footprint, and implement sustainable practices. Reducing the dependency on fossil fuels through renewable energy generation and usage, making communities more resilient, eliminating waste disposal to landfills, and constructing highly efficient buildings are all key examples of sustainable practices that organizations are applying. Incorporating sustainable practices into everyday standards will not only help reduce GHG emissions but will also help alleviate some of the issues that we are facing due to climate change. It is up to individual and organizational stakeholders across the planet to take action towards minimizing our carbon footprint to ensure that we leave this planet a habitable planet for all generations and species to come. Generating an effective CAP is just the beginning towards creating a brighter and sustainable tomorrow.

On Earth Day 2013, USFSP became a signatory of the American College and University Presidents' Climate Commitment (ACUPCC) in recognition of the real problem of global climate change and its inevitable impacts on waterfront communities. We are committed to exercising

² "Global Analysis- Temperatures". (2015). *National Oceanic and Atmospheric Administration: National Centers for Environmental Information*. Retrieved from: <https://www.ncdc.noaa.gov/sotc/global/201513>

³ Alexander, L., Allen, S., Bindoff, N., Francois-Marie, B., Church, J.Xie, S.P. (2013). *Climate Change 2013: The Physical Science Basis. Intergovernmental Panel on Climate Change*. pp. 1-28.

leadership in responding to this challenge with a comprehensive vision of campus sustainability including education, research, operations, administration, and finance. Meeting ACUPCC expectations and ranking in the Princeton Review Green Colleges guide are measured as key performance indicators within the USFSP Strategic Plan, Vision 20/20, and this emissions reduction plan is instrumental in satisfying both. This CAP serves as a guide for USFSP's endeavor to reach its sustainability goal of carbon neutrality. This CAP reflects an extensive analysis of the campus' 2014 GHG inventory and business as usual (BAU) forecast, which in turn helped to direct goals to reduce carbon emissions for the next twenty years and beyond.

2.1 Our Climate Commitment

Upon signing the ACUPCC, USFSP has committed towards taking significant strides in reducing our carbon footprint. This first included conducting a GHG inventory towards setting a baseline for our current emissions and where to go from there. Following the GHG inventory was the development of this Climate Action Plan to be used as a guide towards reducing our campus footprint. This CAP includes, but is not limited to, the following key elements and recommendations:

- An analysis of current GHG emissions from USFSP activities found that the largest contributors to the campus carbon footprint are electricity consumption and commuter vehicle fuel use.
- A menu of 20 direct mitigation strategies was prioritized and narrowed down to 9 strategies for initial development and analysis in the Energy Supply & Demand (ESD), Transportation, and Waste Management Sectors.
- Overall, the current set of CAP strategies are estimated to reduce baseline emissions by over 50% by 2035. Most of these reductions are attributed to ESD strategies (about 87%).
- In addition to the direct CAP strategies, a number of indirect strategies were developed to help generate awareness, knowledge, and ideas needed to create a culture engaged in protecting the environment and creating a just and sustainable society for all. The indirect strategies make the implementation of the direct strategies easier as there will be more campus-wide support and awareness.

Based on the work conducted and data available for this initial CAP, **USFSP pledges to reduce its baseline GHG emissions by 50% by 2035 and to achieve carbon neutrality by 2050.** Additional work to update the CAP and monitor implementation progress could result in the need to adjust these goals (either up or down).

3. GHG Baseline

USFSP's GHG baseline [2014 inventory and business as usual (BAU) forecast] indicated that the institution was responsible for emissions that totaled about 23,070 metric tons of carbon dioxide equivalent (tCO₂e) in 2014.⁴ In characterizing organizational GHG emissions, these are often broken down into three categories or "Scopes":

- **Scope 1:** refer to emissions associated with on-site combustion of fuels or other activities that lead to direct emissions. For USFSP, these include combustion of: natural gas for water heating and other purposes; and transportation fuels in vehicles owned or operated by the institution;
- **Scope 2:** refer to indirect emissions that result from electricity consumed in campus buildings and operations (importantly chilled water from the Central Utility Plant);
- **Scope 3:** these are other types of indirect emissions that include: transportation of students and staff to campus; emissions from solid waste generation and management; upstream emissions from the production of fuels and waste materials addressed in all three scopes.⁵

Figure 3-1 provides a breakdown of emissions by scope for 2014. This shows the importance of indirect source contributions such as electricity consumption (Scope 2), commuter vehicles and solid waste generation (Scope 3) as key contributors.

Additional details on 2014 emissions contributions are provided in Figure 3-2. Emissions for all GHGs are shown in units of metric tons of carbon dioxide equivalents (tCO₂e).⁶ As shown in this figure, campus electricity consumption and commuter vehicle emissions should be key source categories for focus in this initial USFSP CAP. In particular, when the upstream emissions for commuter vehicle fuels are added to those from fuel combustion, the total is nearly equivalent to those attributed to electricity consumption. Considering the GHG emissions associated with the solid wastes generated on campus (both downstream management, as well as upstream emissions during production and transport of these materials), solid waste management emissions rank third in importance toward GHG emissions contributions.

⁴ *GHG Baseline for the University of South Florida, St. Pete*, submitted to the American College and University Presidents Climate Commitment (ACUPCC) program, May 2015.

⁵ For example, these include the emissions associated with extraction of petroleum, its shipment, refining, and distribution to gasoline stations.

⁶ All GHGs include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O); global warming potentials used to convert mass emissions to CO₂ equivalents were taken from the IPCC's Fifth Assessment Report.

Figure 3-1. Breakdown of USFSP Emissions for 2014

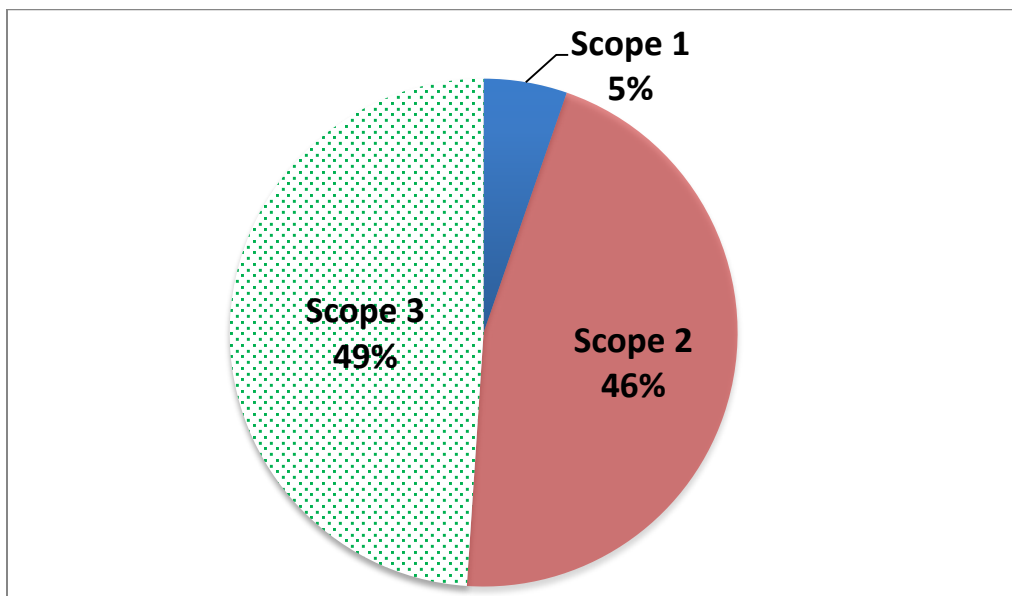
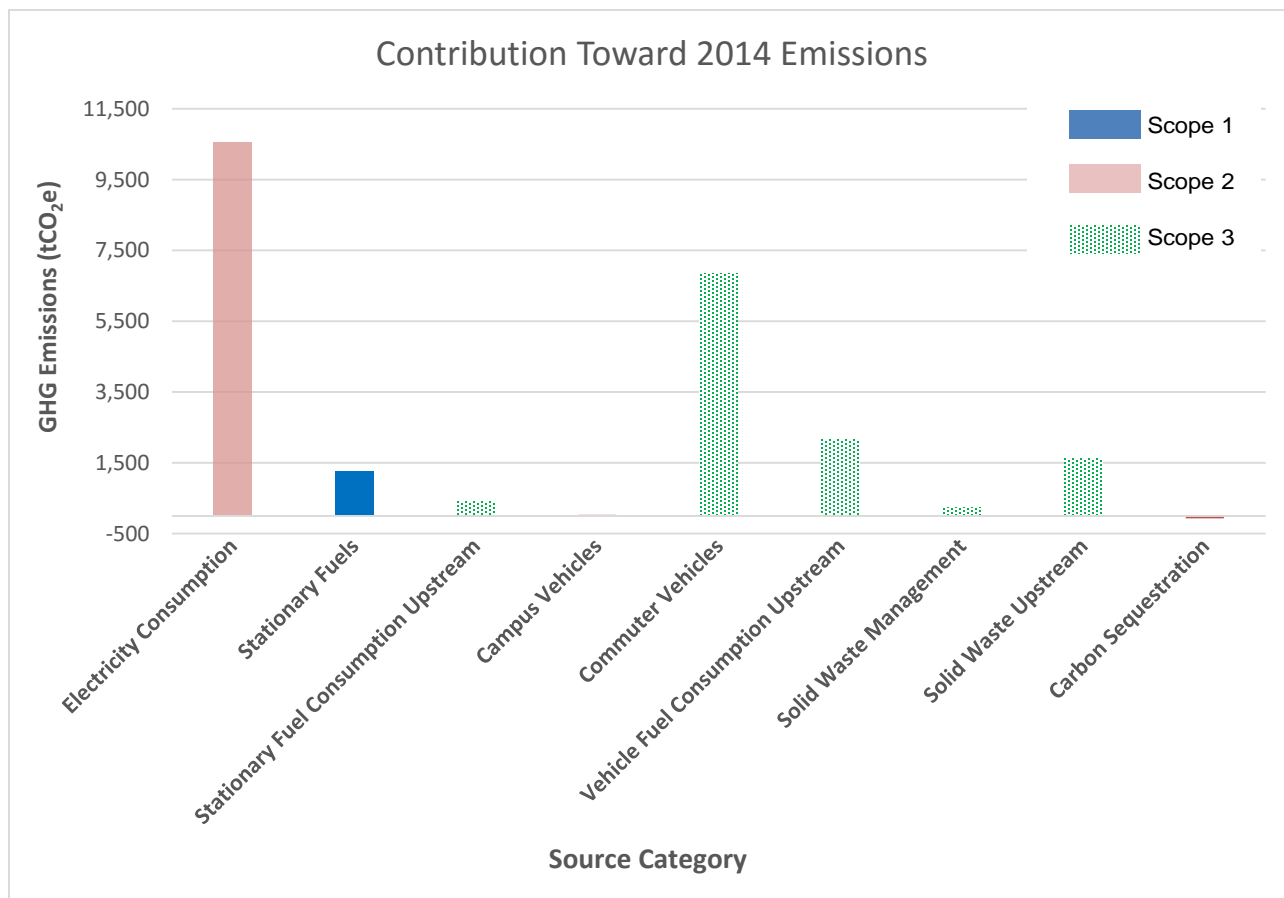


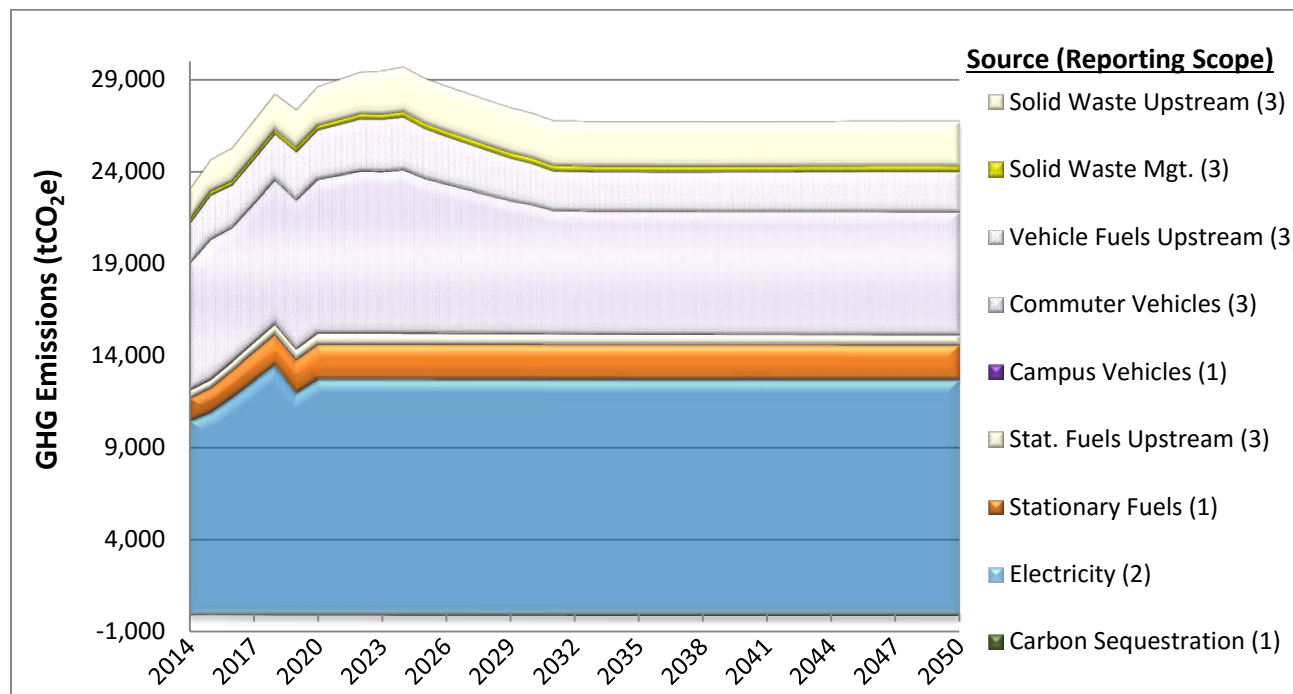
Figure 3-2. Breakdown of 2014 USFSP Emissions by Source Category and Scope



As shown in Figure 3-2, emissions from use of campus vehicles and carbon sequestration in campus trees have little impact on the GHG baseline (“campus carbon footprint”). While there may be opportunities for some GHG emission reductions from these categories, strategies aimed at these sources are not expected to have a significant impact on USFSP’s carbon footprint.

The USFSP GHG baseline includes a business-as-usual (BAU) forecast out to 2050, which is based on current plans for new building space and enrollment consistent with the strategic and master plans. Figure 3-3 provides a summary of the baseline. Emissions are expected to peak in the early 2020s at which time campus enrollment reaches maximum capacity. Some reductions are expected into the early 2030s as a result of more efficient vehicles entering the commuter fleet. See the GHG baseline report for more details.

Figure 3-3. USFSP BAU Emissions: 2014 - 2050



Future work recommended for improving and updating the GHG baseline includes:

- Expansion of source coverage: of key interest here is the inclusion of GHG emissions associated with campus sourcing of water and for the treatment of wastewater
 - The upstream GHG emissions associated with fuels used by DEF generating stations could also be added as Scope 3 emissions
- Improvement of detail: primarily gained through building level metering of electricity and chilled water usage

Reduction in uncertainty: increased understanding of commuter travel habits (via ongoing surveys of staff and students) and waste generation and management (via ongoing measurement and characterization of solid waste generation).

4. Direct Mitigation Strategies

A menu of options for USFSP CAP strategies was compiled through research by the CAP team, with an emphasis on peer institutions and ranking universities on the Princeton Review Green Colleges Guide. These options were then organized into each of the three main sectors for focus of the CAP: Energy Supply/Demand; Transportation; and Waste Management. Some of the strategies were quite specific but could also be aggregated into a broader overlying strategy (e.g. decrease plastic water bottle generation as a sub-strategy for a broader strategy aimed at solid waste source reduction and reuse). Another example was expansion of solar photovoltaic (PV) generation at the USFSP parking garage. This was aggregated into a broader solar PV strategy containing other anticipated PV projects. Understanding the processes and research done by peer institutions when instituting various strategies allowed for the ability to further refine the strategies and the undertakings that will be involved when instituting them at USFSP.

Other initial ideas for CAP strategies were actually mechanisms for implementing GHG reduction strategies. For example, a key need for building energy efficiency (EE) projects is to gain an understanding of building-level energy usage. With this understanding, EE projects can be identified and targeted. An energy management system, which would provide these measurements, is a key need for the campus, but it will not necessarily result in energy and emissions reductions by itself. So, it is included as an implementation mechanism within a building EE strategy for USFSP. Table 4-1 provides a summary of the 20 initial CAP strategies identified for further assessment. Details are provided in the sector-level subsections later in this chapter.

Table 4-1. Initial Set of Direct CAP Strategies

ID	Direct CAP Strategy
T-1	Reduced Commuter VMT
T-2	Mode Shift: Carpooling
T-3	Mode Shift: Walking/Biking
T-4	Mode Shift: PSTA Campaign
T-5	Mode Shift: Shuttle
T-6	Higher Efficiency Commuter Vehicles
T-7	Mode Shift: Electric Scooter

ID	Direct CAP Strategy
T-8	Efficient Campus Fleet
T-9	Reduced Idling
ESD-1	Campus Building EE: Electricity Projects
ESD-2	Campus Building EE: Automated Demand Response
ESD-3	Campus RE: Renewable Electricity Generation
ESD-4	Explore Renewable Energy Opportunities
ESD-5	Central Plant Upgrades
ESD-6	Green Electricity Purchase Programs
ESD-7	Stationary Fuel EE
WM-1a	Source Reduction & Reuse - Paper and Plastic
WM-1b	Source Reduction & Reuse - Other Waste
WM-2a	Composting: On-Site
WM-2b	Composting: City Facility
WM-3	Recycling

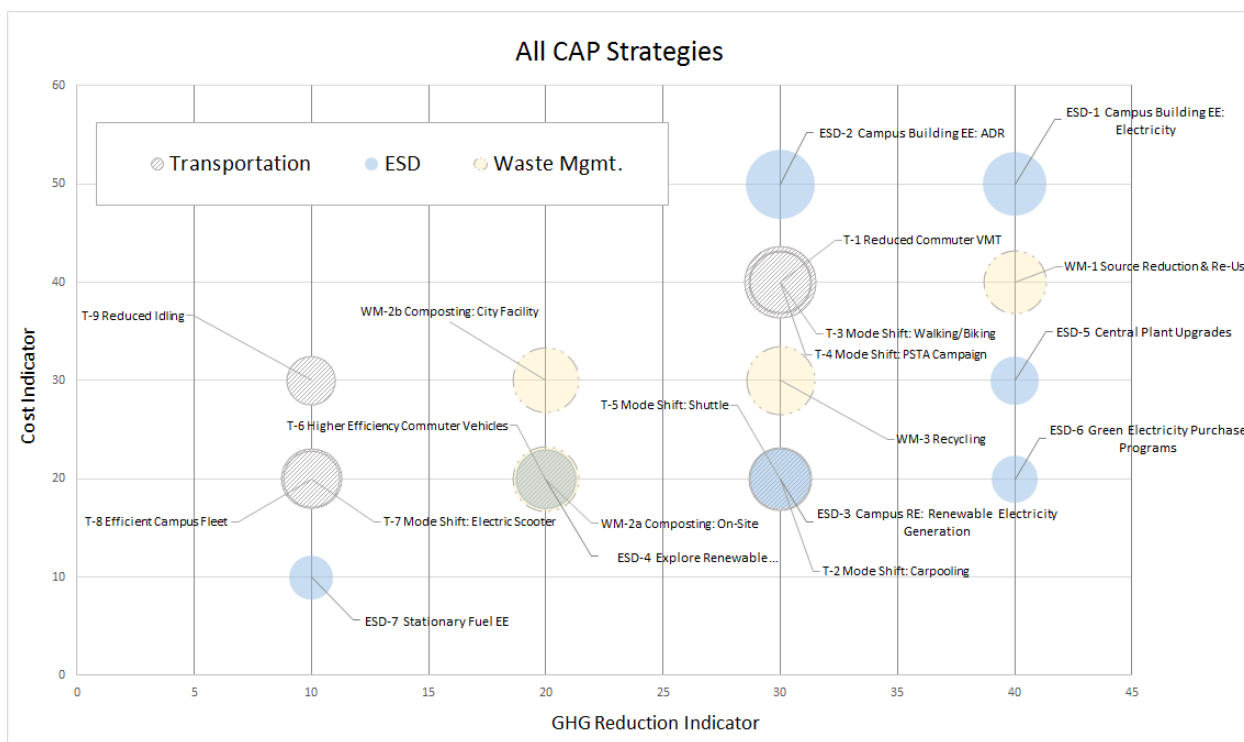
While all CAP strategies have value and should be further developed and analyzed, the Team needed to prioritize the strategies in light of limited time and resources. A prioritization rubric was developed to assist in this process. The criteria used are as follows:

- *GHG Reduction Potential*: a quantifiable reduction in GHG emissions is expected that cuts sector emissions by potentially a high percentage;
- *Cost Effectiveness (CE) & Return on Investment (ROI)*: likely low CE (\$/ton GHG reduced) and/or rapid ROI (e.g. due to energy savings);
- *Other Criteria*:
 - *Externalities*: includes things like regional goods and services, partnerships and community impact;
 - *Visibility*: regularly seen by all campus stakeholders, creates awareness and educates about carbon reduction;
 - *Curricular Impact*: easily integrated into curriculum for new sustainability programs and across disciplines;

- *Research*: research opportunities are obvious, easy, and abundant.
- *Equity of Impact*: benefits are available to all stakeholders. Undue burden is not placed on any one group;
- *Alignment*: Strategy is aligned with STARS (Platinum), Princeton Review Placement, STAR Communities, Vision 20/20, and USFSP Master Plan;
- *Time*: 1 year or less to implement, benefits will persist for 3 years or more;
- *Resources*: resources are acquired easily and quickly;
- *Limitations*: Implementation barriers are few, or there is an obvious plan to overcome them.

For each CAP strategy, a value of 1 to 5 was assigned to each of these criteria (5 representing the most positive impact or least cost). These screening criteria were then charted in a bubble chart as shown in Figure 4-1 below. This chart shows each strategy graphed by its potential GHG reductions, costs (higher values are better), and the sum of the remaining criteria (size of the bubble). Large bubbles in the upper right-hand portion of the chart represent the highest priorities for development and analysis.

Figure 4-1. Prioritization of USFSP CAP Strategies



Based on the prioritization assessment, the following CAP strategies were selected for initial development and analysis:

- *Energy Supply & Demand (ESD)*: 1. Reduce Electricity Consumption; 2. Increase On-Site Renewable Generation; 3. Clean Power Purchases
- *Transportation (T)*: 1. Carpooling; 2. Walking and Biking; 3. Shuttle and Transit

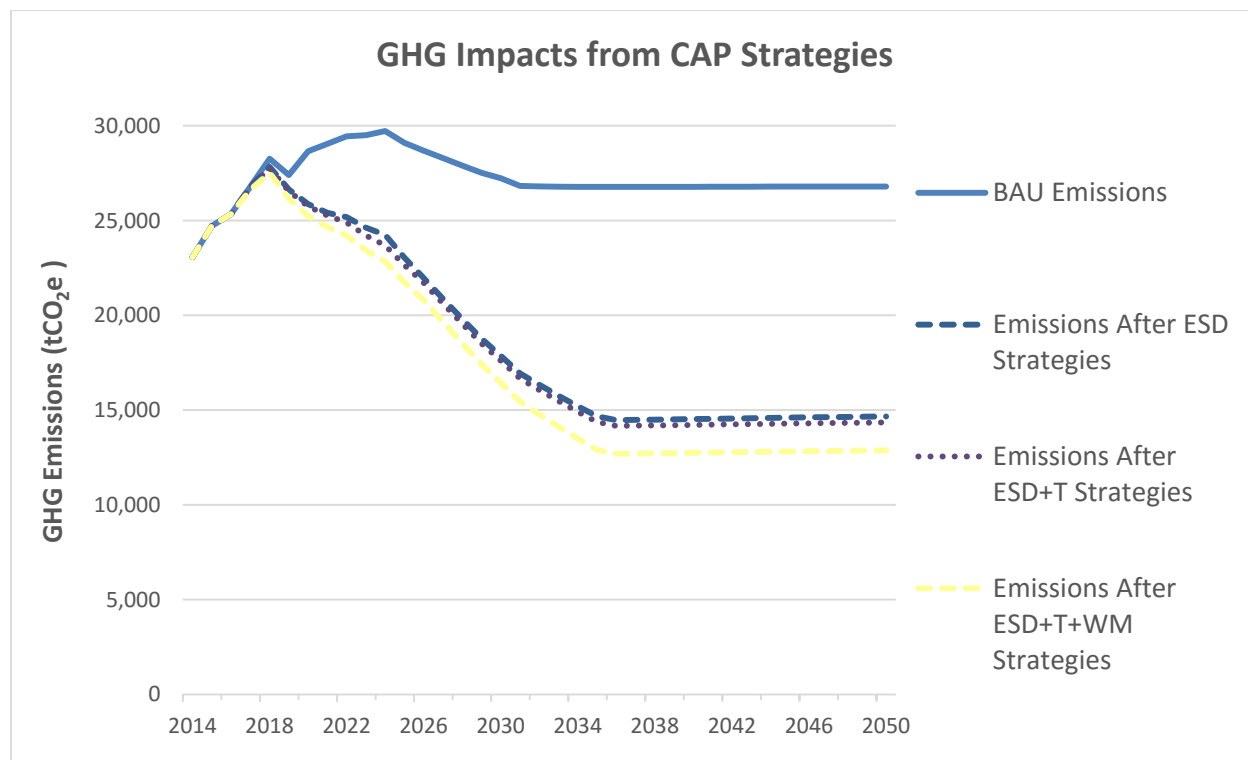
- *Waste Management (WM)*: 1. Source Reduction; 2. Increase Solid Waste Recycling; 3. Composting

The CAP strategies by sector are presented in detail below, including direction for future development and analysis. The energy, materials and GHG impacts for each strategy are estimated using a process referred to commonly as “baseline shift analysis”. In conducting these analyses, the following overarching equation is used to determine the net annual change associated with strategy implementation:

$$\text{Net Annual Change} = \text{Strategy Scenario Annual Value} - \text{BAU Annual Value}$$

The net annual change value is then subtracted from the baseline to show the “shift” associated with strategy implementation. For example, if implementation of a strategy was estimated to result in electricity consumption of 25.5 megawatt-hours (MWh) in 2020 as compared to BAU consumption of 26.5 MWh in that year, then the net annual change would be -1.0 MWh in 2020. Baseline shift analysis can be applied to energy, materials, emissions or other metrics. The GHG baseline chart was provided in Chapter 3 above. The top line of that chart is also shown in Figure 4-2 below and labeled as “BAU Emissions”. This line represents the primary baseline for our shift analysis in the CAP.

Figure 4-2. GHG Impacts from Implementation of CAP Strategies



Emission reductions estimated for each of the CAP strategies are detailed in the sections to follow. Overall the current set of CAP strategies is estimated to reduce baseline emissions by just over 50% by 2035. Most of these reductions are attributed to ESD strategies (about 87%). This is more clearly shown in Table 4-2 below. Each of the dotted shifts against the baseline shown in Figure 4-2 overlap one another since the reductions associated with T and WM strategies are fairly modest.

By 2050, the initial CAP strategies are expected to continue reducing baseline GHG emissions by about half. This is due to the scope of ESD strategy coverage which addresses all electricity demand-related emissions by 2035 through a combination of energy efficiency, on-site renewable generation, and clean electricity purchases. GHG emissions that remain are mostly from campus commuting (i.e. those that have not yet been addressed through this initial set of strategies). About half of the solid waste management emissions also remain in the campus' carbon footprint in the future; however, these emissions are fairly small as compared to electricity consumption and transportation. The solid waste management emissions are mainly those associated with the embedded (upstream) energy use in waste materials production and transport (see the Baseline section for more details).⁷

Table 4-2. GHG Impacts from CAP Strategies

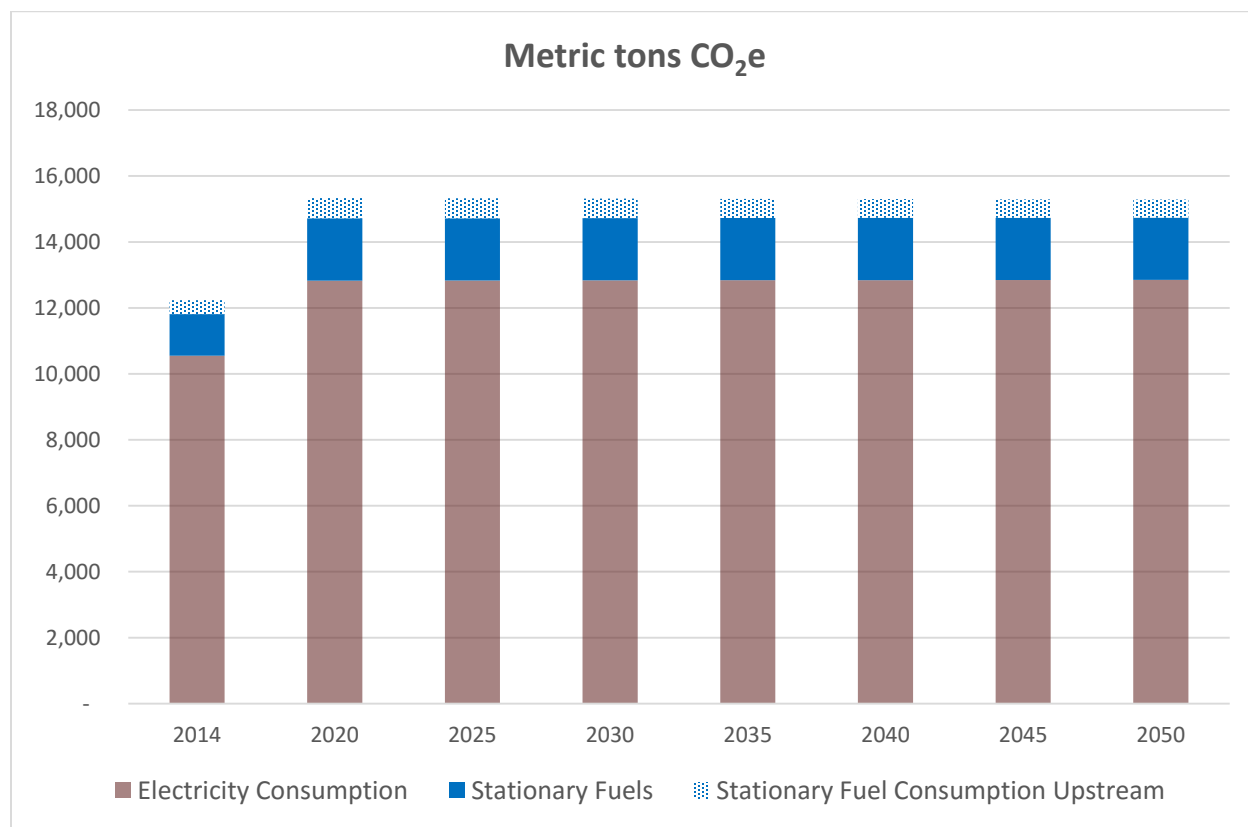
GHGs in tCO ₂ e	2015	2020	2025	2030	2035	2050
Campus BAU Emissions	24,716	28,660	29,098	27,233	26,777	26,795
ESD-1 Reductions	0	(1,296)	(3,241)	(5,186)	(6,482)	(6,482)
ESD-2 Reductions	0	(334)	(878)	(1,462)	(2,385)	(2,407)
ESD-3 Reductions	0	(1,167)	(1,945)	(2,723)	(3,241)	(3,241)
T-1 Reductions	0	(91)	(330)	(196)	(233)	(233)
T-2 Reductions	0	(1)	(2)	(4)	(7)	(7)
T-3 Reductions	0	(26)	(65)	(67)	(64)	(79)
WM-1 Reductions	0	(357)	(717)	(968)	(1,284)	(1,284)
WM-2 Reductions	0	(158)	(188)	(188)	(188)	(188)
WM-3 Reductions	0	(0.1)	(0.3)	(0.4)	(0.3)	(0.3)
Total CAP Reductions	0	(3,431)	(7,366)	(10,793)	(13,884)	(13,921)
CAP Scenario Emissions	24,716	25,229	21,732	16,440	12,892	12,874
% Change from Baseline	0%	-12%	-25%	-40%	-52%	-52%

⁷ As mentioned in the Baseline Report, future improvements to coverage of the GHG baseline include adding in GHG emissions associated with the use of water and for wastewater treatment at USFSP. Those emissions are also expected to be fairly modest as compared to electricity consumption and transportation.

4.1 Energy Supply & Demand (ESD)

Most campus emissions come from building electricity use, notably the Central Utility Plant (CUP). ESD baseline emissions shown in Figure 4-3 below provide a sense of the contribution from electricity use. Much smaller contributions come from combustion of fuels on campus and the upstream emissions associated with the extraction, processing, and transport of those fuels.⁸

Figure 4-3. ESD BAU Emissions



Where transportation and waste strategies are achieved through largely behavioral and operational shifts, reducing energy consumption in buildings is an especially technical matter. Greater data collection and analysis (e.g. benchmarking) followed by strategic investments will be key to significantly reducing energy demand. For the ESD sector, energy efficiency (EE) is the area to focus on first, since any unit of electricity consumption avoided results in less investment required for every subsequent year to source cleaner power (e.g. from either on-site or off-site sources). Because of these energy savings, EE programs are often the most cost effective way to reduce GHG emissions. ESD-1, presented below, addresses on campus EE programs.

⁸ Note: in future updates to the GHG baseline, the emissions contribution from fuels that supply DEF's electricity generators should also be added.

As USFSP becomes more energy efficient, then the process of sourcing cleaner power to address the remaining energy demand should be assessed. ESD-2 covers the development of additional on-site renewable power generation. Table 4-3 highlights the campus emissions per gross square foot (GSF), both in terms of BAU emissions and with reduction strategies incorporated. These emissions relate directly to Scope 2 emissions because realistically not every sq. foot of campus consumes energy and thus a carbon footprint; however, every building does, thus GSF emissions are associated with emissions from energy usage. Finally, ESD-3 addresses renewable power purchase programs. Details on the implementation and costs of each of the ESD strategies are continuing to be developed; however, the CAP team’s initial estimates of GHG impacts are presented in each of the strategy summaries presented below.

Table 4-3. Emissions per Gross Square Foot

Year	2010	2012	2014	2016	2018	2020-2035
Total Campus ESD Scope 2 Emissions BAU (<i>tCO₂e</i>)	9,388	11,381	10,552	11,845	13,594	12,830
Total Campus ESD Scope 2 Emissions w/ reduction strategies (<i>tCO₂e</i>)	9,388	11,381	10,538	12,009	13,756	12,234
tCO ₂ e per Gross Square Foot BAU	.0113	.0137	.0077	.0087	.0100	.0094
tCO ₂ e per Gross Square Foot w/ reduction strategies (<i>includes future area growth</i>)	.0113	.0137	.0077	.0088	.0097	.0090

ESD-1. Reduce Electricity Consumption

STRATEGY DESCRIPTION

In the Fiscal Year 2014-2015, USFSP paid \$1.72 million for 17,200 megawatt-hours (MWh) to Duke Energy for electricity. In 2014, the twenty-eight facilities at USFSP accounted for over 45% of total university emissions, more than any other single source. With the campus’ projected growth to double in student population over the next ten years, energy demand will only go up, thus increasing the amount of GHG emissions. Thus, there is a dual purpose towards reducing electricity consumption: one is to greatly minimize the amount of emissions, while the other is to incorporate sustainable energy practices that reduce electricity demand while increasing campus growth.

STRATEGY DESIGN:

Goals

- Reduce total campus building electricity consumption 50% by 2035 as compared to BAU consumption with intended campus growth
 - Takes into consideration continued growth of campus (i.e. buildings & students)
 - Follows Strategic Plan intentions
 - See *Figure 4-2* for further analysis
- Reduce University's energy costs 50% by 2035 as compared to BAU costs in 2035
- Direct 50% of all energy efficiency savings into a revolving fund for reinvestment

Timing

- Reduce total campus building electricity consumption 10% by 2020 as compared to BAU consumption
- Reduce total campus building electricity consumption 40% by 2030 as compared to BAU consumption
- Reduce total campus building electricity consumption 50% by 2035 as compared to BAU consumption
- Energy Management System operational by September 2016
- CERCC reports status and future of Central Utility Plant by December 2016
- Produce peak-demand profile by December 2016
- Revolving Fund generating revenue by February 2017
- Available buildings benchmarked and rated by May 2017
- CERCC report recommending energy related budgets, standards, policies, guidelines and/or directives submitted to Chancellor by December 2017
- Integrate EMS, CAP, AASHE STARS, & GRF by 2018
- All buildings separately metered by January 2018
- All buildings benchmarked and rated by May 2018
- Implement significant energy conservation pilot project (at least by December 2017)
- Lead and implement smart-grid project
 - Produce plan/proposal by December 2016
 - Implement by December 2017
- Revolving fund receives at least \$250,000 by 2020 (from energy savings)
- Revolving fund invests \$1M by 2030
- Revolving fund invests \$1.25M by 2035

Parties Involved

- SGEF leads projects and provides co-funding
- Facilities Services provides technical assistance
- Duke Energy Florida provides leadership, technical assistance and co-funding

Implementation Steps

- Integrate this CAP with our Energy Management System (EMS), AASHE STARS, & the Green Revolving Fund (GRF)

- Measure, track, manage, improve energy performance (DATA)
 - Duke Energy help
 - Energy management system (EMS)
 - Meter/submeter buildings
 - Conduct performance benchmarking & ratings for all facilities
 - Maintenance schedule
- Capital Improvements
- Update plans and quantify costs/savings
 - Expand metering, software and controls
 - Upgrade inefficient equipment
 - Prepare for smart-grid integration
 - Invest in energy storage
 - Ensure high performance chiller (costs/savings)
 - Phase out / Upgrade on-campus combustion engines
- Smart Grid / Auto Demand Response (ADR)
 - Coordinate Smart-Grid effort
 - Shave peak loads and respond to grid
 - Build performance synergy with adjacent institutions/infrastructure
 - Develop research capacity
- Budgeting
 - Project capital costs
 - Expand green revolving fund to cover capital and policy implementation costs
- Policy
 - Raise new building standards to LEED Platinum
 - Prepare list of Master Plan revisions/additions
 - Life-cost projections
 - Prepare recommendations for Strategic Plan
 - Update hiring/training processes
 - Provide for additional professional development
 - Employ full-time grant writer
 - *Increase efficiency standards/policies*
- Program development/implementation
 - Marketing strategy
 - Education workshops, signage, activities
 - Faculty/Staff/Admin training
 - Website, Dashboard, Facebook, etc.
 - Permanently Integrate CAP/GHG work into academics and research (AASHE-STARS)

Estimated GHG Reductions

Estimated GHG reductions for ESD-1 are summarized in the table below (Table 4-4). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual

reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

Table 4-4. ESD-1 GHG Reductions

ESD-1	2025 GHG Reductions (tCO₂e)	2035 GHG Reductions (tCO₂e)	2016 – 2035 Cumulative Reductions (tCO₂e)	2050 GHG Reductions (tCO₂e)
ESD-1. Reduce Electricity Consumption	3,214	6,482	66,427	6,482

Data Sources

Data required assessing the GHG reductions for this strategy all came directly from the baseline and the strategy design. This included the BAU electricity consumption for the campus (which includes power offset by the existing photovoltaic array on the parking garage), as well as the forecasted carbon intensity of grid-based power from DEF.

Quantification Methods

Business as usual campus-wide electricity consumption and the associated indirect GHG emission values were assembled from the baseline. The estimates of strategy scenario electricity consumption were derived using the strategy targets specified above. For the intervening years between the specified reduction targets, a continued linear ramp-up toward the next future target is assumed. Electricity consumption reductions are assumed to begin in 2018 (3%), then achieve 5% reduction of baseline consumption in 2019, and then the target of 10% reduction in 2020. Indirect GHG emissions are calculated using the expected carbon intensity of electrical power, which also came from the baseline analysis.

The summary table below (Table 4-5) provides results from the analysis. As shown in the final column, full implementation of the strategy is expected to net 6,482 metric tons of GHG reductions in 2035. Cumulatively from 2016 - 2035, the strategy would reduce nearly 73,000 metric tons of GHG emissions. In 2050, the reductions are expected to remain at 6,482 tCO₂e, since, as specified in the baseline; campus BAU consumption remains flat after 2020.

Table 4-5. ESD-1 Emissions Reduction Timeline

Year	BAU Electricity Consumption	BAU Carbon Intensity of Delivered Electricity	BAU Indirect Emissions	Strategy Reduction in Electricity Demand	Strategy Scenario Indirect Emissions	Net Change in Emissions
	MWh	tCO ₂ e/MWh	tCO ₂ e	%	tCO ₂ e	tCO ₂ e
2016	19,574	0.61	12,009	0%	12,009	0.00
2020	25,270	0.51	12,965	10%	11,668	(1,296)
2025	25,270	0.51	12,965	25%	9,723	(3,241)
2030	25,270	0.51	12,965	40%	7,779	(5,186)
2035	25,270	0.51	12,965	50%	6,482	(6,482)
2016 - 2035 Cumulative Total	491,156	n/a	258,313	26%	185,405	(72,909)
2050	25,270	0.51	12,965	50%	6,482	(6,482)

Key Assumptions

- Reductions in campus electricity use consistent with the strategy targets are achieved by the specified schedule.
- Carbon intensity of grid power is consistent with the values estimated during the baseline analysis.
- Campus electricity consumption remains flat in the post-2020 period, consistent with baseline assumptions about growth in building area and student population.

Additional Benefits

- Provides research opportunities for students regarding energy consumption
- Will help fit into future energy projects such as the integration of the Energy Management System (EMS), along with Duke Energy's Community Solar project, Innovation District Microgrid, etc.
- Set an exemplary leadership standard for sustainability and energy efficiency within the Tampa Bay region
- Could lead to future job growth within the clean energy sector

Feasibility Issues

- Implementing energy efficiency projects requires significant funding which may not be feasible at all desired time frames
- Incorporating sustainable energy projects requires a shift in organizational culture which could create resistance due to behavioral change
- Several existing buildings and infrastructure would need to be reevaluated which takes significant amount of time and energy

ESD-2. Increase On-Site Renewable Generation

STRATEGY DESCRIPTION

Over the course of the next twenty years, USFSP will need to further implement renewable projects that generate campus energy for production. This will include several strategies over the long-term but some key examples would be to increase PV solar arrays for existing and new infrastructures, as well as investing in nearby solar farms. PV solar would be the most likely option for this campus because of the geographical region, in which there is a lot of sunlight, as compared to wind energy potential.

STRATEGY DESIGN:

Goals

- Increase on-site photovoltaic energy production to meet 50% of total electricity demand by 2035

Timing

- Produce campus PV map that includes all future on-site production and energy storage by December 2016
- Increase on-site photovoltaic energy production to meet 10% of total electricity demand by 2020
- Increase on-site photovoltaic energy production to meet 40% of total electricity demand by 2030
- Increase on-site photovoltaic energy production to meet 50% of total electricity demand by 2035

To meet the goals above, the following targets are specified:

- Inventory total campus energy production potential and promising locations by December 2016
- Inventory all potential grant opportunities by December 2016

- Complete new on-site photovoltaic energy production⁹
 - At least 100 kW by December 2018
 - At least 600 kW by December 2020
 - At least 1,300 kW by December 2025
 - At least 2,200 kW by December 2030
 - At least 3,600 kW by December 2035

Parties Involved

- SGEF
- USFSP Facilities Services
- Duke Energy Florida
- City of St. Petersburg

Implementation Steps

- USFSP Sustainability Planner works with Facilities Department, Duke Energy Florida (DEF), and potential vendors to develop bid specifications and obtains informal estimates of construction costs
- USFSP Sustainability Planner identifies funding sources or list those if known
- USFSP Sustainability Planner works with Purchasing Department to prepare bid documents
- USFSP Sustainability Planner sends out a request for bid to potential vendors.
- USFSP Sustainability Planner and Purchasing Department select vendor and prepare contract documents
- Selected vendor constructs the PV system expansion
- DEF and the Facilities Department complete system commissioning and start-up

Estimated GHG Reductions

Estimated GHG reductions for ESD-2 are summarized in the table below (Table 4-6). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

⁹ These targets are based on the strategy goals and timing and presume the successful implementation of ESD-1. The estimated capacity requirements are derived from the campus electricity consumption following implementation of the ESD-1 EE measures through 2035.

Table 4-6. ESD-2 GHG Reductions

ESD-2	2025 GHG Reductions (tCO ₂ e)	2035 GHG Reductions (tCO ₂ e)	2016 – 2035 Cumulative Reductions (tCO ₂ e)	2050 GHG Reductions (tCO ₂ e)
A. Next 100 kW Parking Garage PV Extension	72	68	1,301	63
B. Rooftop, Parking Lot and Other PV Projects	806	2,317	18,916	2,344
TOTAL	878	2,385	20,217	2,407

Data Sources

As with the analysis of ESD-1, the main inputs for the analysis of ESD-2 came from the Energy Supply & Demand baseline. These include campus electricity consumption, the carbon intensity of electricity from the grid, and the production of electricity from the existing 100 kW PV array on the campus parking garage (which assumes 0.5%/yr degradation in generation).¹⁰ In particular, the existing PV array produced 1,453 kWh/kW capacity during 2015. This value was used to estimate the PV generation potential for all new PV capacity to be added under this strategy.

Quantification Methods

First, the anticipated electricity generation for the 100 kW PV array expansion for the parking garage was estimated through 2050. This expansion is expected to be fully operational in 2018. An assumed PV generation degradation rate of 0.5%/yr was applied (consistent with the assumption used in the baseline for the existing 100 kW array). The PV capacity additions required to meet the strategy goals (specified above) were input into the appropriate year.

Next, the expected generation from other PV projects needed to meet the overall strategy goals and timing was estimated (see Goals and Timing section above). For the intervening years, a linear ramp-up to the next capacity target was assumed.

The summary table below (Table 4-7) provides campus electricity consumption remaining after ESD-1 EE measures, the associated indirect GHG emissions from electricity consumption, total new PV generation capacity for ESD-2, additional PV generation with ESD-2, the indirect GHG

¹⁰ 0.5%/yr degradation over time based on 2012 NREL Study: <http://www.nrel.gov/docs/fy12osti/51664.pdf>.

emissions for electricity consumption under the strategy scenario, and finally, the net change in GHG emissions (strategy scenario emissions minus the initial emission estimates).

Table 4-7. ESD-2 Emissions Reduction Timeline

Year	Campus Electricity Consumption	Indirect Emissions from Electricity	New PV Capacity	New PV Generation	Strategy Scenario Indirect Emissions	Net Change in Emissions
	MWh	tCO ₂ e	kW	MWh	tCO ₂ e	tCO ₂ e
2016	19,574	12,009	0	0	12,009	0.00
2020	22,743	11,668	450	652	11,334	(334)
2025	18,952	9,723	1,200	1,711	8,846	(878)
2030	15,162	7,779	2,020	2,849	6,317	(1,462)
2035	12,635	6,482	3,320 ¹¹	4,649	4,097	(2,385)
2016 - 2035 Cumulative Total	361,791	191,887	3,320	39,377	167,573	(24,314)
2050	12,635	6,482	3,500	4,692	4,075	(2,407)

Key Assumptions

Key assumptions are similar to those specified for ESD-1:

- Reductions in campus electricity use consistent with the ESD-1 strategy targets are achieved by the specified schedule. This affects the amount of new PV capacity required per the ESD-2 goals and timing.
- Carbon intensity of grid power is consistent with the values estimated during the baseline analysis.
- PV electricity generation for new projects is similar to the levels achieved during 2015 with the existing 100 kW PV array.
- Campus electricity consumption remains flat in the post-2020 period, consistent with baseline assumptions about growth in building area and student population.

Additional Benefits

¹¹ The full 3,500 kW is not assigned until the year 2036, since the policy design calls for completion by the end of 2035; which means that the first full year of operation with that level of capacity would be 2036.

- Provides research opportunities for students regarding energy consumption
- Will help fit into future energy projects such as the integration of the Energy Management System (EMS), along with Duke Energy's Community Solar project, Innovation District Microgrid, etc.
- Set an exemplary leadership standard for sustainability and energy efficiency within the Tampa Bay region
- Could lead to future job growth within the clean energy sector

Feasibility Issues

- A key one to address here is the space requirements for 3,500 kW of generation. Full build-out of PV over the parking garage would be on the order of 400 kW. So, USFSP would need to identify nearly 10x that much area to site new PV projects, including rooftops, parking lots, and other areas.

ESD-3. Clean Electricity Purchases

STRATEGY DESCRIPTION

This strategy covers purchases of clean electricity from USFSP's utility, which is currently DEF. The most preferred sources of clean electricity are from renewable generation sources with zero carbon emissions, like solar and wind. Other sources of generation that could fit here could include power generated from biomass or biogas (e.g. landfill or digester gas), although these are not completely carbon free.

Clean power purchase programs are more common in the northeast and western portions of the U.S., however, the general idea is that electricity consumers agree to pay a slight premium for all or a portion of their power, which is being sourced from renewable generation projects. These renewable projects would not otherwise exist as part of the utility's business as usual generation portfolio, and the renewable attributes of the power generated (i.e. low or zero carbon power) are passed directly to the consumer who purchases the power.

Recent discussions with DEF indicate that the company has a program under development that could provide USFSP with clean power to meet a portion of campus consumption within the next 2 to 3 years.¹² Partnerships among large consumers (e.g. USFSP, City of St. Pete, Tropicana Field) to purchase allotments of renewable power could help to bring market certainty and bring down the cost with increased scale.

¹² T. Lawery, DEF Wholesale Renewables Manager, Distributed Energy Resources, personal communication with S. Roe, CCS, May 4, 2016. This program is likely to include local photovoltaic projects, but other generation sources are also being assessed and would be available to DEF customers in all sectors, including residential customers. Renewable power could be available for purchase by as early as 2018 or 2019; however, the potential cost premium has not been determined.

STRATEGY DESIGN:**Goals**

- Purchase renewable energy from Duke Energy Florida, equal to 50% of total electricity consumption by 2035

Timing

- Increase renewable energy purchasing to meet 10% of total electricity demand by 2020
- Increase renewable energy purchasing to meet 20% of total electricity demand by 2025
- Increase renewable energy purchasing to meet 35% of total electricity demand by 2030
- Increase renewable energy purchasing to meet 50% of total electricity demand by 2035¹³

Parties Involved

- Duke Energy Florida
- USFSP
- City of St. Petersburg
- Tampa Electric Company
- Solar Providers
- Sierra Club

Implementation Steps

- Identify local/regional partners that are fairly large power consumers in order to leverage buying power in upcoming DEF green power purchasing programs, as well as to send a signal to DEF regarding the potential size of initial green power purchasing demand
- Negotiate purchasing at or below cost renewable energy from Duke
 - Identify generation facilities and their plans
 - Timeline
 - Costs
- Recommend revisions and additions to the City of St. Pete & Duke Energy Franchise Agreement
- Recommend revisions and additions to USFSP & Duke Energy contract
- Identify regulatory/legislative barriers

Estimated GHG Reductions

¹³ These goals and the assessment of GHG impacts presume the full implementation of strategies ESD-1 and ESD-2.

Estimated GHG reductions for ESD-3 are summarized in the table below (Table 4-8). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e). Note that the reductions shown here presume full implementation of both ESD-1 and ESD-2. Essentially, half of the remaining power consumption that has not been addressed by ESD-1 will be addressed by renewable generation under ESD-2 and the other half through green power purchases under ESD-3.

Table 4-8. ESD-3 GHG Reductions

ESD-3	2025 GHG Reductions (tCO₂e)	2035 GHG Reductions (tCO₂e)	2016 – 2035 Cumulative Reductions (tCO₂e)	2050 GHG Reductions (tCO₂e)
Clean Electricity Purchases	1,945	3,241	37,105	3,241

Data Sources

As with the analysis of ESD-1, the main inputs for the analysis of ESD-3 came from the Energy Supply & Demand baseline. These include campus electricity consumption and the carbon intensity of electricity from the grid. The only other required input for analysis came from the strategy goals and timing above.

Quantification Methods

The first step was to assemble the expected campus electricity consumption following the implementation of ESD-1 EE measures. The indirect GHG emissions associated with this consumption were then estimated using the carbon intensity of grid-based power established in the baseline (i.e. 0.513 tCO₂e/MWh for most of the CAP planning period). This electricity and associated emissions are summarized in the second and third columns of the table below (Table 4-9).

The schedule for clean electricity purchases was then established based on the strategy goals and timing specified above. Since it is not clear how soon DEF will have this type of program available, no purchases were specified until the year 2020. In that year, 10% of campus electricity requirements would be met via clean electricity purchases. For the intervening years between strategy goals, it is assumed that the purchases will be ramped up linearly toward the next 5-year goal.

Table 4-9. ESD-3 Emissions Reduction Timeline

Year	Campus Electricity Consumption After ESD-1	Indirect Emissions from Electricity After ESD-1	Clean Electricity Purchases	Clean Electricity Purchases	Strategy Scenario Indirect Emissions	Net Change in Emissions
	MWh	tCO ₂ e	%	MWh	tCO ₂ e	tCO ₂ e
2016	19,574	12,009	0%	0	12,009	0.00
2020	22,743	11,668	10%	2,274	10,501	(1,167)
2025	18,952	9,723	20%	3,790	7,779	(1,945)
2030	15,162	7,779	35%	5,307	5,056	(2,723)
2035	12,635	6,482	50%	6,317	3,241	(3,241)
2016 - 2035 Cumulative Total	361,791	191,887	20%	72,322	154,782	(37,105)
2050	12,635	6,482	50%	6,317	3,241	(3,241)

The clean electricity purchase programs are assumed to be sourced from solar projects, meaning that GHG emissions should be zero for all green purchases (for green electricity sourced from biomass/biogas GHG emissions would be very low, but not zero). Strategy scenario emissions were estimated by subtracting the clean electricity purchases in each year from the overall campus consumption (assuming ESD-1 implementation) and then multiplying the result by the carbon intensity of grid power (from the baseline). The net change in emissions shown above results from: subtracting the values for “indirect emissions from electricity after ESD-1” (after ESD-1 implementation) from “strategy scenario indirect emissions”. The results are similar to those shown above for ESD-2 given similar goals and timing; however, the ESD-2 results are lower due to the expected generation in output over time of the new PV systems.

Key Assumptions

Key assumptions are similar to those specified for ESD-1:

- Reductions in campus electricity use consistent with the ESD-1 strategy targets are achieved by the specified schedule. This affects the amount of new clean electricity purchases required per the ESD-3 goals and timing.
- Carbon intensity of grid power is consistent with the values estimated during the baseline analysis.

- DEF makes clean power purchase programs available during the timing specified and in the amounts called for in the strategy. DEF indicated that the initial program available by 2020 or sooner would be based on a solar project in the size range of 1 to 2 MW.¹⁴ Assuming a 20% capacity factor, 2 MW would yield 3,504 MWh annually (2 MW x 8,760 hours/yr x 0.20). Current estimates suggest that this ESD-3 strategy would require 2,300 - 3,800 MWh between 2020 and 2025, essentially using all of the initial DEF program capacity.
- Campus electricity consumption remains flat in the post-2020 period, consistent with baseline assumptions about growth in building area and student population.

Additional Benefits

- Will help fit into future energy projects such as the integration of the Energy Management System (EMS), along with Duke Energy's Community Solar project, Innovation District Microgrid, etc.
- Could lead to future job growth within the clean energy sector
- Will help USFSP acquire clean sources of energy without investing into large-scale and on-site renewable energy projects

Feasibility Issues

- Willingness of USFSP administration or other sources to fund the required purchases
 - Using the clean power purchase schedule shown in the summary table above, for 2020, 2,274 MWh of clean power would be needed
 - Assuming a DEF premium of \$5 to \$10/MWh for this clean power, the cost of these purchases would be in the range of \$11,000 - \$22,000
 - By 2035, the costs could be on the order of \$32,000 - \$64,000.¹⁵

ESD-4. Future Mitigation Strategies

The following initiatives are suggestions for consideration in the next update in the Climate Action Plan:

- Upgrade Stationary Combustion Engines
 - A plan is needed to inventory and replace all on-site combustion engines with emission-free alternatives
- Integration of an Energy Management System

¹⁴ T. Lawery, DEF Wholesale Renewables Manager, Distributed Energy Resources, personal communication with S. Roe, CCS, May 4, 2016.

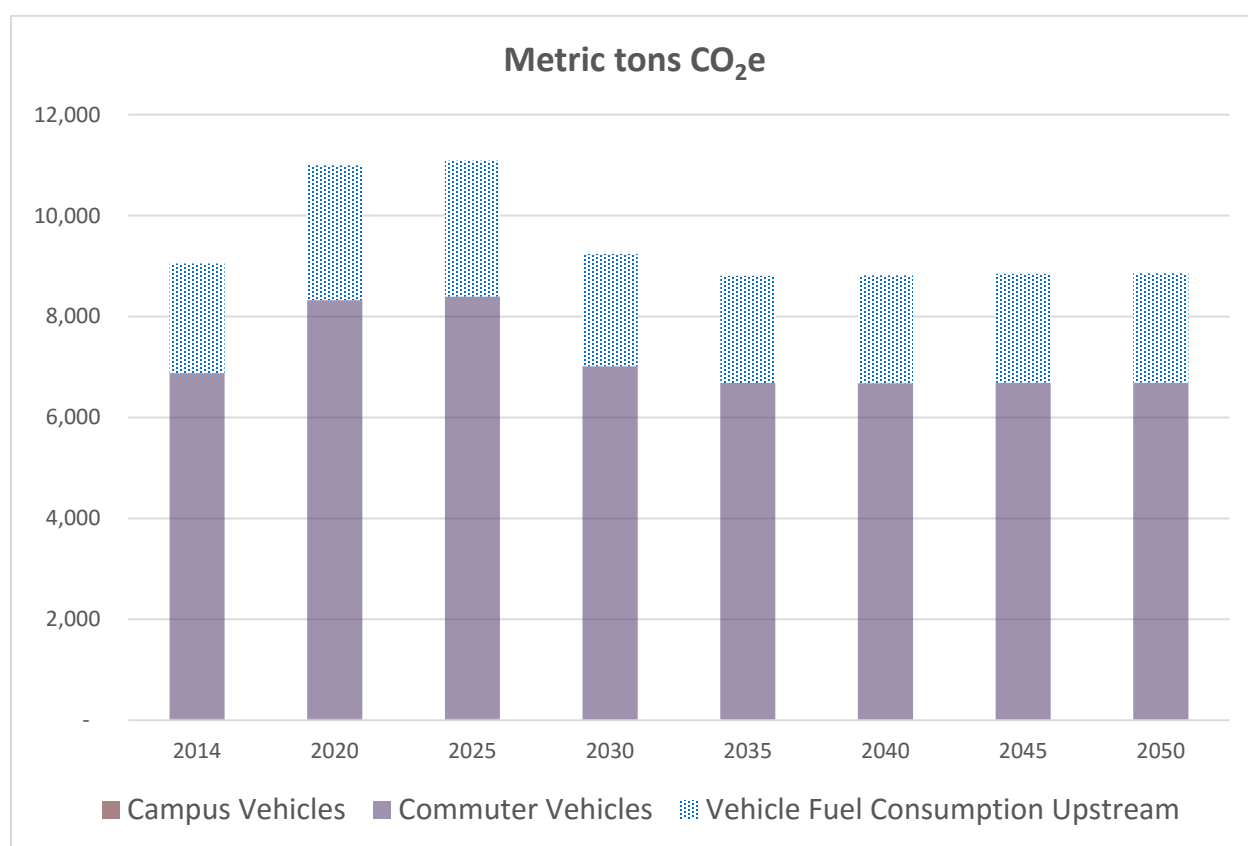
¹⁵ DEF has not yet determined a cost premium for their upcoming program. The values of \$5/MWh to \$10/MWh were taken from the Sacramento Municipal Utility District's Greenergy Program: <https://www.smud.org/en/business/environment/greenergy.htm>.

- Routinely meter, monitor, and control energy usage per building per individual in real-time
- Invest in renewable energy research
 - New developments in offshore wind/solar farms, wave and oceanic energy generation, as well as potential partnerships with the USF Tampa's College of Engineering and the PCGS algae energy research
- Amendments to the campus Master Plan
 - Make policies that include renewable energy inclusion (i.e. PV solar) for all new building construction and development

4.2 Transportation (T)

As shown the USFSP Greenhouse Gas Baseline, commuter emissions account for the second-largest share of overall campus emissions (39% of 2014 campus-wide emissions). Figure 4-4 below shows that commuter vehicle emissions make up the majority for the sector. Emissions from campus vehicles are too small to be seen on this chart. The upstream emissions associated with fuel consumption refer to emissions that come from the extraction, shipment, processing and distribution of petroleum (i.e. those involved in getting crude oil from the well to the gasoline or diesel pump).

Figure 4-4. Transportation GHG Baseline



Transportation is a detrimental source of greenhouse gas emissions on a global and local level. The large commuter culture of USFSP demands an extensive and wide-reaching shift in transportation methods. With the campus seeking to reach 10,000 students within the next ten years, parking will be extremely limited. Currently, with the new addition of the Poynter parking lot near the College of Business, there are only 1,857 parking spaces with virtually no area left to build. Thus, rethinking ways of getting students to campus must be enacted in order to increase efficiency while reducing emissions. This means reducing the amount of vehicles making daily trips to campus by increasing carpooling efforts. This area also includes finding more sustainable and cleaner modes of transportation which includes using zero emission

vehicles (i.e. electric, biofuel, etc.), biking, and enhancing pedestrian safety. In an effort to reduce the amount of commuters driving to campus each day, this section will provide details for a mode shift strategy intended for the students, faculty, and administration of USFSP.

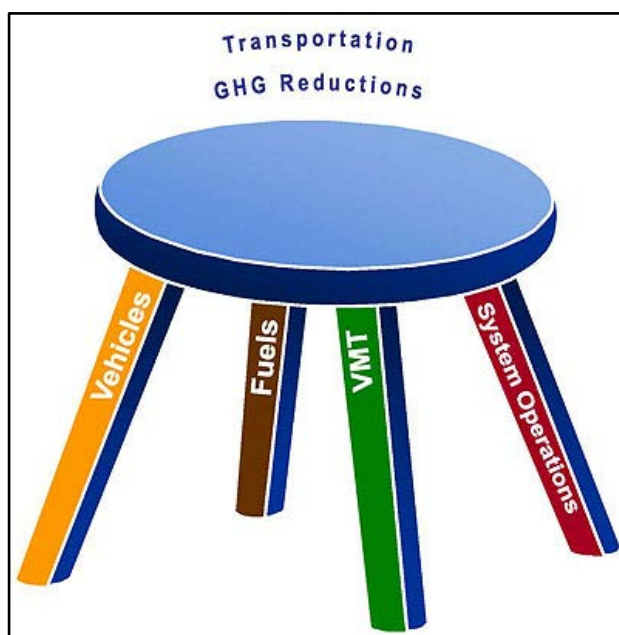
Transportation Emissions Reduction Strategies

Transportation emissions reduction approaches are typically described as falling into three major categories:

- demand reduction, which reduces the total amount of travel;
- vehicle characteristics changes, which reduce the amount of energy required over a given distance, or per trip; and
- fuel characteristics changes, which reduce the volume of emissions generated when fuel is used to provide the energy that transport vehicles require.

These three major categories are often referred to as the “three legs of the stool” of transportation emissions. A fourth category, which focuses on more efficient system operations, is sometimes also considered for demand strategies that focus specifically on emissions reduction without seeking to reduce the number of travelers or volume of travel. Figure 4-5 below (is a common conceptual representation of these types of approaches.¹⁶)

Figure 4-5. GHG Mitigation Categories in Transportation



Different Entities Focus on Different Types of Strategies. National governments are typically capable of approaching all of these areas of focus through policy, or alternatively of delegating

¹⁶ source: USDOT, Intelligent Transportation Systems Office, <https://www.pcb.its.dot.gov/eprimer/module11p.aspx>.

them to lower levels of government. Local governments, institutions and individuals, however, cannot typically force the transportation system's components to change in all of the same ways. In the United States, fuel-efficiency standards are primarily set by the federal government. State and local governments do not generally seek to further restrict the types of vehicles that enter their systems. However, they do make independent decisions about the placement of a majority of all transportation infrastructure through planning-level decisions made for neighborhoods, cities and regions. Their control over fuels and efficiency of vehicles is typically little, and strategies in these areas tend to focus on the direct locus of control of these entities - their own fleets and the fuels they consume directly. Institutions such as USFSP are in similar situations, and have accordingly focused on travel demand as the top area of focus in designing their emissions-reduction strategies.

That said, while many elements of policy are set by national and state governments, for example, the University can go beyond its direct control to influence the decisions of members of its community through communication and incentives. Clean technologies can be enabled through new infrastructure, such as charging stations for electric vehicles. Walking and biking can be motivated through protected walkways, protected bicycle racks and places to shower and change clothes for those electing to ride bicycles. Transit services can be provided directly, or institutions can either fund or advocate for better bus shelters with real-time trip information for those using transit.

A fuller discussion of each area follows.

Demand Reduction. This focuses on reducing the total demand for transportation, either by reducing the number of trips or by reducing the length of trips required. A wide variety of strategies fall into this category, the first of which is the set of long-range urban planning approaches that bring trip origins and destinations closer together. These concepts focus on co-locating different land uses, so that places of residence, employment, shopping, school, and entertainment are nearby each other, rather than strictly separated into distant zones. Concepts such as multi-use developments and matching the volume of housing to the volume of employment in each region are frequently considered here. A second type of strategy seeks to reduce demand through activities such as telecommuting, carpooling, and ridesharing, which reduce the demand for vehicle use within the existing urban planning infrastructure.

A crucial component here, particularly when considering the economic and social impacts of policies alongside their environmental impacts, is the impact on the value these trips create. Transportation activities are largely induced by demand for other things: access to work opportunities, access to schools, access to goods, services, supplies, entertainment, events, and family gatherings, and many other purposes which contribute mightily to our economy and social fabric. Some demand-reduction strategies work by making the transportation requirements lower (i.e. urban design that co-locates various types of land uses, such as putting corner stores into neighborhoods previously zoned exclusively for housing), while others reduce demand by raising the cost or time burdens of transportation, effectively increasing the price of trips and reducing the volume through the elasticity of demand for whatever goods and services

inspired the trip. Transportation is best understood not as a normal good that people consume for its own value, but as a transaction cost - something people invest time and money into in order to be able to get other things they want or need. From an economic and social standpoint, reducing the burden that transportation costs put on other activities is positive while increasing that cost has a contractive effect.

Vehicle Characteristics. This focuses primarily on vehicle fuel efficiency, regardless of the fuel involved. Technologically, such advances occur through improved engine design, transmission design changes (such as the current trend toward automatic transmissions with nine or more gears, rather than the four or five gears standard in vehicles before 2005), reduction in vehicle weight, improvements in aerodynamics, or the use of hybrid technology to reduce idling and engine use during deceleration. For standard internal-combustion engines utilizing gasoline or diesel fuels, these strategies focus typically on standards for manufacturing or incentives for purchasing that are connected to progressively higher efficiency targets over time. The federal CAFE standards, which require every automaker's overall collection of sold vehicles to achieve an average fuel efficiency target that rises with time, is the most influential vehicle-efficiency regulation in the United States at this point. Organizations of any size, however, can manage their own carbon emissions levels through purchases or use of more fuel-efficient vehicles.

Fuel Characteristics. This area focuses on the emissions intensity of fuels, specifically the intensity per unit of energy of the emissions generated from fuel combustion. In petroleum fuels, a common strategy here is the addition of ethanol as an additive. While ethanol contains less energy than gasoline, it also generates fewer emissions, and per mile driven tends to emit slightly less in most cases. A more dramatic form of fuel-emissions policy is switching electricity supply for transportation (either in electric cars or in electric shuttles, trams or transit systems) from conventional generation, which is typically dominated by coal-fired generation or natural-gas-fired generation, to less-intensive generation from wind, solar, hydroelectric power, or biomass. This can make a dramatic difference in the emissions profile of a transportation system.

System Efficiency. This area focuses again on the overall transportation system, but seeks to reduce emissions in ways other than demand reduction. Strategies here include mode shift to lower-emissions means of travel. In dense, mixed-use areas, this can include walking and biking and the focus is on the necessary infrastructure to make such trips safe and convenient. On a larger scale, it can involve strategies to improve utilization and service of transit systems, which move far more people per vehicle than do individually operated cars. Other efficiency strategies can include efforts to get employers to vary workdays so that communities are not all traveling to work at the exact same time. This can reduce peak congestion, which can improve vehicle efficiency performance (this is a debatable emissions-reduction strategy, however, as open roads tend to attract new travel volume until congestion drives travel times and burdens back to where they were before.)

T-1. Carpooling

STRATEGY DESCRIPTION

The behavior shift that this strategy calls for is designed to reduce the single occupancy commuting and vehicle-miles traveled, ultimately lowering the GHG emissions from vehicles used by USFSP students and staff. Single occupancy commuting activity here is defined as driving by students, faculty, staff or administrators to and from USFSP with only the driver in a personal vehicle (excluding motorcycles and scooters.) To reduce the overall vehicle miles traveled associated with commuting, this strategy consists of competitions, pledges and programs aimed at reducing driving miles. Students will be encouraged to carpool through initiatives like reduced parking pass prices, advantageous parking spots, a ride-share program, and through a “Commute Club” monthly scratcher as well as a pledge that limits the number of times the student can drive to campus alone. It is the goal of this strategy to cut down on individual commuters that comprise half of the total campus emissions of USFSP.

In the following section, employees refer to staff, faculty and administrators. Personal vehicle users refer to employees and students who commute to campus in a car, truck or other personal vehicle, excluding motorcycles and scooters. Full-time refers to students taking a designated full-time credit hour course load or employees working 40 hours per week. Ridesharing initiatives refers to all outreach, communication, and carpooling programs aimed at encouraging or achieving ridesharing.

STRATEGY DESIGN:

Goals

- 20% of full-time personal vehicle users engaged in some form of ridesharing or carpooling at least once a week by 2035
- 10% of all full-time personal vehicle users using ridesharing as their primary form of campus commuting by 2035

Timing

- Within two years, 10% of full-time, nonresident students and 10% of full-time employees will have been engaged by ridesharing initiatives at least once.
- Within 5 years, 6% of all personal vehicle users should be using carpooling and ridesharing as their primary form of campus commuting. This goal is defined in terms of users because it is expected that the 15% will be split unevenly between employees and students.
- Within 15 years, 7% of all personal vehicle users should be using carpooling and ridesharing as their primary form of commute.
- By 2035, 10% of all personal vehicle users should be using carpooling and ridesharing as their primary form of transportation.

Parties Involved

- The Office of Sustainability
- USFSP Facilities Services
- USFSP Commuter Club.
- Possibilities of shared parking:
 - Bayfront Medical Center
 - Mahaffey Theater
 - Poynter Institute
 - Albert Whitted Airport

Implementation Steps

- **Step 1:** Establish implementation steps to USFSP Parking Services
- **Step 2:** Plan and begin ridesharing/carpooling communication campaign
- **Step 3:** Establish carpool app
 - The first step in creating momentum will be incentivizing a first-mover group to make the switch
 - Two potential target segments may be more easily motivated:
 - low-income
 - environmentally conscious users
 - Zimride app will be used and promoted to connect carpool drivers to users who need a ride to school
 - This interactive real-time app will create a ride-share network of willing drivers and riders
- **Step 4:** Establish carpool parking passes
 - The price of all parking passes will be increased
 - This will force some price-sensitive commuters to engage in ridesharing
 - Carpool parking passes will be established with a much lower price, if not free
 - Carpool members will sign a pledge to commute to campus with the signing members in the vehicle
 - If possible, three levels of carpool parking passes should be established corresponding to the number of riders in the vehicle; 1, 2 or 3
 - The lowest price pass will be for those vehicles with 3 committed riders
 - An easy, obvious method for students and employees to access the PSTA Emergency Ride Home Service will be established and advertised.
- **Step 5:** Increase incentives to reduce VMT
 - Carpool-only, or 5 rider only, parking spots could be established to further incentivize the purchase of carpool passes
 - Commuter Club monthly scratcher parking passes could also be added to the range of parking passes

- With a monthly scratcher, a driver would get assistance in establishing a carpool or mode shift and in exchange agree not to park on campus except for a few times a month
 - A card with scratch-offs indicating the date in the month would be used as a parking pass
- Develop a reduced-mile competition between commuters for a short period of time with high-visibility competition, prizes and winners

Estimated GHG Reductions

Estimated GHG reductions for T-1 are summarized in the table below (Table 4-10). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

Table 4-10. T-1 GHG Reductions

T-1	2025 GHG Reductions (tCO ₂ e)	2035 GHG Reductions (tCO ₂ e)	2016 – 2035 Cumulative Reductions (tCO ₂ e)	2050 GHG Reductions (tCO ₂ e)
Carpooling	330	233	3,769	233
With upstream emissions included	434	306	4,959	306

Data Sources

The primary sources of data are captured in the baseline inventory and forecast. Specifically, the survey data which serves as the foundation for estimating emissions attributed to commuting behavior by faculty, staff and students was also the basis for estimating individual policies. In particular, this data was useful for separating out the emissions attributable to subgroups of commuters, such as those who drive alone, as well as narrower categorizations such as those who take transit and live within five miles of campus.

Quantification Methods

CCS first developed a sub-baseline estimate, using survey data, for the existing percentage of all commuters who are currently making trips to campus primarily by carpool or ride-sharing. This group was further divided into those riding with one other person and those riding with two or more other people (these groups differ in the amount of emissions attributed to each person

traveling). Using the assumption that new carpoolers would likely adopt carpooling in roughly the same manner as existing carpoolers, CCS developed an average emissions value for single-occupant drivers and for carpoolers. Each individual shifting from driving individually to campus to a carpool was credited with a reduction equal to the difference in these two averages. This methodology allows for uncertainty in the trip distances and frequency of travel to campus of future drivers and carpoolers, which cannot be predicted with confidence in advance.

Key Assumptions

- In the absence of a policy, the current share of carpoolers (just over 3%) will remain constant throughout.
- The travel behavior (number and length of trips per semester) of future new carpoolers will be similar to that of current carpoolers - i.e. that there is no significant difference in the location or required attendance schedules of the new vs. existing carpoolers.
- The vehicle characteristics and fuel requirements of future new carpoolers will be similar to that of current carpoolers - i.e. that there is no significant difference in the age or fuel efficiency of the vehicles used by new vs. existing carpoolers, and the two fleets do not significantly differ in the mix of fuels required.

Additional Benefits

- Carpooling programs should strengthen campus community ties and enhance the campus identity
- Reducing the amount of space and human resources needed for vehicle parking will allow resources to be devoted to other, more fruitful areas

Feasibility Issues

Social stigma will be a hurdle for ridesharing initiatives. Support from key student organizations and a strong communication campaign will help greatly in this regard. Furthermore, although we have received preliminary support from Parking Services, drastic changes to their service model will require strong leadership engagement.

The larger hurdle is the challenge of helping carpoolers effectively share trips despite differing start and endpoints and differing times of travel. Daily schedules can be complicated for a great many people within a university community, as evenings, weekends, part-time commitments and other work and family obligations pull people away from a standard time of commute or a standard pattern of commuting from home to school and back. Changes in schedules can be sudden, and finding a way to keep ridesharing information updated moment by moment would improve the feasibility of reliance on it, rather than one's own vehicle, for those whose schedules change often.

T-2. Walking and Biking

STRATEGY DESCRIPTION

T-2 is a group of strategic initiatives aimed at encouraging campus community members to make walking or biking their primary mode of transportation to and from campus. The initiatives include bike infrastructure improvements, bike share program expansion, walking and biking campaigns, prohibition of freshman resident cars, and improving walkability, access, and safety. The target audience is faculty, staff and students that live within 2 miles of the USFSP campus. Within 10 years, it is hoped that as many of this target group as possible will have shifted to modes other than single occupancy commuting. Of those alternative mode shifts, it is hoped that the majority of this target group will shift to walking and biking. As such, this strategy is related to T-3, the development of a USFSP shuttle, which may affect this target group. By improving access and incentivizing walking and biking, T-2 should reduce campus commuting activity. Single occupancy commuting should decrease dramatically and, as such, the emissions associated with commuting will be reduced. Furthermore, it should be noted that USFSP looks to further increase students living on campus, by increasing the percentage from 10% to eventually 30% within the next twenty years. This will also help alleviate emissions associated with students traveling to and from campus.

STRATEGY DESIGN:

Goals

- The goal of these strategies and initiatives is to shift 40% of the campus community members who live within a 2 mile radius of campus to walking or biking as their primary mode of transportation by 2035
- Increase students living on-or near campus from the baseline of 10% to 30% by 2035

Timing

- **Target Population:** employees and students living with a two mile radius of the campus
 - 25% within 5 years
 - 30% within 10 years
 - 35% within 15 years
- **Step 1:** Safety and Accessibility - June 2016
- **Step 2:** Resources and Incentives - December 2016
- **Step 3:** Marketing and Communication Campaign - January 2017
- **Step 4:** Measure and Adjust - December 2017
- **Step 5:** Construct new residence hall on campus- August 2018
- **Step 6:** Increase affordable housing options near downtown- January 2018

Parties Involved

- USFSP Sustainability Planner
- USFSP Police
- City of St. Petersburg
- USFSP Facilities Department
- USFSP Space Committee
- Real Estate Companies
- Affordable Housing Management Services

Implementation Steps

- **Step 1:** Conduct full assessment of safety and accessibility
 - USFSP Sustainability Planner works with Facilities Department, the City of St. Petersburg, the USFSP Space Committee, the USFSP Police and any other relevant parties in conducting an accessibility and safety review of walking and biking routes to campus
 - Previously conducted accessibility and space utilization studies, including those produced for master and strategic planning processes, should be considered in this process
 - USFSP Sustainability Planner identifies accessibility and safety concerns and creates a plan to address them in conjunction with relevant campus entities and the City
- **Step 2:** Improve resources and incentives
 - Improvements will largely be determined by the assessment, but should likely include improved bike storage, bike racks, shower facilities, and the introduction of bike lanes and speed reduction measures
- **Step 3:** Plan and begin communication campaign
 - Under the direction of the USFSP Sustainability Planner, and in conjunction with University Advancement and Marketing faculty, a team of students creates a marketing and communication campaign to raise awareness about the increased safety, accessibility, and resources for walkers, boarders and bikers
 - The campaign should also include clear incentives for employees, like early morning breakfast stations at key points in common walking routes or an additional 15 minute break in the day
 - Partnering with the Wellness Center and their Walk to Lunch initiative may help speed adoption
 - Joint 'walk to work' or 'bike to work' events.
- **Step 4:** Measure and Adjust
 - If possible, a student team should help design and execute the campaign and collects data on progress
 - Data should include surveys of transportation modes, illness and absentee rates, bicycle counts and shower use
 - Additional incentives and updates will be identified at this time

- **Step 5:** Construct new residence hall on campus
 - Plan the design of a new residence hall
 - Should be highly energy efficient while improving occupancy quality of life
 - Offer several amenities to retain occupancy throughout semester years
- **Step 6:** Increase affordable housing options near downtown
 - Work with the City of St. Petersburg to establish income restricted buildings
 - Work with downtown development associations for student-living programs
 - Partner with downtown lofts and apartments to create affordable student housing

Estimated GHG Reductions

Estimated GHG reductions for T-2 are summarized in the table below (Table 4-11). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

Table 4-11. T-2 GHG Reductions

T-2	2025 GHG Reductions (tCO ₂ e)	2035 GHG Reductions (tCO ₂ e)	2016 – 2035 Cumulative Reductions (tCO ₂ e)	2050 GHG Reductions (tCO ₂ e)
Walking and Biking	1.5	5.1	40	5.2
With upstream emissions included	1.9	6.8	52	6.8

Data Sources

The primary sources of data are captured in the baseline inventory and forecast. Specifically, the survey data which serves as the foundation for estimating emissions attributed to commuting behavior by faculty, staff and students was also the basis for estimating individual policies. In particular, this data was useful for separating out the fuel use, travel volume and emissions attributable to those driving alone but starting trips within two miles of campus, and understanding the existing share of under-two-mile travelers already walking or bicycling to campus.

Quantification Methods

- CCS first established two baseline estimates from the inventory and forecast: the share of commuters within two miles of campus already walking and biking (and assumed to

do so in the future), and the volume of fuel use and emissions generated by those who drive alone but are also within two miles of campus. These shares and volumes (relative to total activity of commuters) were developed from the commuter survey data and applied to the overall fuel use and emissions forecasts for commuter travel.

- From these business-as-usual estimates, a forecast change was framed to bring the existing 26-27% of walkers and bikers to 40% by 2035. These walkers and bikers were assumed to come entirely from the existing pool of single-occupancy vehicle drivers. The volume of fuel and emissions attributed to the short-distance drivers (a very small group to start with) was reduced accordingly.

Key Assumptions

- The existing profile of under-two-mile commuters, in terms of the share walking or biking vs. driving alone vs. carpooling vs. taking some form of transit, will not significantly change. At the moment, they represent a very small portion - less than one percent - of the commuter population's total travel volume and related emissions. This small share limits the potential impact of this policy.
- Current walkers and bikers are now, and will remain, heavily focused on this mode. In the inventory and forecast, they are assessed no emissions, which relies on the assumption that they rarely travel to or from campus by motorized transport. However, it may be that commuters will partially adopt transit, walking and biking. In this case, the focus on improving the prevalence of the use of low-emissions modes by all commuters, rather than moving people neatly from one category to the other, may be the optimal way to consider the effectiveness of these policies.
- This policy and T-1, regarding carpooling and ridesharing, are not likely to significantly influence each other. The presence of enhanced carpooling options for those walking and biking is not likely to reduce their tendency to walk and bike, and the walkers and bikers displace a very small share of total emissions, and thus have little potential to influence the carpooling strategy.

Additional Benefits

- Increased community integration and cohesion
- Improved safety in surrounding area
- Ambient air quality
- Student research opportunities on health, marketing, air quality, behavior change, GHG reductions, etc.
- Fewer additional parking structures needed resulting in reduced construction costs and more available campus space and resources

Feasibility Issues

- Perceived lack of safety in the surrounding area could limit the mode shift

- o Developing strong City, Police and area stakeholder partnerships will be key in overcoming this hurdle
- A lack of accessibility could also be a major behavior change hurdle
 - o Proper infrastructure improvements will overcome this obstacle
- The improvement of other alternatives to single-occupancy transit can improve adoption of walking and biking
 - o Individuals may be more interested in walking and biking if their return trip, or other trips from campus, can be made by transit

T-3. Shuttle and Transit

STRATEGY DESCRIPTION

T-3 is another mode shift strategy focused on improving Pinellas Suncoast Transit Authority bus system ridership and developing a USFSP owned and operated shuttle system to serve campus community members living within five miles from the campus. Within ten years, it is hoped that 30% of this target group will have shifted to transit as an alternative to personal vehicle use. By providing an alternative to personal vehicles, the PSTA bus, the downtown trolleys, and USFSP shuttle service should reduce the emissions associated with commuting. USFSP shuttle vehicles could also transport students to special events. PSTA would need to enhance bus routes, making stops at campus during peak hours of the day, this would also include increasing their efficiency to make exact time stops. There are also trolleys that run through downtown several times an hour, which could increase stops at campus as well. The USFSP shuttle system would also need to be efficient at making sure students make to to campus during peak and congested class times. PSTA use will be encouraged through a marketing campaign, improved communication of routes and schedules, and expanded routes and schedules.

Currently, USF Tampa operates a bus service known as “The BullRunner,” which services the campus and surrounding area and is offered free of charge to campus community members. The BullRunner runs off biodiesel as well, thus reducing emissions. Thus, creating a campus shuttle service should, at minimum, have the same standards as the biodiesel shuttle at USF Tampa. That service is connected to an mobile application called “BullTracker” which allows riders to know precise arrival times and track bus movements. If the USFSP program is developed as an extension of the USF Tampa bus service, it will carry the same “BullRunner” branding. If not, suggested titles for this program include “The Green Machine.” Either way, USFSP will in the foreseeable future, enhance bus and shuttle services to students through either the development of a shuttle service or through increasing PSTA bus routes stopping at campus.

STRATEGY DESIGN:

Goals

- Shift 30% of the campus community members who live within a five mile radius of campus to use a shuttle system as their primary mode of transportation

Timing

- **Target Population:** Faculty, Staff and Students living within a 5 mile radius of the campus
 - 30% of all trips by people within five miles of campus using transit within 10 years, through the creation of a system similar to but further-reaching than USF Tampa's Bull Runner and through coordination with PSTA to optimize service to campus
 - 42% of all trips by this group using transit by 2050 through steady improvements to service levels, routing, stop location and other efforts to maximize the service value of the two systems
- **Step 1:** Feasibility Study and Scope of Program Developed - January 2017
- **Step 2:** Necessary Resources Acquired, Communication & Incentive Plan Developed- October 2017
- **Step 3:** Coordinate bus routes to increase during campus congestion periods (i.e. 11:45am prime class scheduling)- November 2017
- **Step 4:** Launch Program- January 2018
- **Step 5:** Measure and Adjust - December 2018

Parties Involved

- Pinellas Suncoast Transit Authority
- USFSP Sustainability Planner
- USFSP Police
- USFSP Facilities Department
- USFSP Space Committee
- USFSP Parking & Transportation Services
- City of Saint Petersburg
- USF Tampa BullRunner
- USF Transportation Services

Implementation Steps

- **Step 1:** Plan and launch full PSTA communication and marketing campaign
 - Awareness about the new "One Bus Away" PSTA mobile application will be the most important piece of information. Also, events in which employees and students ride the bus or trolley together to a specific destination will be key.
 - There is a major social stigma associated with bus riding. The primary goal of the campaign will be to make PSTA ridership simple and easy, but the secondary goal will be to overcome this social stigma by advertising incentives and by

portraying the bus as a transportation mode of choice rather than a mode of need.

- **Step 2:** Identify infrastructure needs, funding, and partners for the USFSP shuttle service
 - The shuttle service targets those commuters living between 2 and 10 miles away from campus. Identifying the areas within that radius that will be the most convenient shuttle stops will be key.
 - A few elements in the shuttle service will aid the speed and ease of the mode shift. Those include frequent service, short waits, reasonably competitive travel time, reliable travel time, reasonable comfort and amenity, and active service when a rider needs it - likely 8am through 10pm Monday through Thursday.
- **Step 3:** Acquire needed materials and infrastructure
- **Step 4:** Plan and launch shuttle service communication plan
 - As discovered in the Fall 2015 Sustainability Strategy Summit and anecdotally, the student body is extremely interested in establishing their own shuttle. This is further fueled by the potential to use this service to ease the commute from St Petersburg to the Tampa campus on weekends and for major events, like football games. Capitalizing on this excitement in communication activities will speed this mode shift.
- **Step 5:** Incentivize shuttle riding
 - Using the shuttle to transport campus community members to special events in Tampa could be used as an incentive. This could be done with frequent rider punch or scratch cards, with a certain number of rides needed to secure a seat on the shuttle for a football game.

Estimated GHG Reductions

Estimated GHG reductions for T-3 are summarized in the table below (Table 4-12). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

Table 4-12. T-3 GHG Reductions

T-3	2025 GHG Reductions (tCO ₂ e)	2035 GHG Reductions (tCO ₂ e)	2016 – 2035 Cumulative Reductions (tCO ₂ e)	2050 GHG Reductions (tCO ₂ e)
Shuttle and Transit	56	55	846	68
With upstream emissions included	65	64	978	79

Data Sources

The primary sources of data are captured in the baseline inventory and forecast. Specifically, the survey data which serves as the foundation for estimating emissions attributed to commuting behavior by faculty, staff and students was also the basis for estimating individual policies. In particular, this data was useful for separating out the fuel use, travel volume and emissions attributable to those driving alone but starting trips within five miles of campus, the same values for those taking transit, and the shares of commuters utilizing the two modes.

Quantification Methods

For the transit policy, CCS developed two subcategory baselines: the fuel use and emissions attributable to those within five miles of campus who drive alone for their commutes, and those in the same radius who primarily take vanpools or transit. For each group, their existing emissions were developed as well as their share of the total number of commuters. From these, CCS developed an estimate of a) the amount by which emissions will drop from single occupancy driving, and b) the amount by which emissions will rise from expanding the operations and capacity of transit to serve the higher demand. As the scenario calls for more transit operations and more transit adoption, the total net emissions reduction was calculated by balancing the increases in emissions from transit against the reductions in emissions from personal vehicles. Transit is, in this baseline, estimated to be about 80% as emissions intensive as personal vehicle use, and so the overall result (while still significant) is reduced dramatically by the increased emissions from operating more transit to achieve the significant shift in ridership - from 1% of commuters to 30% in 10 years.

Key Assumptions

- One central assumption here is that significant capacity is added to provide new service to this cohort of commuters over the next ten years, and that new riders are served by more vehicles running more transit service miles. This is much more akin to the creation of a version of the Bull Runner for the USFSP campus than it would be to some route optimization of the PSTA service already running. Steady efforts at route optimization are assumed after 2026, as a result of which the rate of ridership continues to climb by small increments each year until the share of transit ridership hits 42% by 2050.
- The transit activity profile is assumed to remain the same, which reflects itself in the emissions intensity per rider remaining the same, throughout the period of analysis. The single-occupant driver activity profile is also expected to remain the same.
- The policy is assumed not to lure a significant number of riders from any mode other than single-occupancy travel, though in practice it is likely that those adopting transit may well be those already showing openness to non-traditional commuting modes. Commuters facing all three of these initiatives could potentially adopt a mix of all three.
- This policy could influence the other two policies (carpooling & ridesharing, and walking & biking) in positive ways. By creating mode choices and alternatives, individuals may

be more willing to avoid their own car if they have multiple options for the return trip. Without a basis for quantification, this impact is left unquantified, but a robust transit policy can be considered a facilitator for adoption of the other two policies.

Additional Benefits

- Increased community integration and cohesion.
- Improved ambient air quality.
- Research opportunities.

Feasibility Issues

- Encouraging PSTA use will experience the highest mode shift resistance from campus community members
 - The bus service is highly stigmatized
 - In presenting this strategy, only one campus community member has ever expressed an openness to considering the shift
 - Communicating the PSTA's adoption of the "One Bus Away" app will help ease this resistance
- The development of a shuttle services will have high costs
 - Sharing the shuttle with SPC would reduce that burden
- A shuttle service would require vehicle storage and maintenance which may be especially challenging on this urban campus

T-4. Future Mitigation Strategies

The following initiatives are suggestions for consideration in the next update in the Climate Action Plan:

- Campus Fleet Improvements
 - Creating an efficiency fleet standard and updating our existing fleet will reduce emissions. A "No Idling" Policy will also reduce emissions, but in a smaller quantity
 - Switching all campus fleet to fleet vehicles or electric vehicles (including golf carts) that are charged from solar stations
- Recognition
 - Garnering recognition will highlight our initiatives and elevate their status in our community, which will likely aid in overcoming social stigma barriers and increasing the rate of adoption
 - Some recognitions includes the Green Parking Garage certification and the Bicycle Friendly University
- Improve Efficiency of Commuter Vehicles
 - Improving the efficiency of commuter vehicles will reduce the emissions associated with each commuter VMT

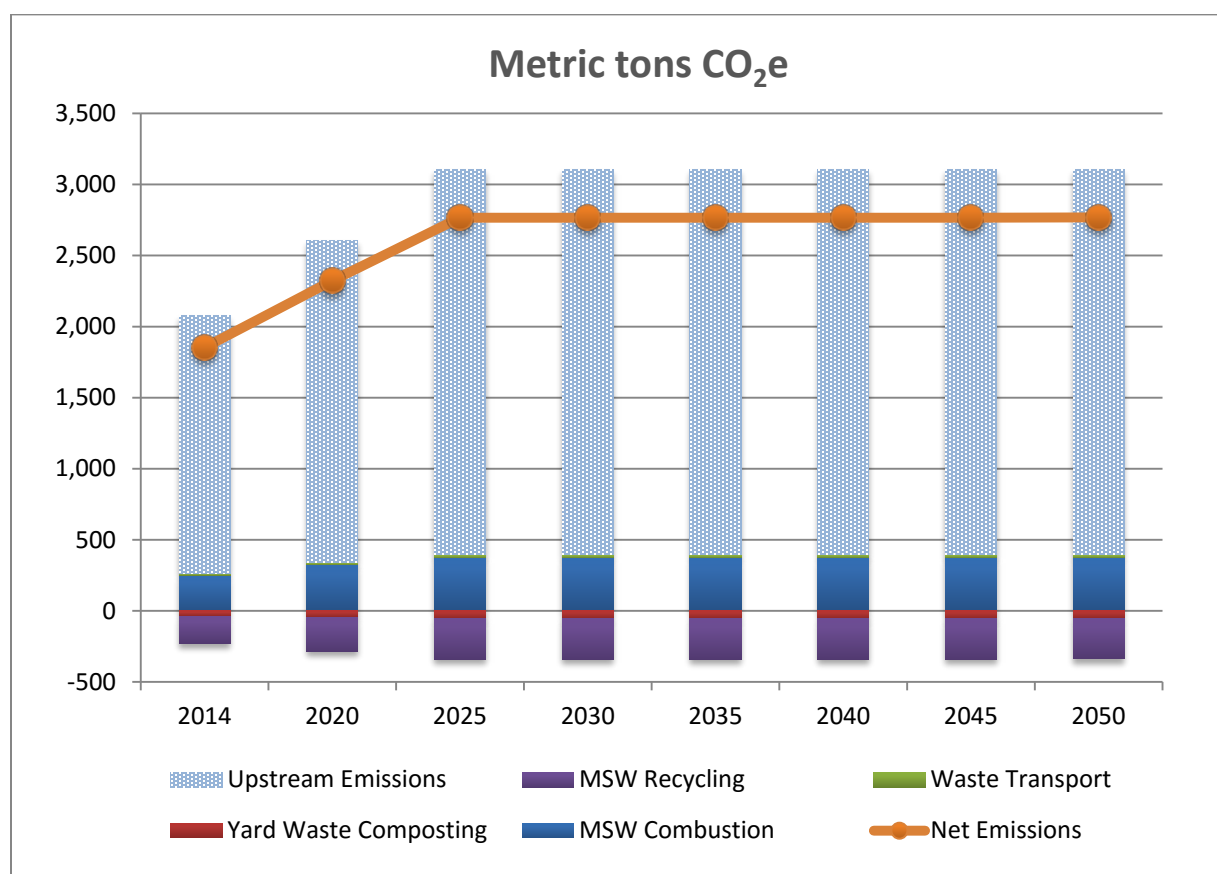
- The development of a Car Sharing Program with only High Efficiency vehicles or electric scooters is one potential action
- Innova Electric Dash Cars powered from solar charging stations
- Hybrid small cars such as ZipCar or Car2Go to help taxi nearby commuters
- Nearby Affordable Off-Campus Housing
 - Housing is expensive near downtown thus many students commute far distances
 - Making downtown apartments complexes specified for USFSP students
 - Limited income/student affordability tenants only
- Keeping Campus Community Members on Campus
 - A convenience store
 - Additional study spaces
 - Enhancement of the Harborside waterfront
 - Development of amphitheater for night-time/weekend events
 - Enhancement of “third spaces” for work, study, socializing, etc.
 - Enhancement of food options or other needs for which people currently drive from campus
- Reducing frequency of required trips to campus
 - Grouping classes frequently taken together into common days
 - Allowing forms of remote attendance or participation in activities (such as office hours, online exercises, etc.)
- City Carpooling Lane
 - The City, County, and Florida Dept. of Transportation (FDOT) dedicate a lane on the freeway, and in congested areas, to carpooling vehicles
 - This provides an incentive to carpooling to avoid traffic delays

4.3 Solid Waste Management (WM)

Introduction

Recycling is the most obvious and tangible form of waste reduction, yet reducing material consumption broadly will be key to eliminating emissions from the waste sector long-term. As shown in Figure 4-6, upstream emissions from product manufacturing and transport are the largest source of emissions from the USFSP Waste Management sector, followed by MSW combustion. Developing strategies to reduce consumption will require a more nuanced discussion about the materials we procure and the ways we use them.

Figure 4-6. Waste Management GHG Baseline



EPA has developed a hierarchy for developing waste management strategies, shown in Figure 4-7. At the top of the hierarchy is source reduction and reuse. Source reduction refers to reducing waste at the source with strategies such as reusing or donating items, buying in bulk, and reducing packaging. These strategies reduce both the upstream emissions associated with materials and the emissions associated with disposal. The second tier in the hierarchy is recycling and composting. These strategies reduce emissions associated with disposal and add to recycling/composting emissions credits. The emissions credit associated with recycling

comes from reducing the upstream emissions of future products that are produced from recycled material instead of virgin materials. The composting emissions credit comes from the carbon storage associated with application of compost to soils. The third and fourth tiers in the hierarchy are energy recovery and treatment and disposal. USFSP current waste management system uses the second and third tiers, since MSW is either recycled or sent to a waste-to-energy (WTE) facility. All three of these strategies will need to be implemented in accordance with several different campus departments, as well as working closely with Waste Management and potentially the City of St. Petersburg Waste & Sanitation Department.

Figure 4-7. Waste Management Hierarchy¹⁷



WM-1. Source Reduction & Re-Use

- Decrease influx of new non-reusable materials through campaigns, “freecycle” trade opportunities, and working with dining services

WM-2. Recycling

- Improve the amount of visible and easily accessible recycling by increasing recycling efforts at move in/move out, having large recycle bins on each residence hall and parking garage floor, and ensuring individual recycle bins in each residence hall room.

WM-3. Composting: Yard Waste (WM-3a) and Food (WM-3b)

¹⁷ Source: US Environmental Protection Agency: <https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy>.

- Partner with City of St. Pete to identify best off site composting opportunities. Create a campus compost program starting with lawn/ garden “waste” and if successful expand to food “waste”

WM-1. Source Reduction and Reuse

STRATEGY DESCRIPTION

The bulk of emissions from the solid waste management sector come from upstream emissions, which are the emissions associated with the manufacture and transport of all the materials within the solid waste stream generated at USFSP. Reducing the total amount of materials entering the waste stream will immediately reduce the amount of campus emissions by reducing the emissions associated with creating the product upstream as well as the emissions associated with managing the product once it becomes waste downstream. Upstream waste reduction tackles a variety of aspects that range anywhere from discouraging users from purchasing new items in the first place, to having a surplus department where excess supplies can be easily exchanged rather than being discarded. In this strategy, because upstream is such a broad term, there are few metric goals.

As with any realm of reducing emissions, the more reduction the better, and until more ample data can be provided, a goal of reducing upstream products as much as possible will be the all-encompassing goal, while the metric goals will need to be established in the next climate action plan after there has been an increase in data collected by the greenhouse gas inventory. Each time a policy, program, or cultural shift is enacted on the campus in regards to the reduction of upstream waste, there should be a corresponding shift seen in the downstream waste management.

STRATEGY DESIGN:

Goals:

WM-1a

- Reduce paper waste 85% by 2025
- Reduce plastic waste 50% by 2035

WM-1b

- Reduce waste upstream emissions 50% by 2035

Timing

- Establish policy to allow students to utilize technology in order to reduce paper consumption by at least 50% by 2020 and at least 85% by 2025 by ensuring that professors allow use of laptops/tablets and other devices for note taking

- Add composting as a recyclable waste stream to overall reduce the amount of food waste by Fall 2017 semester
 - Includes working with Facilities Services towards creating composting sites for soil enrichment and fuel for an anaerobic digester
- Establish a program to capture clothing, household items, furniture, appliances, and other items that departing students leave behind. Items are to be collected, clothing and furniture are donated to local nonprofits, and other items are cleaned and stored in trailers for sale the following semester
 - The first collection should take place at the end of the Spring 2018 semester and the first sale should take place at the start of the Fall 2018 semester
- Create and implement a marketing campaign that informs students of options to purchase things in bulk within the city and surrounding areas by 2020
- Establish a bulk purchasing option for students to use personal containers and purchase bulk quantities within the dining hall by 2020
- Establish policy requiring professors to accept student work electronically when applicable by 2020
- Establish policy of using china and flatware whenever possible to avoid the use of disposables. When disposables must be used, products offered are biodegradable/sustainable products made from paper, corn or potatoes by 2020.
- Establish policy of purchasing 100 percent recycled, non-chlorinated paper products, and purchasing those products, as well as food items and cleaning supplies, in bulk to reduce the quantity of packaging material by 2025
- Ban the sale of any drink sold in a plastic bottle by 2035

Parties Involved

- USFSP Office of Sustainability
- City of St. Petersburg Sanitation Department
- USFSP Facilities Services
- Sodexo Food Services
- Waste Management
- USFSP Dining Services
- USFSP Division of Student Affairs

Implementation Steps

Policy recommendations will be made to the campus leadership team once per semester with quantified data and potential logistics for each policy recommendation.

Estimated GHG Reductions

Estimated GHG reductions for WM-1 are summarized in the table below (Table 4-13). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual

reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

Table 4-13. WM-1 GHG Reductions

WM-1	2025 GHG Reductions (tCO₂e)	2035 GHG Reductions (tCO₂e)	2016 – 2035 Cumulative Reductions (tCO₂e)	2050 GHG Reductions (tCO₂e)
WM-1a Source Reduction and Reuse - Paper and Plastic	717	717	10,907	717
WM-1b Source Reduction and Reuse - Other Waste	0	566	2,711	566
Total	717	1,284	12,034	1,284

Data Sources

Data required assessing the GHG reductions for this strategy all came directly from the baseline and the strategy design. This included the BAU paper and plastic consumption for the campus; and combustion, recycling, and upstream emission factors for paper and plastic. The heat content of waste paper and plastic sent to the WTE plant was obtained from an EIA report (6.7 MMBtu/short ton for paper, 23 MMBtu/short ton for plastic).¹⁸

Quantification Methods

WM-1a. Business as usual campus-wide consumption of paper and plastic and the associated indirect GHG emission values were assembled from the baseline. The estimates of strategy scenario paper and plastic consumption were derived using the strategy targets specified above. For the intervening years between the specified reduction targets, a continued linear ramp-up toward the next future target is assumed. Paper consumption reductions are assumed to begin in 2017 (13%), achieve 50% reduction of baseline consumption in 2020, and then the target of 85% reduction in 2025. Plastic consumption reductions are assumed to begin in 2017 (6%) and then achieve 50% reduction of baseline consumption in 2035. Indirect GHG emissions associated with waste combustion, emissions credits associated with recycling, and upstream GHG emissions associated with production and transportation of paper and plastic are calculated using the same emission factors from EPA's WARM model that were used in developing baseline emission estimates. In addition, source reduction and the subsequent

¹⁸ "More recycling raises average energy content of waste used to generate electricity", U.S. Energy Information Administration, <http://www.eia.gov/todayinenergy/detail.cfm?id=8010>.

reduction in waste disposal reduce the amount of waste available for the WTE plant. The reduction in waste for WTE energy production was assumed to be replaced by natural gas combustion.

The summary table below (Table 4-14) provides results from the analysis. As shown in the final column, full implementation of the strategy is expected to net 717 metric tons of GHG reductions in 2035. Cumulatively from 2016 - 2035, the strategy would reduce nearly 11,000 metric tons of GHG emissions. In 2050, the reductions are expected to remain at 717 tCO₂e, since, as specified in the baseline; campus BAU consumption remains flat after 2020.

Table 4-14. WM-1a BAU Emissions Reduction Timeline

Year	BAU MSW Disposed	BAU Emissions	Strategy Reduction in Consumption	Strategy Scenario Waste Disposed	Strategy Scenario Emissions	Net Change in Emissions
	tons	tCO ₂ e	tCO ₂ e	tons	tCO ₂ e	tCO ₂ e
2016	120	722	0%	120	722	0
2020	141	851	42%	82	494	(357)
2025	163	980	73%	40	263	(717)
2030	163	980	73%	40	263	(717)
2035	163	980	73%	40	263	(717)
2016 - 2035 Cumulative Total	3,062	18,442	59%	1,208	7,536	(10,907)
2050	163	980	73%	40	263	(717)

WM-1b. The upstream emissions remaining after the reductions in paper and plastic from WM-1a was estimated and compared the BAU upstream emissions to determine the additional reductions needed to reach a 50% reduction by 2035. These reductions were assumed to come from the mixed MSW, aluminum, food waste, and cardboard. As shown in the table below (Table 4-15), additional reductions in are not needed in the first few years, because of early reductions in paper and plastic. However, starting in 2027, there will need to be reductions in these other waste categories to stay on track to reach a 50% reduction in upstream emissions by 2035. The net change in emissions includes reductions in upstream emissions, reductions in waste transport emissions, reductions in combustion emissions from waste at the WTE plant, increases in natural gas combustion emissions (required to replace energy production at the WTE plant), and a reduction in the recycling credit from cardboard.

Table 4-15. WM-1b GHG Reduction Emissions Timeline

Year	BAU Waste after WM-1a	BAU Emissions after WM-1a	Reduction required	Strategy Scenario Waste Disposed	Strategy Scenario Emissions	Net Change in Emissions
	tons	tCO ₂ e	tCO ₂ e	tons	tCO ₂ e	tCO ₂ e
2016	382	1,750	0%	382	1,750	0
2020	450	1,736	0%	450	1,736	0
2025	519	1,816	0%	519	1,816	0
2030	519	1,905	16%	437	1,655	(251)
2035	519	1,905	35%	335	1,339	(566)
2016 - 2035 Cumulative Total	9,756	36,711	30%	8,841	35,583	(1,127)
2050	519	1,905	35%	335	1,339	(566)

Key Assumptions

- The reduction paper and plastic consumption was assumed to come proportionally from paper and plastic currently being disposed in MSW and paper and plastic in the recycling stream.
- Reductions in the waste stream going to the WTE plant were assumed to be replaced by natural gas combustion.
- Additional reductions in MSW mass will come from the mixed MSW category (all waste that is not paper/plastic, paper, or food waste).

Additional Benefits

Reductions in product consumption will reduce the costs of campus waste disposal and recycling programs.

Feasibility Issues

In the next greenhouse gas inventory, it is imperative that metrics of the following are obtained:

- Amount of academic course material being printed by faculty, staff, and students, pinpointing paper-intensive courses
- Amount of disposable eating and drink ware being distributed by the dining facility on a daily basis and for special events

- Amount of plastic bottles sold on campus in vending machines and dining halls
- Amount of “waste” that is viable for re-use left behind by students in residence halls at the end of each housing term

WM-2 Increase Solid Waste Recycling

STRATEGY DESCRIPTION

Solid waste recycling is an all-encompassing initiative to overhaul the recycling bin fleet, create educational campaigns to foster a culture that not only welcomes an innovative recycling program, but that sees through to its continued use and expansion. Through the baseline GHG inventory, it was discovered during the solid waste characterization that the amount of recyclable materials ending up in the solid waste stream was overwhelming with almost 50% of the municipal solid waste (MSW) being recyclable products (i.e. 10% Plastic/Aluminum, 20% Compostable, 18% Paper). Also, during the recycling characterization many of the recyclable items ending up in the recycling receptacles either did not belong there or contained waste that contaminated the entire bin. Ultimately, it is necessary to reduce the actual amount of waste being created and brought onto the campus as a whole, however this initiative is substantially more difficult to tackle, and until it is tackled there will continue to be waste on the campus that could be properly recycled.

USFSP will overhaul the university wide recycling efforts by establishing uniform labeling from Recycle Across America. Every receptacle on campus will have clear labels dictating what should be placed into the bin and educational campaigns will be run in an effort to educate students, faculty, and staff about properly using these receptacles. All spaces both indoors and outdoors will have unified recycling readily available. There will be absolutely no stand-alone trash receptacles anywhere on campus, academic classrooms and office spaces included.

The overhaul of the recycling and trash collection points should be completed in phases until the campus is uniform in bins, and then additional phases should begin to remove trash receptacles all together. The integration and educational aspects of this strategy will be key in meeting the goals established.

STRATEGY DESIGN:

Goals

- Reduce recyclable materials from MSW stream entirely by 2025
- Reduce contamination in recycle receptacles entirely by 2025

Timing

- Reduce recyclable materials from MSW stream by a total of at least 58 short tons by 2020

- Reduce Plastic/Aluminum in MSW by at least 50% from the 2014 level to less than 20.6 short tons
- Reduce Plastic/Aluminum in MSW by at least 50% from the 2014 level to less than 21.2 short tons
- Reduce contamination in recycle receptacles from an average of 2.87lbs of MSW per bin by 50% to no more than 1.453lbs per bin by 2020
- The goal of having no more than a negligible amount of recyclable materials from the MSW entirely should be reached by 2025
- The goal of having no contaminating sources entering any recycling bin should be reached by 2025

Parties Involved

- USFSP Facilities Services
- USFSP Sustainability Planner
- Student Green Energy Fund (SGEF)
- University Student Center Residence Hall Staff
- Residence Hall One Staff
- City of St. Petersburg Sustainability Coordinator

Implementation Steps

- Brand a campus wide recycling mascot to aid educational campaigns
- Purchase Recycle Across America receptacle labels and label ALL current receptacles before the Fall 2016 semester
- Current SGEF outdoor recycling bins will be given additional Recycle Across America labeling to add consistency; additional “Future Ready” receptacles will be added across the campus to prevent stand-alone trash receptacles.
- In several phases the recycling access should be updated
 - The first phase will involve labeling current unidentified receptacles as “Recycling” and “Trash” and ensuring that there are no stand-alone trash receptacles inside academic buildings
 - The first phase also includes the introduction of large 96 gallon roll away bins to each floor of each residence hall:
 - Residence Hall One
 - 7 large recycling bins to be added, one to each floor
 - University Student Center Residence Hall
 - 5 large recycling bins to be added, one to each floor
 - New 3rd Hall
 - New hall should have at least 1 large recycling bin on each floor of the hall and be updated to current practices upon coming online
 - All spaces being used for multiple purposes should be appropriately fit with an equal number of recycling bins and trash receptacles so that there are no stand-alone trash receptacles. This spaces include, but are not limited to:

- University Student Center Indoor Dining Hall (Reef)
 - University Student Center Upstairs Common Areas
 - Student Life Center
 - Library
 - Coquina Club
- Academic Building commons areas should be appropriately fit with equal numbers of recycling bins and trash receptacles. These areas include, but are not limited to:
 - Lynn Pippenger Hall (College of Business)
 - Peter Rudy Wallace Center For Teachers
 - Science and Technology Building
 - Davis Hall
 - Coquina Hall
 - Harbor Hall
- Within Classrooms
 - Equal trash and recycling bins should be represented in each room
- Office Spaces
 - Equal trash and recycling bins should be represented in each room
- Administrative Offices
 - Equal trash and recycling bins should be represented in each room
- Connect with and educate maintenance staff to establish a protocol for properly moving recycling and other waste items to the correct mass collection points before 2017
- Notify and educate resident hall assistants during the summer about incoming recycling programs
- Partner with city for an initial mass recycling effort to occur during move-in to prevent the excessive packaging from new residents entering the trash streams
- Establish and maintain a partnership with the city of St. Petersburg
 - Establish mass recycling efforts at the beginning and end of semesters
 - Establish a point of contact with the city/person most able to coordinate a large recycling effort with 4 and 8 cubic ft dumpster size recycling receptacles to be placed near residence halls
 - Determine costs of having the receptacles located on campus for the days of move-in when substantial amounts of packaging materials are typically thrown away--can the quantity of recycled materials be used as a bargaining chip in getting the receptacles placed for free?
 - Ensure that USFSP is consistently able to participate in all recycling innovations established in the city such as single sort recycling.

Expansion (Looking Forward):

- Residents should be provided recycling receptacles and have their recycled materials collected weekly

- Drop off location for commuter students, staff, and faculty, in a drive up fashion to allow for quick drop off of recyclable materials should be established for any campus user that is currently unable to obtain recycling within their residences
- Remove at least 50% of trash receptacles across campus, making recycling the first option and forcing trash to be the most difficult option when putting something into the waste stream
- Provide rinse stations in various locations near prominent recycling centers for users to prevent contamination

Estimated GHG Reductions

Estimated GHG reductions for WM-2 are summarized in the table below (Table 4-16). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e).

Table 4-16. WM-2 GHG Reductions

WM-2	2025 GHG Reductions (tCO₂e)	2035 GHG Reductions (tCO₂e)	2016 – 2035 Cumulative Reductions (tCO₂e)	2050 GHG Reductions (tCO₂e)
WM-2 Increase Solid Waste Recycling	188	188	2,711	188

Data Sources

Data required assessing the GHG reductions for this strategy all came directly from the baseline and the strategy design. This included the BAU paper, plastic, and aluminum disposal for the campus; and combustion and recycling emission factors for paper, plastic, and aluminum. The heat content of waste paper and plastic sent to the WTE plant was obtained from an EIA report (6.7 MMBtu/short ton for paper, 23 MMBtu/short ton for plastic).¹⁹

This policy was quantified assuming concurrent implementation of WM-1 (Source Reduction). Therefore, “BAU” paper and plastic/aluminum disposal in MSW is the estimated amount of paper and plastic/aluminum disposed after WM-1 implementation.

Quantification Methods

¹⁹ “More recycling raises average energy content of waste used to generate electricity”, U.S. Energy Information Administration, <http://www.eia.gov/todayinenergy/detail.cfm?id=8010>

Business as usual campus-wide disposal of paper, plastic, and aluminum and the associated indirect GHG emission values were assembled from the baseline and the results of the WM-1 analysis. The estimates of strategy scenario paper, plastic, and aluminum in MSW were derived using the strategy targets specified above. For the intervening years between the specified reduction targets, a continued linear ramp-up toward the next future target is assumed. Reductions in paper and plastic/aluminum in MSW are assumed to begin in 2017 (13%), achieve 50% reduction of baseline consumption in 2020, and then the target of 100% reduction in 2025. Indirect GHG emissions associated with waste combustion, emissions credits associated with recycling, and upstream GHG emissions associated with production and transportation are calculated using the same emission factors from EPA's WARM model that were used in developing baseline emission estimates. In addition, source reduction and the subsequent reduction in waste disposal reduces the amount of waste available for the WTE plant. The heat content of waste paper and plastic was obtained from an EIA report (6.7 MMBtu/short ton for paper, 23 MMBtu/short ton for plastic).²⁰ The reduction in waste for WTE energy production was assumed to be replaced by natural gas combustion.

The summary table below (Table 4-17) provides results from the analysis. As shown in the final column, full implementation of the strategy is expected to net 188 metric tons of GHG reductions in 2035. Cumulatively from 2016 - 2035, the strategy would reduce slightly more than 2,700 metric tons of GHG emissions. In 2050, the reductions are expected to remain at 188 tCO₂e, since, as specified in the baseline; campus BAU consumption remains flat after 2020. The reductions for this policy are relatively low because the amounts of paper and plastic in the waste stream are already assumed to have been significantly reduced through implementation of WM-1.

Key Assumptions

- It was assumed that all plastic in the plastic/aluminum category of the baseline inventory is recyclable and that all non-recyclable plastic was captured in the "mixed MSW" category
- The plastic/aluminum category was assumed to be 75% plastic, consistent with the baseline inventory
- Reductions in the waste stream going to the WTE plant were assumed to be replaced by natural gas combustion

Additional Benefits

Creating an atmosphere that makes recycling just as easy as putting things into the trash will engrain the idea that recycling is not a more strenuous option. Students, staff, and faculty can translate this idea into their homes and aid in recycling efforts across the city. With reduced

²⁰ "More recycling raises average energy content of waste used to generate electricity", U.S. Energy Information Administration, <http://www.eia.gov/todayinenergy/detail.cfm?id=8010>.

trash on the campus, it reduces the need for emissions producing MSW trucks to visit the campus as often as they currently do and may reduce the number of dumpsters located on our campus all together.

Table 4-17. WM-2 Emissions Reduction Timeline

Year	BAU MSW Disposed (after WM-1)	BAU Emissions	Strategy Reduction in Consumption	Strategy Scenario Waste Disposed	Strategy Scenario Emissions	Net Change in Emissions
	tons	tCO ₂ e	tCO ₂ e	tons	tCO ₂ e	tCO ₂ e
2016	120	78	0%	120	78	0
2020	88	71	50%	44	(87)	(158)
2025	52	52	100%	0	(136)	(188)
2030	52	52	100%	0	(136)	(188)
2035	52	52	100%	0	(136)	(188)
2016 - 2035 Cumulative Total	1,387	1,043	66%	478	(1,668)	(2,711)
2050	52	52	100%	0	(136)	(188)

Feasibility Issues

The cost of overhauling the recycling program utilizing Recycle Across America labels is going to cost roughly \$1500-\$2000 in just the labels, assuming that we are able to put these labels onto the receptacles the campus already owns. If new receptacles need to be purchased, that will need to be assessed and will also come at a cost depending on how many receptacles and what size receptacles we need to purchase. It is estimated that we will spend nearly \$25,000-\$30,000 on purchasing new recycling bins for both indoor and outdoor areas on campus. The man-power of re-labeling receptacles would be a onetime effort and will take several hours to complete. Placing the receptacles will need to consider student traffic and observing whether receptacles are being over or under whelmed on a daily basis which may take a few weeks to months in order to track and respond. Custodial staff will also have to be effectively trained in order to ensure the student effort to recycle is not diminished downstream.

WM-3a. Composting: Food Waste

STRATEGY DESCRIPTION

With approximately 650 students living on campus and the promise of at least one additional residence hall, the majority of residents are consuming all of their meals at the dining hall on campus, or within their residence halls. The dining hall is open to the public, so even those that are not living on the campus are consuming food and subsequently producing food waste being disposed on the campus. Despite being a primarily commuter campus, many faculty, staff, and students also bring their own food from outside sources whether that be from home or food establishments, again, leaving the hands of the consumer and entering the waste stream on the campus.

Much of this organic waste can be diverted from inefficient end points by being composted. In the baseline 2014, 82.5 short tons of organic materials were measured in the MSW waste stream, and are estimated to continue to rise as the campus population increases and more resident students are established. Diverting organic materials, specifically food waste, to composters will eliminate a substantial portion of waste being taken to landfills, and also will act as a carbon sequestration.

WM-3b. Composting: Yard Waste

STRATEGY DESCRIPTION

Fortunate enough to be nestled alongside a prominent waterfront and bustling downtown, USFSP has landscaped itself into a beautiful green space to provide a relaxing refuge for students, staff, faculty, and community as they embark on academic endeavors of the university. With a pristinely landscaped campus comes yard waste removed on a regular basis. This yard waste is currently collected in a truck with a flatbed trailer. This method will be used over time, and the removal of yard waste is a necessary point of maintaining the campus. Because yard waste itself cannot simply be eliminated, it should be composted and diverted from landfills as best as possible. As of right now, this is being done in a mulching fashion rather than completely composting it. Approximately 296 short tons of yard waste are collected and mulched each year, which is only transported 6 miles to be taken to a storage area where it is mulched. This process is currently not emitting any emissions; rather it has a net emission of $-0.12 \text{ tCO}_2\text{e/short ton waste}$. This means that it is capturing more carbon than it is emitting.

The emission of carbon from this process is in the short drives that occur to drop the yard waste off. This can be improved by moving the process onto the campus, however this sort of an improvement would require a commercial grade wood chipper and composter, time and energy to be properly utilized, and the costs of this are incredibly difficult to justify given the efficiency of the currently established practice. Therefore, this practice should be continued and if improved via either more efficient transportation methods or increase in yard waste being mulched by decreasing the use of herbicides which prevents yard waste from being viable for mulching. This

strategy should be further explored if a digester is brought onto campus for other purposes such as food composting.

It is imperative that the next GHG inventory includes metrics about the amount of yard waste that is actually being mulched or composted, and if any of the waste that is transported is being re-routed due to being non-viable from herbicides or any other notable reason.

STRATEGY DESIGN

Goals

- Divert at least 90% of organic materials to composting facilities (on and off campus) by 2030

Timing

- Establish a relationship with a composting facility, preferably with the city of St. Petersburg, and create a feasible plan to introduce composting to the campus by 2018
- Divert at least 25% of organic wastes to composting facilities by 2020
- Divert at least 50% of organic wastes to composting facilities by 2025
- Divert at least 90% of organic wastes to composting facilities by 2035

Parties Involved

- Campus dining facilities
- City of St. Petersburg
- Local farmers
- Mulching & Composting companies
- USFSP Facilities Services

Implementation Steps

- Establish a relationship with a composting facility, preferably through the city of St. Petersburg, and create a plan to introduce composting to the campus
- Obtain compost collection bins and strategically place them across campus with uniform signage for ease of understanding amongst campus users
- Create and implement a marketing plan to educate all campus users about composting
- Require all dining vendors on campus to compost their unused and leftover organic materials
- Determine the reasons campus users are not composting and make improvements and modifications to the program and marketing to ensure optimal use of the composting program
- Obtain and continuously use an anaerobic biodigester to convert organic waste into biogas to be used for other energy measures

Expansion

If it becomes feasible in cost and space, expansion of the composting strategy would ideally consist of moving some if not all of the composting operations onto the campus. This requires both space, equipment, and maintenance staff will need to be educated and have dedicated personnel to maintaining the composting site.

Estimated GHG Reductions

Estimated GHG reductions for WM-3 are summarized in the table below (Table 4-18). Annual reductions for 2025 and 2035 are followed by the estimated cumulative reductions through 2035. Due to the greater levels of uncertainty in long-term estimates, the potential annual reductions in 2050 are reported separately. All values are reported in metric tons (t) of carbon dioxide equivalent (CO₂e). As shown in the table, this strategy results in a very small benefit, because the GHG benefits of composting food waste is only slightly better than the benefit of combusting the food waste to create electricity at the WTE plant.

Reductions in GHG emissions were not quantified for WM-2b, because the differences in emissions between composting of yard waste and the current mulching system are not expected to be significant.

Table 4-18. WM-3 (a & b) GHG Reductions

WM-3	2025 GHG Reductions (tCO ₂ e)	2035 GHG Reductions (tCO ₂ e)	2016 – 2035 Cumulative Reductions (tCO ₂ e)	2050 GHG Reductions (tCO ₂ e)
WM-3a Food Waste	0.3	0.3	5	0.3
WM-3b Yard Waste	<i>Not quantified</i>			

Data Sources

Data required assessing the GHG reductions for this strategy all came directly from the baseline and the strategy design. This included the BAU food disposal for the campus and combustion emission factors. Composting emission factors for food waste was taken from EPA's WARM model.²¹ The heat content of food waste sent to the WTE plant was obtained from an EIA report (5.2 MMBtu/short ton).²²

²¹ U.S. EPA, Composting, <https://www3.epa.gov/warm/pdfs/Composting.pdf>.

²² "More recycling raises average energy content of waste used to generate electricity", U.S. Energy Information Administration, <http://www.eia.gov/todayinenergy/detail.cfm?id=8010>.

Quantification Methods

Business as usual campus-wide disposal of compostable materials in MSW and the associated indirect GHG emission values were assembled from the baseline. The estimates of strategy scenario food waste in MSW were derived using the strategy targets specified above. For the intervening years between the specified reduction targets, a continued linear ramp-up toward the next future target is assumed. Reductions in food waste in MSW are assumed to begin in 2017 (6%), achieve 25% reduction of baseline consumption in 2020, 50% reduction in 2025 and then the target of 90% reduction in 2030. Indirect GHG emissions associated with waste combustion, emissions credits associated with composting, and upstream GHG emissions associated with production and transportation are calculated using the same emission factors from EPA's WARM model that were used in developing baseline emission estimates. In addition, source reduction and the subsequent reduction in waste disposal reduces the amount of waste available for the WTE plant. The reduction in waste for WTE energy production was assumed to be replaced by natural gas combustion.

The summary table below (Table 4-19) provides results from the analysis. As shown in the final column, full implementation of the strategy is expected to result in a slight reduction of 0.5 tCO₂e in 2035. Cumulatively from 2016 - 2035, the strategy would reduce emissions by 6 metric tons of GHG emissions. In 2050, the reduction is expected remain at 0.5 tCO₂e, since, as specified in the baseline, campus BAU consumption remains flat after 2020.

Table 4-19. WM-3 Emissions Reduction Timeline

Year	BAU Compostable Disposed (after WM-1)	BAU Emissions	Strategy Reduction in Compostables in MSW	Strategy Scenario Compostables Disposed	Strategy Scenario Emissions	Net Change in Emissions
	tons	tCO ₂ e	tCO ₂ e	tons	tCO ₂ e	tCO ₂ e
2016	86	3.5	0%	86	3.5	0.0
2020	102	4.1	25%	76	4.0	(0.1)
2025	117	4.8	50%	59	4.5	(0.3)
2030	99	4.0	90%	10	3.6	(0.4)
2035	76	3.1	90%	8	2.7	(0.3)
2016 - 2035 Cumulative Total	2,000	81	53%	933	76	(5)
2050	76	3.1	90%	8	2.7	(0.3)

Key Assumptions

- Reductions in the waste stream going to the WTE plant were assumed to be replaced by natural gas combustion.
- Emissions associated with transporting waste to the WTE plant and transporting waste to a composting facility were assumed to be the same.

Additional Benefits

With the establishment of a campus wide composting program, campus users become familiar with the process involved in composting while the campus serves as a test point for the city to implement a city-wide composting program. This program can strengthen the partnership between the city and the university.

Feasibility Issues

The most prominent feasibility issue will be long term financing once it is established with whom the campus will compost with and creating a dynamic agreement that allows for the campus to grow in its efforts as well as be supported by the composting facility. The next feasibility issue comes with obtaining proper composting bins that are easy to use and training facilities staff to properly handle the material. For the next GHG inventory, it is imperative that data regarding the amount of organic waste disposed of by all campus users be included in the study for enhancement of future sustainable waste implementations.

WM-4. Future Mitigation Strategies

The following initiatives are suggestions for consideration in the next update in the Climate Action Plan:

- Obtain a campus anaerobic biodigester
 - This will help recycle compostable and organic food matter by breaking it down and using the biogas for heating potential
 - The water can be used as fertilizer or discharged safely in sewage
- Reusable containers, cups, and bottles
 - Eliminating disposable plastic, glass, and aluminum bottles and containers by encouraging and providing individuals with personalized bottles
- Adding compost to the required wastestream
 - Eliminate the amount of food waste sent to the landfill
 - Can be used for fertilizer at garden locations such as the Food Forest
 - Can be used in conjunction with the anaerobic biodigester

5. Indirect Mitigation Strategies

Most of the credit for this particular section goes to the Association for the Advancement of Sustainability in Higher Education (AASHE),²³ for the criteria they set for institutional leadership in mitigating climate change. Several of the sections below are direct reflections of AASHE's criteria that they set for STARS reporting.²⁴ The indirect strategy categories are Education (ED), Research (R), Campus Education (CE), and Public Education (PE).

Table 5-1. Indirect CAP Strategies

ID	Indirect CAP Strategy
ED-1	Improve Sustainability Curriculum
ED-2	Offer more Immersive Experiences
ED-3	Enhance the Campus as a Living Laboratory
ED-4	Provide Sustainability Literacy Assessment
R-1	Inventory of Faculty Sustainability Research
R-2	Enhance Support for Research
CE-1	Assess Sustainability Culture
CE-2	Sustainability at Student Orientation
CE-3	Create Student Educators Program
CE-4	Enhance Outreach Materials and Publications
CE-5	Hold Outreach Campaigns
CE-6	Create Employee Educators Program
CE-7	Green Office Certification Programs
CE-8	Sustainability in New Employee Orientation
CE-9	Employee Professional Development

²³ <http://www.aashe.org/>

²⁴ <https://stars.aashe.org/>

ID	Indirect CAP Strategy
PE-1	Community Partnerships
PE-2	Improve Inter-Campus Collaboration
PE-3	Improve Continuing Education
PE-4	Community Service
PE-5	Participation in Public Policy

Although the direct strategies discussed throughout this report are critically important in reducing USFSP's environmental impact, they are by no means the only strategies that should be implemented. The following topics are considered indirect strategies because they don't have detailed and estimated emissions reductions like the direct strategies do. Instead these strategies help generate awareness, knowledge, and ideas needed to create a culture that is engaged in protecting the environment and creating a just and sustainable society for all. These indirect strategies will help create a conscious culture at USFSP, making the implementation of the direct strategies easier as there will be more campus-wide support and awareness. Thus, indirect mitigation strategies play a vital role in the long-term outlook of this report, overall emissions reductions, and the future of sustainability at USFSP and the city of St. Petersburg.

5.1 Education (ED)

Despite the fact that USFSP fosters higher education in several different disciplinary fields, sustainability-focused education is currently lacking and there is plenty of room for improvement. In accordance with the latest AASHE-STARS report, USFSP received only six of nineteen potential points for sustainability curriculum. There are no major, minor, or certification programs designed for sustainability studies, and few if any sustainability courses are offered in all three colleges. In 2008, a campus subcommittee consisting of faculty members from the different colleges (i.e. College of Business, College of Arts and Sciences, College of Education), along with administrative staff, and both graduate and undergraduate students developed a five year strategic plan for the integration of environmental stewardship into USFSP's campus core and curriculum. Although certain goals were met from the report, the main bulk of enhancing the curriculum failed to be addressed. That report needs to be revisited, revised and established as a key document along with this CAP towards enhancing sustainability education.

In 2013, a research study spearheaded by Dr. Anna Lewis evaluated current USFSP coursework and found several courses in the College of Business, College of Education, and College of Arts & Sciences that could easily include sustainability topics and overall improve sustainability-related education for students and faculty. One of the main recommendations in relation to this finding was to develop sustainability programs that utilize cross-disciplinary

coursework, to enhance holistic education for students. A majority of professors agreed that cross-disciplinary sustainability courses should be offered to students; however, 67% said they wouldn't personally create or implement sustainability into their own teachings. To add, only 39% of professors said they would actively engage in a sustainability-focused workgroup.

This data conflicts with the student focus group, in which 96% of students felt that a cross-disciplinary sustainability program should be implemented at USFSP. A majority of them said that they didn't know much about sustainability, but would like to learn more. Furthermore, 45% of students said they would enroll in a sustainability-specific course (important to note, the numbers were lower for students about to graduate vs. freshman/sophomores who were undeclared). Thus, there is a clearly an opportunity to enhance sustainability education at USFSP, which in turn will create a campus culture of environmental stewards who are conscious about minimizing their ecological footprint.

“One of the primary functions of colleges and universities is to educate students. By training and educating future leaders, scholars, workers and professionals, higher education institutions are uniquely positioned to prepare students to understand and address sustainability challenges. Institutions that provide sustainability education help equip their students to lead society to a sustainable future.”

- AASHE STARS

ED-1. Improve Sustainability Curriculum

STRATEGY DESCRIPTION

Sustainability curriculum can provide valuable grounding in the concepts and principles of sustainability, help build knowledge about a component of sustainability, or introduce students to sustainability concepts. Institutions that integrate sustainability concepts throughout the curriculum prepare students to apply sustainability principles in their professional fields. Having sustainability courses and content offered by numerous colleges and departments helps ensure that the institution's approach to sustainability education is comprehensive and includes diverse topics. This will increase student exposure to different sustainability topics and themes, allowing students to develop a broad understanding of the field. The following goals and strategies all aim to help improve sustainability curriculum from different angles.

Improve Sustainability Course Inventory: Conducting an inventory of academic offerings provides an important foundation for advancing sustainability curriculum. It provides a baseline for understanding current offerings and can help institutions identify strengths and opportunities for growth. In addition, a list and description of sustainability courses and other courses that include sustainability helps current and prospective students find and understand sustainability course offerings, which can assist them in organizing their academic studies.

Include Sustainability in Learning Outcomes: Learning outcomes help students develop specific sustainability knowledge and skills and provide institutions and accrediting bodies with

standards against which to assess student learning. While they do not necessarily have to use the term “sustainability”, learning outcomes must collectively address sustainability as an integrated concept having social, economic, and environmental dimensions.

Create Incentives for Developing Courses USFSP should offer incentives to help faculty expand sustainability course offerings. Providing release time, funding for professional development, trainings, and other incentives can help faculty broaden and deepen sustainability curriculum. Faculty members often need these incentives to determine how best to include sustainability in their courses. Providing such incentives lends institutional support to increased sustainability course offerings.

STRATEGY DESIGN:

Goals

- Conduct an inventory of all courses identifying ones that include sustainability and make it public by 2017
- Incorporate Sustainability component in General Education Curriculum by 2018
- Create a Sustainability course that is required as a General Education course by 2020 (i.e. Intro to Sustainability 101)
- Establish an ongoing program or programs that offer incentives for all faculty to develop new sustainability courses and/or incorporate sustainability into existing courses by 2022
- Include sustainability outcomes in 75% of all courses by 2025
- Create Cross-College/Interdisciplinary Degree program in Sustainability by 2025

Timing

- Sustainability Workgroup established and holding meetings by end of 2016
- Complete draft inventory of all Courses that include Sustainability by end of 2016
- Increase sustainability specific and related courses by 2018
- Offer at least one required sustainability course in each College by 2020
- Offer an Interdisciplinary Sustainability minor by 2022

Parties Involved

- Kate Tiedemann College of Business, College of Education, College of Arts & Sciences
- USF Tampa's Patel College of Global Sustainability
- USF Tampa's College of Marine Science
- USFSP Office of Sustainability

Feasibility Issues

- Creating sustainability courses will entail hiring new faculty to teach these courses
- Getting current faculty to develop sustainability courses will be a challenge
- Working with the Patel College of Global Sustainability and the College of Marine Science will be limited for offering coursework because they are separately accredited (i.e. part of USF Tampa)
- Obtaining desirable amount of students willing to take sustainability courses

ED-2. Offer More Immersive Experiences**STRATEGY DESCRIPTION**

Sustainability related immersive experiences such as community-based internships and “study abroad” programs give students the opportunity to witness and learn in-depth about sustainability challenges and solutions. These programs provide a memorable way for students to deepen and expand their knowledge of sustainability. The programs should be one week or more in length and may take place off-campus, overseas, or on-campus. The programs will concentrate on sustainability, including its social, economic, and environmental dimensions; And/or examine an issue or topic using sustainability as a lens.

STRATEGY DESIGN:***Goals***

- Provide at least one sustainability related immersive experience per College per year by 2020

Timing

- Provide at least one sustainability related immersive experience by any college per year by 2017
- Provide at least one sustainability related immersive experience by any two colleges per year by 2018

Parties Involved

- USFSP Education Abroad
- USFSP Office of Sustainability
- Division of Student Affairs
- Division of Academic Affairs
- College of Education, College of Arts & Sciences, College of Business

ED-3. Enhance the Campus as a Living Laboratory**STRATEGY DESCRIPTION**

USFSP should utilize its infrastructure and operations as living environments for multidisciplinary learning and applied research that helps understand campus sustainability challenges and helps advance sustainability on campus. This includes substantive work by students and/or faculty that involves active and experiential learning (e.g. class projects, thesis projects, term papers, published papers). Students that actively participate in making their campuses more sustainable are well prepared to continue that work in their careers and communities after graduation.

STRATEGY DESIGN:**Goals**

- Students and/or faculty are using the campus as a Living Laboratory (LL) in all of the following fourteen areas by 2025:
 - Air & Climate, Buildings, Energy, Food & Dining, Grounds, Purchasing, Transportation, Waste, Water, Coordination & Planning, Diversity & Affordability, Investment, Public Engagement, Wellbeing & Work

Timing

- Students and/or faculty use the campus as a LL in researching at least four of the above areas by 2018
- Students and/or faculty use the campus as a LL in researching at least six of the above areas by 2020
- Students and/or faculty use the campus as a LL in researching at least ten of the above areas by 2022

Parties Involved

- College of Business, College of Education, and the College of Arts & Sciences
- USFSP Office of Sustainability
- NOAA
- USF College of Marine Sciences
- USF Tampa & USF Sarasota-Manatee
- PCGS
- FWC
- USGS
- Eckerd College
- St. Pete College
- University of Tampa

ED-4. Provide Sustainability Literacy Assessment**STRATEGY DESCRIPTION**

Such an assessment helps institutions evaluate the success of their sustainability education initiatives and develop insight into how these initiatives could be improved. The sustainability literacy assessment focuses on knowledge of sustainability topics and challenges

STRATEGY DESIGN:**Goals**

- Provide Sustainability Literacy Assessment to all students during their first year (i.e. Freshman class) and before their graduation (i.e. Senior class) by 2025

Timing

- Provide a Sustainability Literacy Assessment to a controlled group of incoming students and graduating students by Spring 2017
- Provide an optional Sustainability Literacy Assessment to all students by 2019
- Provide a Sustainability Literacy Assessment to all incoming freshman and transfer students by 2022
- Provide a Sustainability Literacy Assessment to all graduating students by 2022

Parties Involved

- Division of Student Affairs
 - Office of Admissions
 - Office of Marketing and Enrollment
 - New Student Orientation Leader
- Office of Graduate Affairs
- USFSP Office of Sustainability

5.2 Research (R)

Within the last ten years, the USF System has grown to be a nationally recognized public research institution. In fact, the University of South Florida ranks in the top ten globally for research patents. To add, in the 2014 fiscal year, the USF System had over \$488.6 million in research expenditures. Recently, USFSP has been involved in some ground-breaking research including the discovery of the oldest African genome, which will be useful for analyzing human traits in relation to past environments. As well as a research study of conducting statistical analyses of energy production for our 100 kW solar panels located on our 5th avenue parking structure, which will be presented at the 2016 International Conference on Energy Sustainability in Paris, France. Both of these research studies not only highlight nationally recognized breakthroughs for USFSP but also demonstrate the possibility for enhanced sustainability research.

With a globalized focus on climate change and sea level rise, universities all over the world are expanding their research towards focusing on these pressing issues. This creates an incentive for USFSP to join in this research, not only to contribute to findings, but potentially unlocking scientific solutions towards mitigating the effects of climate change. Because of research breakthroughs, the USF System increased its research expenditures by 6.4 percent, \$29.2 million, from 2013 to 2014. This example highlights the importance of conducting research in relation to capital investments. Thus, enhancing sustainability-related research will likely generate future investments into projects focusing on clean energy, resource conservation, and social responsibility; which in turn will help with the enhancement of curriculum (4.1 Education).

There are several opportunities to enhance sustainability research at USFSP, especially because of the campus' geographical location. Within walking distance of campus is the National Oceanic & Atmospheric Administration (NOAA), U.S. Geological Survey (USGS), Florida Fish & Wildlife Conservation Commission (FWC), and USF Tampa's College of Marine Science all of whom should be considered important sustainability research partners for USFSP. The campus sits along Bayboro Harbor in the Gulf Coast region of Florida, home to rich marine and wildlife biodiversity, thriving wetlands and estuaries, and dense tree canopies. This region is also extremely vulnerable to intense hurricanes, floods, and sea level rise, thus making the case that USFSP should be a Gulf Coast leader in mitigation and adaptation research.

“Conducting research is a major function of many colleges and universities. By researching sustainability issues and refining theories and concepts, higher education institutions can continue to help the world understand sustainability challenges and develop new technologies, strategies, and approaches to address those challenges.”

-AASHE STARS

R-1. Inventory of Faculty Sustainability Research

STRATEGY DESCRIPTION

Improve Inventory of all faculty conducting sustainability research and make it public
 Conducting an inventory of an institution's sustainability research can serve as a valuable first step in identifying strengths and areas for development. Likewise, since sustainability requires collaboration that transcends traditional disciplines, conducting an inventory can help connect individuals, laboratories, research centers, and other campus community members with a shared interest in sustainability.

STRATEGY DESIGN:

Goals

- Complete inventory of all faculty conducting sustainability research and make it public on the USFSP Sustainability website by the end of 2017

Timing

- Send out mass emails to all faculty identify any that are conducting sustainability-related research by Fall 2016
- Identify faculty currently conducting sustainability research by Spring 2017
- Identify faculty that will in the near future, or previously, conduct sustainability research by Spring 2017

Parties Involved

- College of Arts & Sciences
- USFSP Office of Sustainability
- Kate Tiedemann College of Business
- College of Education
- Faculty Research Council
- Regional Vice Chancellor for Academic Affairs

R-2. Enhance Support for Research

STRATEGY DESCRIPTION

Providing support and incentives demonstrates that sustainability is an institutional priority and can help deepen students' understanding of sustainability issues and attract new researchers to the field. In addition, it helps faculty members explore new areas and encourages broader research on the topic. Addressing sustainability challenges requires solutions and understandings that often cover multiple academic disciplines. Giving interdisciplinary research equal weight as research from a single academic discipline provides an important foundation

that allows faculty to pursue sustainability related research. Thus, creating programs to encourage students and faculty members to research sustainability.

- An ongoing program to encourage students in multiple disciplines or academic programs to conduct research in sustainability. The program provides students with incentives to research sustainability. Such incentives may include, but are not limited to, fellowships, financial support, and mentorships. The program specifically aims to increase student sustainability research.
- An ongoing program to encourage faculty from multiple disciplines or academic programs to conduct research in sustainability topics. The program provides faculty with incentives to research sustainability. Such incentives may include, but are not limited to, fellowships, financial support, and faculty development workshops. The program specifically aims to increase faculty sustainability research.
- Formally adopted policies and procedures that give positive recognition to interdisciplinary, transdisciplinary, and multidisciplinary research during faculty promotion and/or tenure decisions.
- Ongoing library support for sustainability research and learning in the form of research guides, materials selection policies and practices, curriculum development efforts, sustainability literacy promotion, and e-learning objects focused on sustainability.

STRATEGY DESIGN:

Goals

- Create an ongoing program that provides students and faculty with incentives to research sustainability established by 2020
- Formally adopted policies and procedures that give positive recognition to interdisciplinary, transdisciplinary, and multidisciplinary research during faculty promotion and/or tenure decisions established by 2020
- Establish formal partnerships with surrounding research institutions by 2020
- Identify outside grant opportunities for sustainability research by 2017

Timing

- Create a yearly inventory of research, grants, and scholarships focused on sustainability-related topics by Spring 2017
- Establish and facilitate interdisciplinary grant writing workshops by Spring 2019
- Build a network of researchers both on campus and indirectly by Spring 2020
- Work closely with the USFSP research office to create funding opportunities for an interdisciplinary sustainability research agenda by Spring 2020

Parties Involved

- Kate Tiedemann College of Business, College of Education, and the College of Arts & Sciences
- USFSP Office of Sustainability
- NOAA
- USF College of Marine Sciences

- USF Tampa & USF Sarasota-Manatee
- PCGS
- FWC
- USGS
- Eckerd College
- St. Pete College
- University of Tampa

5.3 Campus Engagement (CE)

Institutions should provide their students with sustainability learning experiences outside the formal curriculum. Engaging in sustainability issues through co-curricular activities allows students to deepen and apply their understandings of sustainability principles. Institution-sponsored co-curricular sustainability offerings, often coordinated by student affairs offices, help integrate sustainability into the campus culture and set a positive tone for the institution.

Institutions should also support faculty and staff engagement, training, and development programs in sustainability. Faculty and staff members' daily decisions impact an institution's sustainability performance. Equipping faculty and staff with the tools, knowledge, and motivation to adopt behavior changes that promote sustainability is an essential activity of a sustainable campus.

CE-1. Assess Sustainability Culture

STRATEGY DESCRIPTION

Institutions should conduct an assessment of campus sustainability culture. The cultural assessment focuses on sustainability values, behaviors and beliefs, and may also address awareness of campus sustainability initiatives. Such assessments help institutions evaluate the success of their sustainability outreach and education initiatives and develop insight into how these initiatives could be improved.

STRATEGY DESIGN:

Goals

- Provide Ongoing Sustainability Culture Assessment by Spring 2018

Timing

- *Crow's Nest*, campus newspaper, conducts article about different sustainability efforts on campus by Winter 2016
- Conduct a small survey regarding sustainability culture assessment to willing students and staff by Spring 2017
- Conduct a sustainability culture assessment to graduating students by April 2017
- Conduct a large open-ended sustainability culture assessment by Summer 2017
- Implement sustainability assessment testing to all graduating and incoming freshman by Winter 2017

Parties Involved

- USFSP Education Abroad
- USFSP Office of Sustainability
- Division of Student Affairs

- Office of Admissions
- Office of Marketing and Enrollment
- New Student Orientation Leader
- Office of Graduate Affairs
- Division of Academic Affairs
- College of Education, College of Arts & Sciences, Kate Tiedemann College of Business

CE-2. Sustainability at Student Orientation

STRATEGY DESCRIPTION

New students need to be made aware of sustainability efforts and cultural norms that occur on campus. This includes educating them about sustainability standards such as recycling, climate commitments, curriculum, clubs, initiatives, etc. By educating new students at orientation, the university is instilling knowledge and sustainability culture into a new era of students, as well as helping retain potential innovative students who can further campus sustainability projects.

STRATEGY DESIGN:

Goals

- Include Sustainability Component at New Student Orientation by Spring 2017

Timing

- Develop sustainability presentation for orientation Summer 2016
- Present sustainability presentation to new and transfer students during orientation beginning Summer 2016
- Mandatory sustainability presentation at each and every new student orientation by Winter 2016

Parties Involved

- USFSP Office of Sustainability
- Division of Student Affairs
 - Office of Admissions
 - Office of Marketing and Enrollment
 - New Student Orientation Leader

CE-3. Create Student Educators Program

STRATEGY DESCRIPTION

Create programs that engage students to serve as educators in peer-to-peer sustainability outreach. Such initiatives, sometimes known as "Eco-Reps" programs, help disseminate

sustainability concepts and a sustainability ethic throughout the campus community. In addition, serving as an educator is a valuable learning experience for students that can deepen their understanding of sustainability while developing their outreach, education and leadership skills.

Coordinate an ongoing peer-to-peer sustainability outreach and education program for students enrolled for credit:

1. Selects or appoints students to serve as peer educators and formally designates the students as educators (paid and/or volunteer)
2. Provides formal training to the student educators in how to conduct peer outreach
3. Supports the program with financial resources (e.g. by providing an annual budget) and/or administrative coordination by faculty or staff

STRATEGY DESIGN:

Goals

- Create an ongoing peer-to-peer sustainability outreach and education program for students enrolled for credit by 2020

Timing

- Work with faculty to identify student sustainability leaders by 2017
- Sustainability leaders work with the Office of Sustainability and sustainability clubs to developing a sustainability education and outreach program with instructors by 2018
- Pilot a sustainability outreach and education program, using existing sustainability student leaders, for particular classes by 2019

Parties Involved

- USFSP Office of Sustainability
- Division of Academic Affairs
- College of Education, College of Arts & Sciences, Kate Tiedemann College of Business

CE-4. Enhance Outreach Materials and Publications

STRATEGY DESCRIPTION

Produce outreach materials and publications that enhance student learning about sustainability outside of the formal classroom

STRATEGY DESIGN:

Goals

- Create a vehicle to publish and disseminate student research on sustainability by 2018
- Create a sustainability walking map in 2017

- Create a guide for green living and/or incorporating sustainability into the residential experience by 2018

Timing

- Create a yearly inventory of research, grants, and scholarships focused on sustainability-related topics by Spring 2017
- Incorporate Google Maps with USFSP Sustainability website for walking map by Spring 2017
- Incorporate on campus website and educate students about benefits of living in LEED certified buildings and nearby green living complexes by 2017

Parties Involved

- USFSP Office of Sustainability
- Division of Student Affairs
- College of Education
- College of Arts & Sciences
- Kate Tiedemann College of Business

CE-5 Hold Outreach Campaigns

STRATEGY DESCRIPTION

Institutions should hold sustainability outreach campaigns that yield measurable, positive results in advancing the institution's sustainability performance (e.g. a reduction in energy or water consumption). Campaigns engage the campus community around sustainability issues and can help raise student and employee awareness about sustainability. In addition, campaigns encourage students and employees to adopt or try sustainable practices and lifestyles.

Institution holds at least one sustainability-related outreach campaign directed at students and employees that yields measurable, positive results in advancing sustainability. The sustainability-related outreach campaign may be conducted by the institution, a student organization, by students in a course, or by an employee organization.

Campaign could take the form of a competition (e.g. a residence hall conservation competition), a rating or certification program (e.g. a green dorm or green office rating program), and/or a collective challenge (e.g. a campus-wide drive to achieve a specific sustainability target). A single campus-wide campaign may meet the criteria for both parts of this credit if educating students is a prime feature of the campaign and it is directed at both students and employees. To measure if a campaign yields measurable, positive results, institutions should compare pre-campaign performance to performance during or after the campaign.

STRATEGY DESIGN:

Goals

- Hold at least two sustainability outreach campaigns per year starting in 2020

Timing

- Hold first ever “Sustainability in Higher Education” Summit for all educational systems in the area in Spring 2017
- Hold first ever “Regional Planning” Sustainability Summit for all regional stakeholders identifying sustainable initiatives in Spring 2017
- Make these summit’s annual events reoccurring in Spring 2018
- Hold a Spring and Fall campaign event in 2019

Parties Involved

- College of Business, College of Education, and the College of Arts & Sciences
- USFSP Office of Sustainability
- NOAA
- USF College of Marine Sciences
- USF Tampa & USF Sarasota-Manatee
- PCGS
- FWC
- USGS
- Eckerd College
- St. Pete College
- University of Tampa
- City of St. Petersburg
- Tampa Bay Regional Planning Council
- City of Tampa
- Tampa Bay Trane
- City of Clearwater
- Duke Energy
- Tampa Electric Company
- United Nations Tampa Bay Association

CE-6 Create Employee Educators Program**STRATEGY DESCRIPTION**

Coordinate programs in which faculty and staff members educate and mobilize their peers around sustainability initiatives and programs.

Engaging faculty and staff in peer educator roles can help disseminate sustainability messages more widely and encourage broader participation in sustainability initiatives.

Institution administers or oversees an ongoing staff/faculty peer-to-peer sustainability outreach and education program that meets the following criteria:

- Employee sustainability educators are formally designated and receive formal training or participate in an institution-sponsored orientation to prepare them to conduct peer outreach to other employees;
- The institution supports the program with financial resources (e.g. by providing an annual budget) and/or administrative coordination by staff or faculty; and
- The peer educators represent diverse areas of campus; the outreach and education efforts of sustainability staff or a sustainability office do not count in the absence of a broader network of peer educators.

This credit recognizes ongoing programs that engage employees as peers on a regular basis. For example, employee educators may represent or be responsible for engaging workers in certain departments or buildings. Thus, a group of employees may be served (i.e. directly targeted) by a program even if not all of these employees actively participate

STRATEGY DESIGN:

Goals

- Establish Employee Educators Program by 2018

Timing

- Identify opportunities to educate employees about sustainable practices by 2017
- Establish optional sustainability workshops for employees by Fall 2017
- Incorporate sustainability into department meetings by Fall 2017

Parties Involved

- USFSP Office of Sustainability
- USFSP Human Resources
- USFSP Facilities Services
- USFSP Administrators, Faculty, & Staff

CE-7 Green Office Certification Programs

STRATEGY DESCRIPTION

Employees, offices, and departments who incorporate sustainable practices into their daily operations should be recognized for their exemplary leadership.

STRATEGY DESIGN:

Goals

- Establish Green office certification by 2018

Timing

- Identify campus departments who follow sustainable principles voluntarily by Fall 2017
- Reward employees and departments for green efforts by Winter 2017 (i.e. employee of the month)

Parties Involved

- USFSP Office of Sustainability
- USFSP Human Resources
- USFSP Facilities Services
- USFSP Administrators, Faculty, & Staff

CE-8 Sustainability in New Employee Orientation**STRATEGY DESCRIPTION**

Including sustainability in new employee orientation helps establish sustainability as an institutional priority and part of the campus culture. Providing information and tools about the institution's sustainability programs and options at the time when an employee is getting acquainted with his or her new employer and developing new work routines and habits can help encourage the adoption of environmentally and socially preferable habits, routines, and choices. USFSP covers sustainability topics in new employee orientation and/or in outreach and guidance materials distributed to new employees, including faculty and staff. The topics covered include multiple dimensions of sustainability (i.e. social, environmental and economic).

STRATEGY DESIGN:***Goals***

- Include sustainability in new employee orientation by 2018

Timing

- Human Resources highlights campus sustainability values to new hires at orientation by 2016
- Office of Sustainability provides a presentation, similar to a new student orientation, regarding sustainability at all new employee orientations beginning in 2017

Parties Involved

- USFSP Office of Sustainability
- USFSP Human Resources
- USFSP Facilities Services
- USFSP Administrators, Faculty, & Staff

CE- 9 Employee Professional Development

STRATEGY DESCRIPTION

Staff members should have the opportunity to participate in training and/or other professional development opportunities in sustainability. By offering and supporting training and professional development opportunities in sustainability to all staff members, an institution helps equip its staff to implement sustainable practices and systems and to model sustainable behavior for students and the rest of the campus community.

STRATEGY DESIGN:

Goals

- Offer all employees professional development in sustainability by 2020

Timing

- Human Resources highlights campus sustainability values to new hires at orientation by 2016
- Identify campus departments who follow sustainable principles voluntarily by Fall 2017
- Establishment of the Green Office certification in 2018
- Offer sustainability workshops to employees beginning in 2019

Parties Involved

- USFSP Office of Sustainability
- USFSP Human Resources
- USFSP Facilities Services
- USFSP Administrators, Faculty, & Staff

5.4 Public Engagement (PE)

The city of St. Petersburg is home to roughly 250,000 residents, however, the entire Tampa Bay metropolitan region houses more than 2.7 million residents. This is important to consider because USFSP plays a major leadership role in the development of St. Petersburg and the greater Tampa Bay region. Several organizations, policy makers, citizens, and businesses look to USFSP as being exemplary for driving creativity and innovation into the community.

When the University began implementing sustainability into its core values, the City of St. Petersburg soon followed. In the past few years the City of St. Petersburg has taken major steps towards being “Florida’s First Green City” which has included enhancing the City’s recycling efforts, creating an Office of Sustainability, completing a citywide Climate Action Plan, expanding partnerships with the Environmental Protection Agency (EPA) and the U.S. Green Building Council (USGBC), as well as the recent executive order signing to the Sierra Club, from Mayor Rick Kriseman, pledging that St. Pete will take strong initiatives at becoming Florida’s first city to depend solely on 100% clean, renewable energy. All of this was made possible by the driving sustainability focus at USFSP. With the City’s growing sustainability efforts also comes greater public support and awareness. Several citizen organizations, such as the St. Pete Sustainability Council and the St. Pete Chamber of Commerce Sustainability Task Force, are helping to increase public engagement.

What this means for USFSP is that there is growing support at the residential and local government level for further implementing sustainable development. With USFSP being a small based campus, successful sustainability projects on campus could transcend well at City level. Thus, the City should look to USFSP as a case study for selecting and implementing sustainable practices with minimal environmental impacts. This could also lead to increasing the overall research focused around sustainability on campus (i.e. 4.2 Research). Furthermore, the relationship between the City and USFSP should be enhanced with better collaboration for sustainable development that betters both the campus and the entire community. With both entities striving to enhance sustainability, the timing is perfect to further gain public support.

Institutions can help catalyze sustainable communities through public engagement, community partnerships and service. Engagement in community problem-solving is fundamental to sustainability. By engaging with community members and organizations in the governmental, nonprofit and for-profit sectors, institutions can help solve sustainability challenges. Community engagement can help students develop leadership skills while deepening their understandings of practical, real-world problems and the process of creating solutions. Institutions can contribute to their communities by harnessing their financial and academic resources to address community needs and by engaging community members in institutional decisions that affect them. In addition, institutions can contribute toward sustainability broadly through inter campus collaboration, engagement with external networks and organizations, and public policy advocacy.

PE-1. Community Partnerships

STRATEGY DESCRIPTION

Institutions should develop campus-community partnerships to advance sustainability. As community members and leaders, colleges and universities can be powerful catalysts, allies and partners in envisioning, planning and acting to create a sustainable future in the region and beyond. USFSP should develop more formal community partnership(s) with school districts, government agencies, nonprofit organizations, NGOs, businesses and/or other external entities, to work together to advance sustainability.

STRATEGY DESIGN:

Goals

- Create formal partnership with local businesses and organizations that can offer robust experiential internship by 2020
- Create formal partnerships with community members to generate funding for students and sustainability activities by 2020
- Develop partnerships with community organizations to provide venues for educating the community regarding sustainability topics

Timing

- Compile a list of possible businesses and organization that can offer robust experiential internships by 2018
- Compile a list of possible community members that can generate funding for students and sustainability activities by 2018
- Reach out to all businesses, organizations, and community members by 2019

Parties Involved

- College of Business, College of Education, and the College of Arts & Sciences
- USFSP Office of Sustainability
- NOAA
- USF College of Marine Sciences
- USF Tampa & USF Sarasota-Manatee
- PCGS
- FWC
- USGS
- Eckerd College
- St. Pete College
- University of Tampa
- City of St. Petersburg
- Tampa Bay Regional Planning Council
- City of Tampa
- Tampa Bay Trane
- City of Clearwater
- Duke Energy
- Tampa Electric Company

- United Nations Tampa Bay Association

PE-2. Improve Inter-Campus Collaboration

STRATEGY DESCRIPTION

Institutions should collaborate with other colleges or universities to help build campus sustainability broadly. Institutions can make significant contributions to sustainability by sharing their experiences and expertise with other colleges and universities. Sharing best practices and lessons learned can help other institutions realize efficiencies that accelerate the movement to sustainability.

STRATEGY DESIGN:

Goals

- Present at a sustainability conference at least once a year by 2019
- Submit at least one case study every other year to a sustainability resource center or awards program that is inclusive of multiple campuses
- Have staff, students, or faculty serving on a board or committee of a sustainability network or conference by 2020
- Create an ongoing mentoring relationship with another institution through which it assists the institution with its sustainability reporting and/or the development of its sustainability program (USF Tampa)
- Have staff, faculty, or students serving as peer reviewers of another institution's sustainability data (e.g. GHG emissions or course inventory) and/or AASHE STARS submission (USF Tampa)
- Participate in other collaborative efforts around sustainability at least once a year with other institutions (i.e. joint planning or resource sharing)

Timing

- Reestablish the USFSP Sustainability Working Group which will include administration, faculty, staff, and students to oversee sustainability-related collaboration beginning Fall 2016
- Hold a higher education sustainability conference in Spring 2017
- Hold a Tampa Bay regional sustainability conference in Spring 2017
 - Have an annual regional sustainability conference following the initial
- Create a higher education sustainability alliance with all relevant institutions for the sharing of ideas, research, and information beginning Fall 2017
- Hold a bi-annual state-wide sustainability conference with actionable outcomes beginning Spring 2018
- Hold a southeast sustainability conference every five years with actionable policy implementations beginning in 2025

PE-3. Improve Continuing Education

STRATEGY DESCRIPTION

Institutions should provide continuing education courses and programs in sustainability to the community. Such courses train community members in sustainability topics and help build knowledge about the subject. They can also provide the training people need to obtain and perform green jobs. Certificate programs offer professional recognition for sustainability training and are important tools in helping students obtain and advance their position in green jobs.

STRATEGY DESIGN:

Goals

- Offer continuing education courses that address sustainability.
- Offer at least one sustainability-themed certificate program through its continuing education or extension department.

Timing

- Offer workshops to enhance environmental stewardship (Some of the workshops can be revenue generating, and some just can be outreach and information transfer efforts.)
 - Master Conservationist Program
 - Xeriscaping
 - Energy conservation for the county school district

PE-4. Community Service

STRATEGY DESCRIPTION

Volunteerism and the sense of compassion that community services help develop are fundamental to achieving sustainability. From tutoring children to removing invasive species to volunteering at a food bank, students can make tangible contributions that address sustainability challenges through community service. In addition, community engagement can help students develop leadership skills while deepening their understandings of practical, real-world problems. USFSP should engage its student body in community service, as measured by how widespread participation is at the institution.

STRATEGY DESIGN:

Goals

- The whole Student Body is engaged in community service by 2030
- Students provide an average of 20 hours of community service per year.

Timing

- Engage student body in community service and measure by the percentage of students who participate in community service.
- Engage students in community service, and measure by the average hours contributed per student per year

PE-5. Participation in Public Policy

STRATEGY DESCRIPTION

Institutions should promote sustainability through public policy advocacy. There are myriad public policies for which institutions can advocate that address sustainability, including policies specific to higher education. Given the prominence and importance of colleges and universities in their communities, institutions can be powerful voices in advancing sustainability through legislation and policy.

Examples of advocacy efforts include supporting or endorsing legislation, ordinances, and public policies that advance sustainability; active participation in campaigns aiming to change public policy; and discussions with legislators in regard to the following.

STRATEGY DESIGN:

Goals

USFSP advocates for public policies that support campus sustainability or that otherwise advance sustainability. The advocacy may take place at one or more of the following levels:

- Municipal/local, State/regional, National, and/or International
- The policy advocacy must have the implicit or explicit support of the institution's top administrators and/or governing bodies to count

Timing

- Hold a higher education sustainability conference in Spring 2017
- Hold a Tampa Bay regional sustainability conference in Spring 2017
 - Have an annual regional sustainability conference following the initial
- Hold an annual statewide sustainability conference with actionable outcomes beginning Spring 2018
- Hold a southeast sustainability conference every five years with actionable policy implementations beginning in 2025

6. Tracking Progress

Following the enactment of this plan, USFSP will continuously monitor the development of the strategies to mitigate emissions using several key procedures. First, is to conduct a bi-annual GHG inventory for our waste, energy, and transportation beginning from the initial baseline inventory conducted in 2014. Second, is that we will conduct a progress report every 24 months (2 years) regarding the implementation progress of each strategy contained in this plan. Third, is that the CERCC committee will meet on a bi-monthly meeting to discuss any updates regarding this climate commitment. Fourth, is that we will keep in constant communication with the Center for Climate Strategies (CCS), regarding any questions related to measuring emissions. Finally, we will update this CAP every three years highlighting the milestones we hope to accomplish along the way, as well as making adjustments towards more clearly reaching our long-term goal of carbon neutrality by 2050.

7. Next Steps

Following the completion of this CAP, the most immediate steps will be the agreement amongst USFSP administration, including Chancellor Wisniewska, to make this plan a staple front for future campus development. Following the agreement, several strategies and projects will be discussed and assessed for implementation. Because energy supply and demand results in most of the GHG emissions on this campus, several of the near-term projects will revolve around sustainable energy production. Below are several near term projects that address energy supply and demand, waste management, and transportation that USFSP will implement.

In terms of energy supply and demand, USFSP is in the process of incorporating an Energy Management System (EMS) to monitor and control real-time energy usage. From an overview, the EMS will meter each campus building, as well as submeter dormitory floors, labs, and cafeterias' energy usage. This will enable us to determine what buildings use the most energy and where there are inefficiencies that could be corrected. This system should also help control inefficiencies such as automatically turning off lights and adjusting the thermostat in unused rooms. Finally, the EMS will be used as an educational tool by displaying real-time data online and on our campus kiosks, as well as highlighting areas where we can apply sustainable solutions.

Furthermore, in terms of waste management, SGEF recently passed a project to increase the amount of recycling bins around campus, both inside and out. These bins will replace several of the existing trash containers, while still maintaining a trash stream along with several recycling streams. The project also includes purchasing recycling labels, to be placed on all new and existing bins, to better educate individuals about what is recyclable and what is not. Finally, in terms of transportation, USFSP is working with the City of St. Pete towards developing a Citywide Bike Share program with bike stations located throughout the downtown region, including two on campus. These bikes will help eliminate downtown commuter emissions, especially students traveling on/off campus around the downtown premises.

Finally, it is important to reiterate from the "Tracking Progress" section (see above) that USFSP will continuously monitor the progress of this plan. Conducting a GHG inventory for the addressed sections, as well as creating a progress report, will be done every two years. CAP dialogue monthly meetings between CERCC, administration, faculty, and students will also occur. This CAP will continuously be in high consideration, along with the campus Master and Strategic Plans, for future development. Finally, this plan will be revised and updated every five years.

8. Conclusion

This CAP was produced to demonstrate USFSP's biggest emission areas and strategies that will take place to reduce these emissions and guide this campus towards becoming carbon neutral. A menu of 20 direct mitigation strategies was prioritized and narrowed down to 9 strategies for initial development and analysis in the Energy Supply & Demand (ESD), Transportation, and Waste Management Sectors. Some of these strategies include:

- Reducing our overall campus energy consumption by 50% as compared to BAU by the year 2035
- Increasing our on-site renewable energy generation to account for 50% of our total electricity needs by 2035
- Increasing carpooling by 20% by the year 2035
- Reducing our upstream waste emissions by 50% by 2035
- Removing 100% of all recyclable products from solid waste stream by 2025

Overall, the current set of CAP strategies are estimated to reduce baseline emissions by over 50% by 2035. Most of these reductions are attributed to ESD strategies (about 87%). In addition to the direct CAP strategies, a number of indirect strategies were developed to help generate awareness, knowledge, and ideas needed to create a culture engaged in protecting the environment and creating a just and sustainable society for all. The indirect strategies make the implementation of the direct strategies easier as there will be more campus-wide support and awareness.

Based on the work conducted and data available for this initial CAP, **USFSP pledges to reduce its baseline GHG emissions by 50% by 2035 and to achieve carbon neutrality by 2050.** Additional work to update the CAP and monitor implementation progress could result in the need to adjust these goals (either up or down). In keeping up with this CAP, USFSP will conduct a progress report every 24 months, along with re-conducting our GHG inventory, highlighting progress along the way, and finally updating the CAP every five years to add new ideas and strategies into our visionary plan.