As a Catholic, Augustinian university, Villanova is committed to shaping a campus community among ourselves and beyond that witnesses to the healing, liberating and empowering truth of the Creator. We value the sacredness of all creation and seek to promote ever increasing knowledge, love for and commitment to the creation of a sustainable world, where all creation will flourish.

VILLANOVA UNIVERSITY SUSTAINABILITY PLAN 2020-2030

October 2020

Prepared by the Villanova Sustainability Leadership Council

LETTER FROM THE REV. PETER M. DONOHUE, OSA, PHD

Dear Members of the Villanova Community,

As the past few months have shown, all of human life is connected. And together, we can effect positive change toward a common goal. Whether its saving lives by staying home or drawing attention to civil injustices, we can make a difference…together.

This connectedness extends to various aspects of our lives, including the responsibility to care for all of creation. As Catholics, as Villanovans, and as human beings, I believe it's prudent to come together to take substantive, transformative action to foster the health and prosperity of God's creation. The responsibility lies with each and every one of us. To that end, the Villanova Sustainability Leadership Council (VSLC) was established to develop an actionable and measurable plan to guide the University's sustainability efforts through 2030.

In conjunction with efforts around our strategic plan Rooted. Restless., the VSLC drafted and I approved, the *Villanova University Sustainability Plan 2020—2030,* which provides a comprehensive road map for Villanova's sustainability efforts over the next decade. The plan adopts an inclusive definition for sustainability—one encompassing effort to support the planet, its people and ensure prosperity for all. It is rooted in both our Augustinian, Catholic tradition and the 17 Sustainable Development Goals laid out by the United Nations in 2015.

Some aspects of the plan are already in motion, and we will continue its rollout this fall to coincide with the fifth anniversary of Pope Francis' encyclical *Laudato si': On Care for Our Common Home*. In it, His Holiness reminds us that "an awareness of the gravity of today's cultural and ecological crisis must be translated into new habits." May each of us, in reading Villanova's sustainability plan, be ready to embrace new habits and commit to an ethos of sustainable living in all aspects of our lives.

I would like to thank and acknowledge the members of the VSLC who are identified in the following pages for formulating this plan to guide Villanova's sustainability efforts. They put countless hours of research and collaboration into the plan's formulation and I am extremely grateful for their efforts.

Sincerely,

Rev. Peter M. Donohue, OSA

President

CONTENTS

EXECUTIVE SUMMARY

The pursuit of sustainability is the pursuit of a world in which resources and opportunities are assured for all future generations. Put simply: enough, for all, forever. The UN recognized the importance of sustainability when it created its Sustainable Development Goals (SDGs) in 2015 to "provide a shared blueprint for peace and prosperity for people and the planet, now and into the future." These goals recognize global challenges that must be solved collaboratively to create a prosperous, just and sustainable world.

> As an Augustinian Catholic institution and a member of the global community, the University felt called to facilitate this critical process by adapting and implementing the UN SDGs to benefit campus, the surrounding region and the globe. It thus formed the Villanova Sustainability Leadership Council (VSLC) and charged it with developing and customizing a plan that would align with the University's mission to promote knowledge of, love for and commitment to a sustainable world in which all creation will flourish. The following report, the Villanova University Sustainability Plan, is the fruit of the VSLC's efforts.

The Sustainability Plan is built on the following decision-making methodology:

1. Determine the priorities of the Villanova community.
2. Modify the UN SDGs to fit Villanova's scope of influence and objectives.
3. Create metrics and calculate a baseline score for each goal.
4. Set key results to measure progress towards each goal.
5. Improve performance and increase baseline score by implementing projects.

The VSLC is the primary governing body for sustainability, is supported by five subcommittees, each led by a council member and focused on a central University function. These committees identify projects designed to achieve key results to improve Villanova's sustainability score. Once VSLC approves projects, the committees oversee their implementation and growth on campus.

The Sustainability Plan integrates Villanova's foundational principles of truth, unity and love with environmental stewardship, inclusiveness and economic needs. Along with Villanova's Strategic Plan, it will guide the University through the next decade to improve personal, communal and institutional sustainability, positively impacting daily routines, systemic structures, equitability and quality of life. At the core of all sustainability activities will be Villanova's vision for this plan: to establish an ethos of sustainable living.

Pope Francis, in *Laudato si': On Care for our Common Home*, promotes concern for an integral ecology, proposing it as a path to transformation toward sustainable living:

> Many things have to change course, but it is we human beings above all who need to change. We lack an awareness of our common origin, of our mutual belonging, and of a future to be shared with everyone. This basic awareness would enable the development of new convictions, attitudes and forms of life. A great cultural, spiritual and educational challenge stands before us, and it will demand that we set out on the long path of renewal. (§ 202)

The Sustainability Plan attempts to face the challenge of Francis' basic conviction regarding our world. It equips Villanova to boldly advance along "the long path of renewal."

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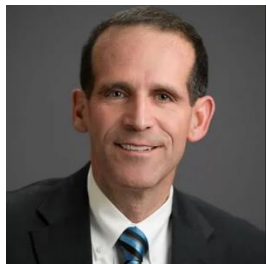
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FIGURES

TABLES

ABBREVIATIONS

Abbreviation	Full Name
AASHE	Association for the Advancement of Sustainability in Higher Education
AHP	Analytical Hierarchy Process
AQI	Air Quality Index
CAP	Climate Action Plan
CDP	Carbon Disclosure Plan
CRP	Carbon Reduction Plan
EPA	Environmental Protection Agency
GRI	Global Reporting Initiative
IPCC	Intergovernmental Panel on Climate Change
IPEDS	Integrated Postsecondary Education Data System
LEED	Leadership in Energy and Environmental Design
OKR	Objectives and Key Results
PESC	President's Environmental Sustainability Committee
STARS	Sustainability Tracking, Assessment, & Rating System
TJEI	Transformative Justice and Equitable Institutions
UN SDGs	United Nations Sustainable Development Goals
VSLC	Villanova Sustainability Leadership Council

1 INTRODUCTION

Since its inception, Villanova University has been an institution that strives to uphold excellence, empathy, creativity and passion to ignite change. These inherent qualities prove fundamental in promoting sustainability principles. Villanova characterizes itself as a leader in innovation and collaboration to solve local, regional and global problems through its three main virtues of truth, unity and love. Sustainability is a bridge between Villanova's foundational principles and its call to action. The world desperately needs innovators who not only have studied their craft but also base their thinking on creating solutions that ensure the future of generations to come. Villanova University has the opportunity and the resources to equip students with these tools through both the education it provides and its fundamental values.

The Villanova University Sustainability Plan integrates the University's value-centered principles with environmental stewardship, promoting inclusion of all members of the University and impacting all aspects of sustainability. Based on the framework of the UN Sustainable Development Goals (UN SDGs) and guided by the principles of Catholic social teaching, the methodology provides clear goals tailored to Villanova, as well as quantifiable targets with set action plans. Not only will this methodology serve as a guide on its own, but it also aligns with Villanova's Strategic Plan to advance the University's ideals.

Generating and advocating sustainable action will help create a future that provides enough, for all, forever. Villanova University is well equipped with tools to educate its students to contribute to creating a future that ensures safety and resiliency against the planet's ever-changing behavior. The Sustainability Plan's methodology will help focus efforts and improve organization for future sustainability-related projects, promote resources and opportunities for involvement, unite students and faculty across all disciplines in a common commitment, and quantify progress toward attaining goals.

The overwhelming task of measuring an institution's impact on both society and the environment proves complicated but not impossible. Pope Francis eloquently explains the crux of the issue in his 2015 encyclical *Laudato si': On Care for Our Common Home*. "We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature" (§ 139). Villanova can easily be a part of this solution through its values of truth, unity and love

for both the surrounding community and the environment. Although the challenges ahead are long and complex, the Sustainability Plan's clearly defined goals and methodology will help successfully guide future sustainability efforts and research.

1.1 INSPIRATION AND COUNCIL FORMATION

In 2007, Villanova's president, the Rev. Peter M. Donohue, OSA, PhD, signed the American College and University Presidents' Climate Commitment. This commitment was a vow to reduce Villanova's greenhouse gas emissions and become carbon neutral by 2050 (*Our Commitment*, n.d.). In 2009, the President's Environmental Sustainability Committee (PESC) was formed to advance this climate agenda. PESC developed a Climate Action Plan (CAP) to guide the University toward carbon neutrality (Olson, 2010). PESC, while hardworking and dedicated, was not able to make large-scale change in reducing the University's carbon emissions because PESC lacked members who were key decision makers and could initiate the changes needed to make a difference at Villanova. This issue and others inspired the creation of the Villanova Sustainability Leadership Council (VSLC) as a governing body for sustainability in early 2018. The VSLC reports directly to the president and includes the CFO, members of the deans' offices, department heads, key administrators, and faculty and staff with relevant expertise.

VSLC is a governing body that is responsible for input and decision making on various aspects of the Villanova University Sustainability Plan. VSLC is led by Professor William Lorenz, director of Sustainable Engineering, and the Rev. Arthur Purcaro, OSA, assistant vice president for Mission and Ministry. VSLC members were chosen based on the positions they hold at the University and their relevance to current sustainability efforts. However, council positions will evolve based on the needs of the University. The council is supported by five subcommittees, each led by a council member. Robert Morro leads Operations; Kathryn Getek Soltis leads Social Justice; Liesel Schwarz leads Student Life; Al Ortega and Joseph Lennon lead Academics and Research, and Stacy Andes leads Health and Well-Being as seen in Figure 1.1. Committees are responsible for proposing sustainability projects and implementing those approved by the council. At the core of all sustainability activities performed by the VSLC and its committees is Villanova's vision: *Establish an ethos of sustainable living.*
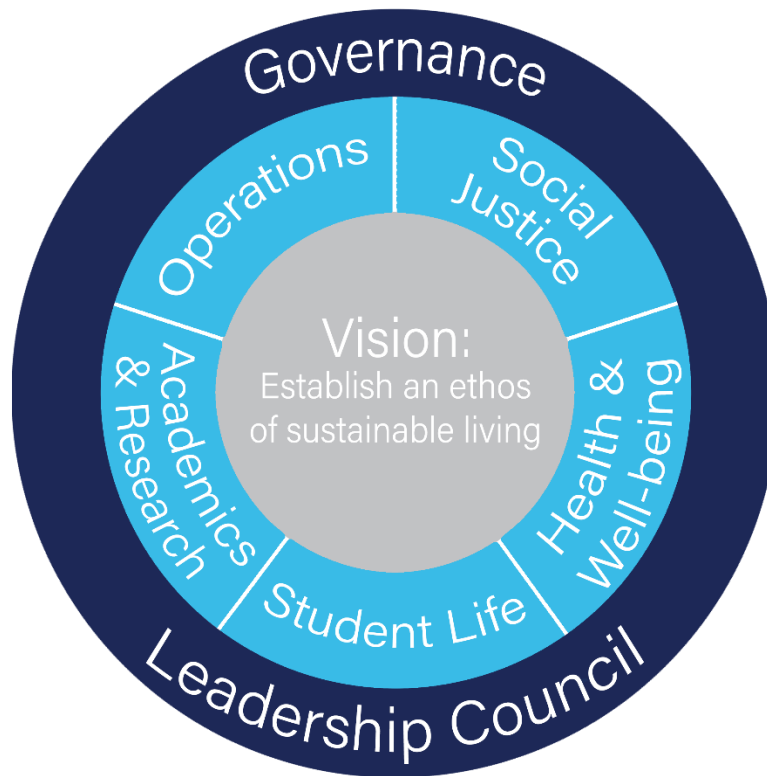
Figure 1.1. Villanova Sustainability Leadership Council and Committee Organization

1.2 SUSTAINABLE DEVELOPMENT GOALS AS A FRAMEWORK

The UN SDGs were created and adopted by UN Member States in 2015 and serve to "provide a shared blueprint for peace and prosperity for people and the planet, now and into the future." These goals recognize that global challenges such as poverty, inequality and environmental degradation can and must be solved collaboratively to create a prosperous and sustainable world. The council chose the SDGs as the framework for the Villanova University Sustainability Plan because they cover a wide range of important and interconnected issues. To make the goals more applicable to campus life, the council added Goal 0, Sustainability in Academics, to the original 17 goals, as seen in Figure 1.2. This goal deals with implementing sustainable learning practices at a higher education institution, which is the fundamental purpose for the creation of the Villanova University Sustainability Plan. The motivation to achieve these goals, in coordination with government and nongovernment organizations, comes from Laudato si'.

Figure 1.2. UN Sustainable Development Goals (1-17) with Additional Villanova Specific Goal, 0

2 BACKGROUND

Decision-making tools in sustainability and project management procedures, such as the Objectives and Key Results (OKR) system from John Doerr's book *Measure What Matters*, were the inspiration for the plan's methodology. The latter was then combined with a scoring system and stakeholder inputs to create five steps for making sustainability decisions for Villanova University, as shown in Figure 2.1. Five Steps of Decision-Making Methodology

Figure 2.1. Five Steps of Decision-Making Methodology

The first step was a materiality study to determine the significance of each SDG to the University—that is, the priorities of the Villanova community. For the materiality assessment of the UN SDGs at Villanova University, the council used the Analytical Hierarchy Process (AHP) because of its compatibility with decision making in a large group of stakeholders. From this assessment, the council produced a weighted list of SDGs, which then formed the basis of the rest of the plan and guided its direction.

The second step was to adapt the UN SDGs to fit Villanova's scope of influence. The UN SDGs often have vague descriptions, as they are meant to be applicable to regions of all sizes around the globe. Therefore, for each of the UN SDGs, VSLC created an objective that would be more applicable to the scope of the campus and region in which Villanova operates and would have the resources to effect change. These objectives were intentionally vague to serve as the University's large-scale goals for 2030.

Just as the UN had created quantitative and measurable items for each SDG so that nations could measure their progress, VSLC's third step of the methodology was to create metrics and calculate a baseline score for each objective so that progress toward Villanova's 2030 sustainability goals could be measured. VSLC would use these metrics to determine an overall sustainability score for the University.

The fourth step was to set key results, which are specific and quantifiable three-year goals, to direct workflow toward current areas of need. Forty-one key results were created for the period 2019–21. At the end of 2021, the council will reevaluate key results and create a new list of key results to be completed by the year 2024. This process will be repeated triennially.

Step five of the methodology was to create projects to improve performance. Five committees on Villanova's campus develop and oversee the implementation of projects to achieve key results and, ultimately, improve the sustainability score. The committees brainstorm projects that could achieve keys results, and VSLC evaluates and approves them.

These steps also can be organized into a managerial framework, as shown in Figure 2.2. Organizational System of UN SDG Materiality, Objectives, Metrics, Key Results and Projects

Materiality of UN SDGs
• Mathematic weighting of all UN SDGs

2030 Objectives
• What Villanova wants to achieve in relation to the UN SDGs

Metrics 2030 and Beyond
• How Villanova is being measured towards meeting the objectives

2021 Key Results
• Direction of Villanova's work for the next three years

Projects
• How Villanova plans to improve its metric score
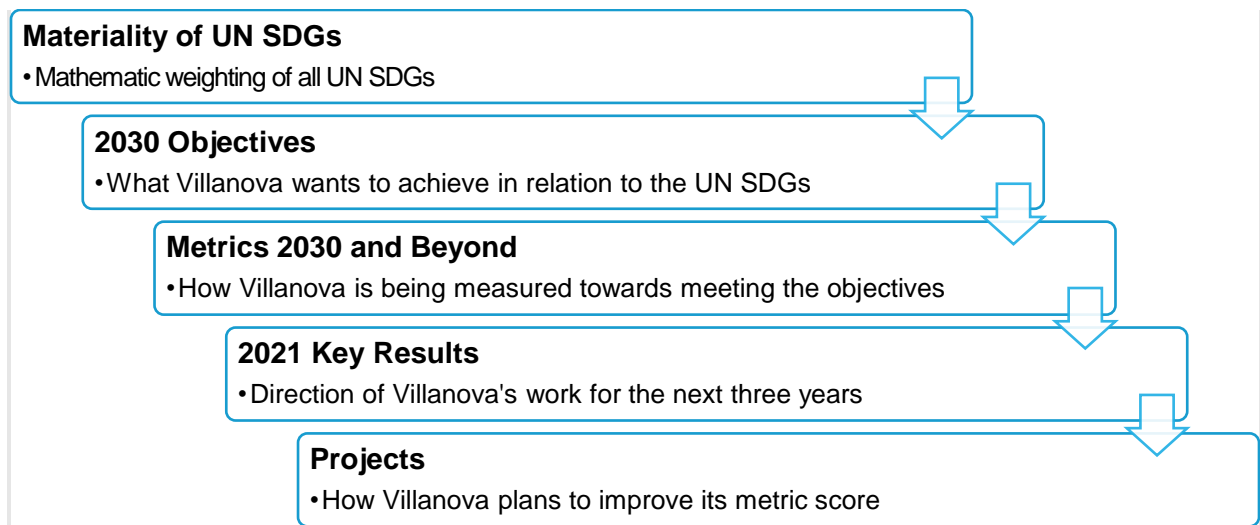
Figure 2.2. Organizational System of UN SDG Materiality, Objectives, Metrics, Key Results and Projects

2.1 STAKEHOLDER INVOLVEMENT AND THE ANALYTICAL HIERARCHY PROCESS

The council chose the UN SDGs as a framework both to create a sustainability plan and to achieve an ethos of sustainable living in the Villanova community. To prioritize the 17 SDGs and the Villanova-specific SDG according to their importance to the Villanova stakeholders, the council used the AHP. It surveyed community members in a series of input sessions to determine how

stakeholders prioritize the sustainability issues affecting the world and the Villanova campus (Gloria et al., 2007).

AHP uses a series of pairwise comparisons to compare alternatives in layers of a hierarchy against each other and in reference to a parent criterion for Villanova, as seen in Figure 2.3. Hierarchy Used in the Villanova AHP Materiality Study. At the top of the hierarchy is the vision to establish an ethos of sustainable living on campus and within the community. There are, then, two criteria layers and an alternatives layer. The first criteria layer is Villanova's three spheres of influence: campus, region (which is defined as the Delaware Valley) and globe. The second layer of criteria comprises categories of the UN SDGs: biosphere, economy and society. This categorization was developed by Johan Rockstrom and Pavan Sukhdev at the Stockholm Resilience Center (Rockstrom, 2016). To have the categories parallel the triple bottom line, which is a business framework that focuses equally on the benefits of company decisions and actions for people, planet and profit, the council renamed the categories People, Planet and Prosperity. The planet category contains Goals 6, 13, 14 and 15. The prosperity category contains Goals 8, 9, 10, 12 and 17. Finally, the people category contains Goals 1, 2, 3, 4, 5, 7, 11 and 16, as well as the synthetic goal, 0.
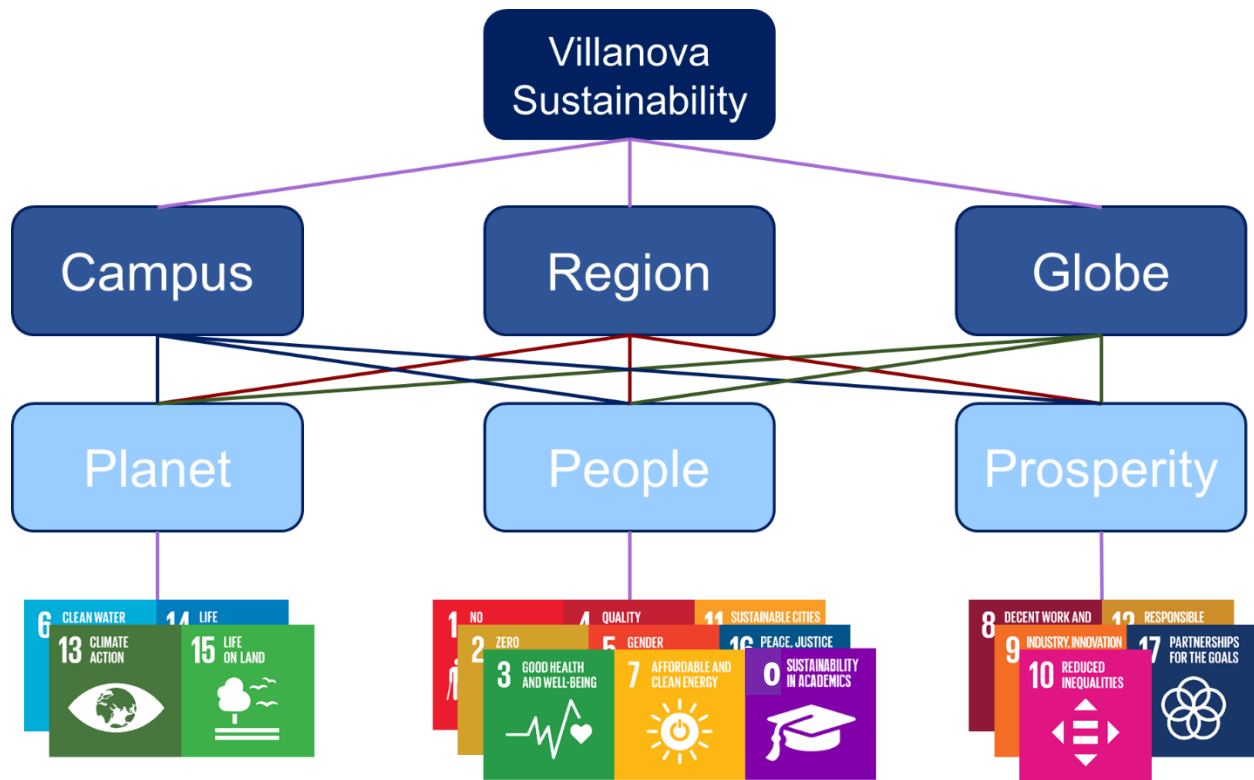
Figure 2.3. Hierarchy Used in the Villanova AHP Materiality Study

When performing the AHP with this hierarchy, VSLC first compared the spheres of influence with respect to their ability to impact Villanova's vision of establishing an ethos of sustainability on campus. An example question from this layer is as follows: "How much more important is Villanova's campus sphere of influence compared to the regional sphere in creating an ethos of sustainability?" This layer contained three questions of this type. After the first layer was complete, the categories were compared with respect to each of the three spheres of influence. The categories were compared three times so that they received a weight within each sphere of influence. An example question from this layer is as follows: "Within Villanova's campus sphere of influence, how much more important is planet versus people?" The overall weight of the category (people, planet or prosperity) was computed by multiplying the weight of the sphere of influence (campus, region and globe) with the weight of the categories within that sphere and then summing across all three spheres. See Equation 2.1 for an example of how to compute the weight of the categories (in this case the planet category).

Equation 2.1. Computing the weight of planet, people and prosperity categories in AHP analysis

$$Planet = (Planet_{campus} * Campus) + (Planet_{region} * Region) + (Planet_{globe} * Globe)$$

The goals were compared against other goals within their category. Each goal received a weight within its category, and then the overall weights of individual goals were calculated by multiplying the weight of the goal within the category with the overall weight of the category. An example calculation for Goal 1 is shown in Equation 2.2.

Equation 2.2. Computing the weight of an individual goal

$$Goal\ 1 = Goal\ 1_{people} * People$$

2.2 ADAPTING THE UN SDGs TO OBJECTIVES FOR VILLANOVA

The second step of the methodology was to customize parallel but more concise objectives from the UN SDGs for Villanova to achieve in 2030. However, because 2020–30 is a longer time frame, the objectives were left relatively broad. For example, the description of SDG 1, No Poverty, is "End poverty in all its forms everywhere." Villanova is not able to bring the entire world out of poverty, or even the entire township in which it resides. It can, however, change the pay of its employees and offer better pay and benefits to students, faculty and staff to begin to alleviate poverty within its campus. Thus, VSLC adapted the objective for SDG 1 for Villanova as follows:

> *Assure that no Villanovan's compensation rate is below living wage guidelines; Villanova supports and participates in local and global initiatives to eradicate extreme poverty; Villanova assures Villanovans have equitable access to basic resources and requires livable wages in their supply chain.*

See Table A.1 for a full list of the objectives. The priority weights determined for each UN SDG in step 1 were translated to each parallel objective.

2.3 METRIC SELECTION AND BASELINE SCORE

Next, a scoring system developed by the Villanova research team was used to determine the baseline sustainability score to show the performance of the University. The purpose of the scoring system is to identify which UN SDGs are being addressed effectively and which need additional work. Villanova's performance in each goal shows where the most significant gains can be made. The baseline score was calculated in the summer of 2019 with data from a 2018 baseline. The score will be updated over the life of the plan as projects are completed. Figure 2.4 shows a hypothetical score progression of the overall score of all SDGs at Villanova through the

year 2030. Each small bar represents an individual goal, and the wide blue bars represent the total score for each year.

The scoring system consists of several parts. First, metrics were selected or developed for each UN goal. The metrics were then weighted based on their perceived ability to measure progress toward the goal. Next, a 0–100% scale was developed for every metric; a score of 100% indicates the maximum achievable performance. These scales were determined by defining the extremes of maximum and minimum performance for each metric. Finally, once the metrics were identified, weighted and scaled, data from the University was used to establish where Villanova falls. The score of each metric is multiplied by the weight of its SDG so that the University can calculate a single score that represents its performance against the entire SDG framework.
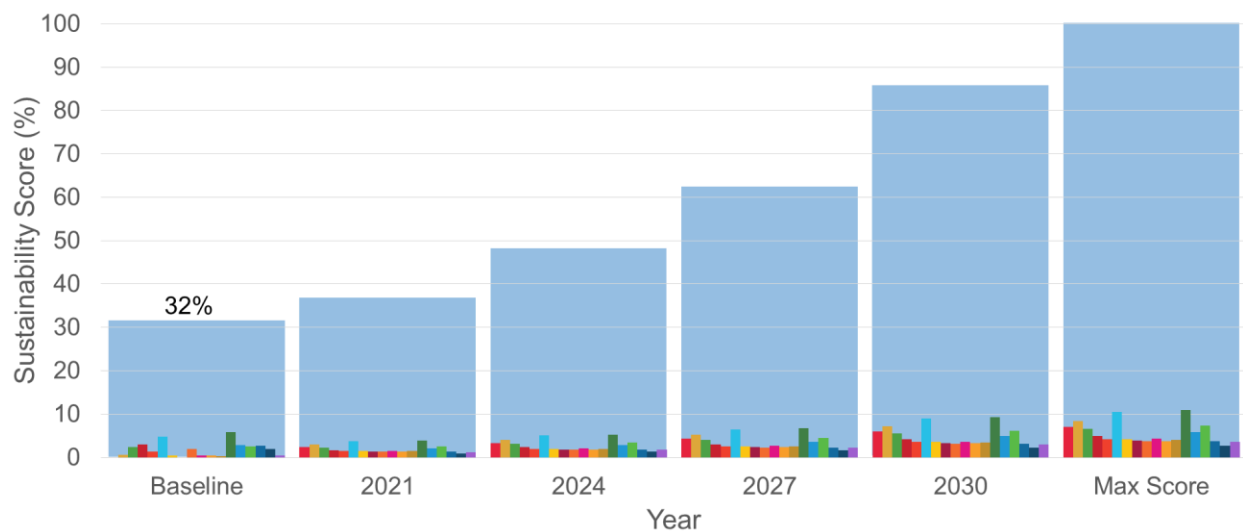
Figure 2.4. Hypothetical Score Progression

2.3.1 Metric Selection and Sourcing

The metrics quantitatively measure how much progress Villanova has made toward completing a UN SDG. The UN uses many targets and indicators for each SDG. However, these indicators are geared towards countries, not universities. Villanova, therefore, used a combination of different sources to compile metrics for each objective and SDG. These metrics aim to measure how well Villanova is achieving an ethos of sustainable living on campus.

When metrics were crafted, they were worded to preserve orthogonality and to be definitive. Orthogonality means metrics should not overlap at all unless they overlap completely. For example, if the first metric measured the total concentration of nitrogen and phosphorus in runoff

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and the second metric measured the total pollutant load in runoff, including nitrogen and phosphorus, these metrics would not be orthogonal. Their measurements overlap with the measurement of nitrogen and phosphorus concentrations but not completely, because the second metric also measured concentrations of other pollutants. To make these metrics orthogonal and still capture the same concept, one can either change the first metric to pounds of fertilizer applied per year or change both metrics to have the exact same wording.

Another quality of metrics is that they are definitive; that is, they were crafted in such a way that they can be measured with concrete, unbiased data and without discrepancies about what was being measured. This method also prioritized metrics being crafted to use data already collected by departments, faculty or staff at the University. If no data related to a metric was available and VSLC determined it was essential to measuring the ethos of sustainable living on campus, then experts were consulted on how to craft the metric so that a measurement system could easily be created. The metrics were drawn from several sources, including the UN indicators list, the Cities Index (Jessica Espey et al., 2018) and from work done by PESC members at Villanova. The first two sources were made for international use and cities, respectively, so they needed to be scaled down to be applicable to a university setting (the third source was already appropriately scaled). Various experts at Villanova were consulted about which metrics should be included in their areas of expertise. The resulting list of metrics can be found in Section A.1.

2.3.2 Weighting Metrics

Once the metrics were selected, they were weighed against the other metrics in each goal. Each council member weighed all the metrics in each objective so that the total weight of the metrics in each objective summed to 100%. The answers of each council member were averaged together using the arithmetic mean to get the final weight for each metric in all 18 goals. Figure 2.5 shows how the three metrics for Goal 13 were weighted by the council. The rest of the metrics and weights can be found in Section A.2.
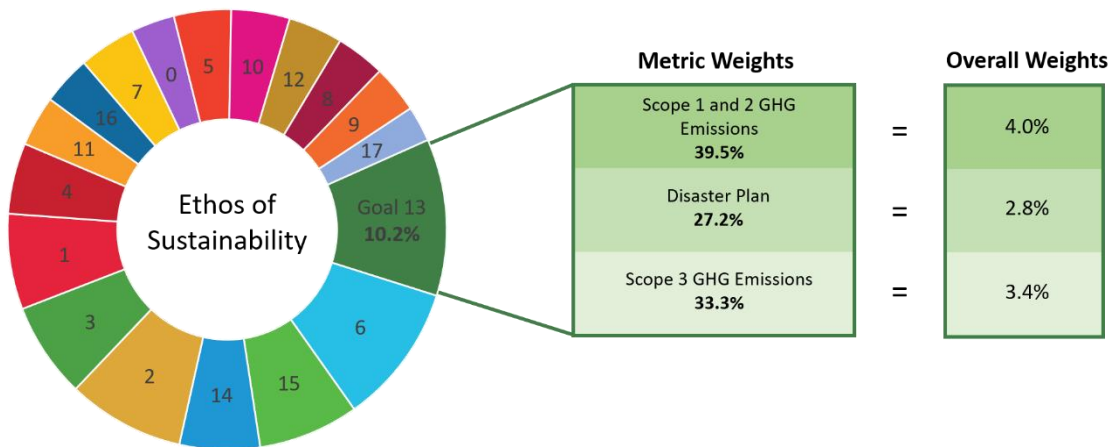
Figure 2.5. Weighted Metrics in Goal 13, Climate Action

After the metrics were weighted within each goal, the intra-goal weights were multiplied by the weight of their goal so that metrics could be compared across all goals. The result was a list of all the metrics in order of importance with a numerical weight. The sum of all the weights is 100%. In addition to identifying appropriate metrics, it was important to choose roughly the same number of them for each goal to avoid artificially diluting the importance of some metrics in comparison to those in other goals with fewer metrics. If one goal contains 3 metrics and another contains 10, each of the metrics in the goal with just 3 will receive a higher weight because the weight of the goal is being split fewer ways. For this reason, the number of metrics has been limited to 3–6 for each UN SDG and objective.

2.3.3 Interconnectivity Through Metrics

To show the interconnectivity between goals, some metrics were duplicated in multiple goals, resulting in a higher weight for the duplicated metrics. However, they were weighted differently in each of the goals in which they were included. For example, minimum wage was included in Goal 1, No Poverty; Goal 8, Decent Work and Economic Growth; and Goal 10, Reduced Inequalities. The metric was weighted at 25.8% of Goal 1, 30.4% of Goal 8 and 26.9% of Goal 10. The overall weight of the metric was calculated with the formula shown in Equation 2.3.

Equation 2.3. Calculating the weight of a metric that appears in multiple SDGs

$$Minimum\ Wage = (MW_1 * Goal_1) + (MW_8 * Goal_8) + (MW_{10} * Goal_{10})$$

Other metrics have been duplicated, including greenhouse gas emissions and food waste. The full list of metrics is available in appendix A. It is important to recognize the interconnectivity of the goals so that they can be tackled systematically.

2.3.4 Scaling Metrics

After metrics were selected and weighted, they were given a scale so that the University can determine how well it is performing on each metric and in each objective. A metric without a scale or frame of reference is not helpful. To determine the scale for each metric, the Villanova Research Team gave each an upper and lower bound. The upper bound indicates the best performance, and the lower bound represents the worst performance. We then determined the best bounds with which to scale each metric using a modified decision tree from the Cities Index (Jessica Espey et al., 2018). In this hierarchical structure, lower-numbered items are preferred methods of bounding:

1. Ideal target set by UN SDGs

2. The principle "No person left behind"

3. Science-based target

4. Bottom or top 2.5th percentile of universities

5. Bottom or top 2.5th percentile of non-university performers

The most preferred way to set a bound is to use an ideal target set by the UN SDGs. If this target did not exist, then the bound was set using the principle "No person left behind." An example of this principle is achieving a 100% graduation rate in four years. If this method was not applicable, then the bound was set using a science-based target. For example, before setting an upper bound for average hours of sleep per night of students, we consulted peer-reviewed studies to determine that the ideal number of hours of sleep students should get per night is eight. If the first three methods of setting bounds were not applicable, then the bottom or top 2.5th percentile of universities was used to determine an upper or lower bound. If this information was not available, then the 2.5th percentile was determined for a general pool of performers most relevant to Villanova.

2.3.5 Scoring System Mathematics

2.3.5.1   Scoring Metrics

The next step in the methodology was to collect data and determine a score based on the weighting structure and bounds. The purpose of the score is to show, in one number, how Villanova is performing in sustainability in all different categories. The following equations show a step-by-step calculation of the overall baseline score. The next step in the methodology was to collect data and determine a score based on the weighting structure and bounds. The baseline value of a metric is the data point that was collected for the metric in 2018. The percentage at which this value falls between the upper and lower bounds is called the metric score (see Equation 2.4). Equation 2.4 through Equation 2.7 show the mathematical steps for calculating the different baseline scores and, in turn, the overall baseline score.

Equation 2.4. Metric score

$$Metric\ Score = \left(1 - \frac{|UB - BV|}{|UB - LB|}\right) * 100\%$$

Where:

UB = upper bound

LB = lower bound

BV = baseline value

The metric score is out of 100%, with 100% indicating that Villanova is performing at the upper bound. The metric score was then used to determine a weighted baseline metric score—one that can be added across all metrics in a goal—by multiplying the metric weight with the metric score (see Equation 2.5). Note that the VSLC determined the metric weight.

Equation 2.5. Weighted baseline metric score

$$Weighted\ Baseline\ Metric\ Score = MW * Metric\ Score$$

Where:

MW = metric weight

The weighted baseline metric scores were then summed together for each SDG to determine an SDG baseline score (see Equation 2.6).

Equation 2.6. SDG Baseline Score

$$SDG\ Baseline\ Score = \sum(Baseline\ Metric\ Scores\ in\ the\ Same\ Objective)$$

The 18 SDG scores were then summed to determine the overall baseline score (see Equation 2.7).

Equation 2.7: Overall Baseline Score

$$Overall\ Baseline\ Score = \sum SDG\ Baseline\ Score$$

Figure 2.6 shows a visual of how each score is calculated using Goal 13.
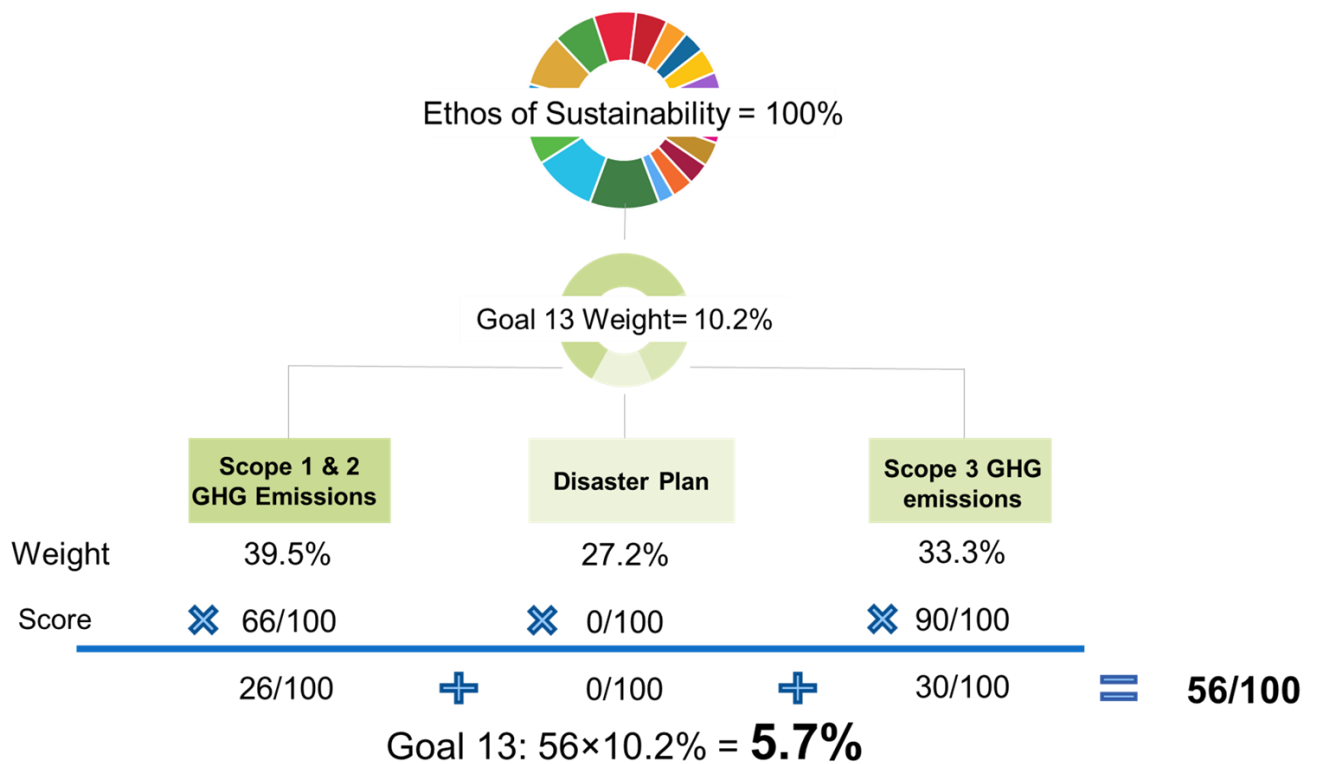
Figure 2.6. Full Scoring Example for Goal 13, Climate Action

2.3.5.2 *Scoring Metrics Without Data Available*

Data was collected for all possible metrics. Although some of the metrics chosen do not have data, VSLC recognized that they are essential to determining if Villanova is meeting its sustainability goals. Therefore, systems will be created to measure these metrics in the first two years of the plan. Of the metrics that were selected, 65% have data already. Figure 2.7 shows the data availability of all the metrics. When data is not available, the metric is scored as a zero. Because any data acquisition project can greatly increase the score, Villanova has incentive to develop its data acquisition capability. As better data is collected, the accuracy of the scoring system will improve, and better sustainability decisions can be made.

Metrics with no data available 35%

Metrics with Data 65%
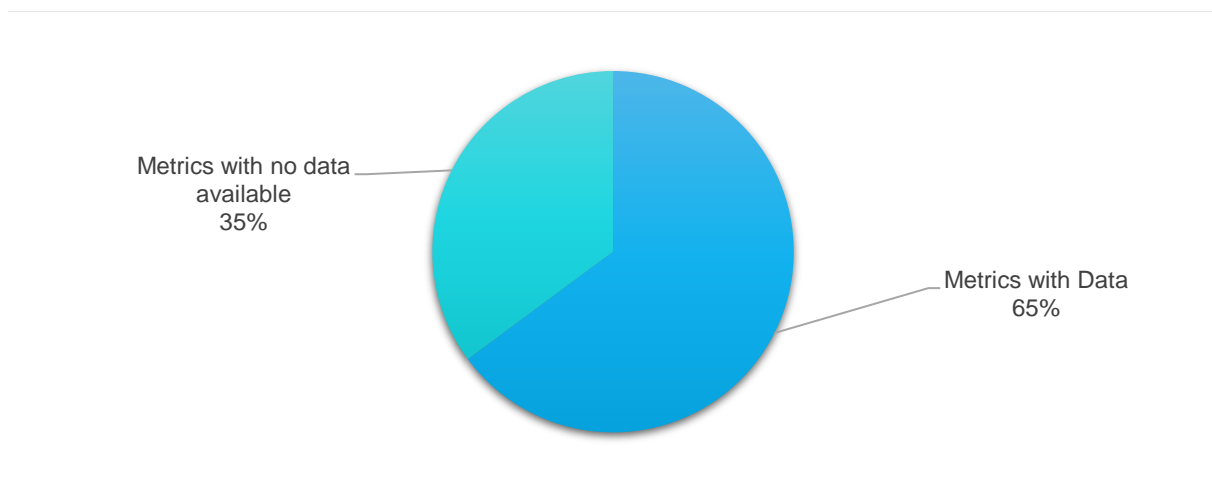
Figure 2.7. Data Availability of Metrics

2.4 CREATING KEY RESULTS

The fourth piece of the methodology is creating key results by specifically setting quantifiable, three-year goals that the University wants to achieve to increase the overall score. Key results are action oriented and are worded in such a way that it can easily be determined if they have been achieved or not. They consider *how* the University wants to achieve its objectives in a certain time span. Key results were inspired by a management style used at top companies such as Google, as well as the Bill & Melinda Gates Foundation. This management style is the aforementioned OKR system. First developed by Andy Grove at Intel and detailed in Doerr's *Measure What Matters*, the OKR system has provided the backbone for the success of many companies. The use of OKR creates a multitiered approach that breaks large goals down into the key steps required to achieve the goals. Objectives are *what* will be accomplished; the outcome

is determined with a simple "Yes, the objective was accomplished," or "No, the objective was not accomplished." Key results are small steps taken that help with time and resources management to keep momentum toward reaching objectives. They are *how* the objective will be accomplished (Doerr, 2018). Computing the University's sustainability score informs the appropriate areas and metrics to address with key results.

The members of VSLC created these key results. They considered weights of the objectives and metrics, as well as the availability of data for the metrics. Key results were created for the time periods 2020–21, 2022–24, 2025–27 and 2028–30. However, key results are considered set in stone only for 2020–21. The other key results will be reevaluated at the beginning of their respective periods. This caution acknowledges that the University's resources and available technology are subject to change, and this plan looks to account for those changes. The key results for 2020–21 were based on two main criteria: (1) obtaining all data needed to measure metrics and (2) focusing on metrics with the largest available score. Considering these two criteria, VSLC created 41 key results for 2020–21. See appendix A for a full list of these key results.

The metrics and scoring system provide a strong quantitative basis for prioritizing work, while the OKRs are easy to understand, making them beneficial for communication with internal and external stakeholders. A full example of the full integration between objectives, metrics and key results can be seen for Goal 13 in Figure 2.8.

| Objective | Take urgent action to combat climate change as central to Villanova's institutional mission while substantially reducing emissions associated with campus and supply chain operations in accordance with the UN IPCC goal of 1.5°C. |

| Metrics | Scope 1 and 2 net greenhouse gas emissions. | Degree of implementation of an up-to-date integrated climate change and disaster resilience strategy. | Scope 3 net greenhouse gas emissions. |

| Key Results | Develop a plan to reduce scope 1 and 2 emissions to meet the 1.5 IPCC report by 2030. | | Conduct a scope 3 emissions inventory. |

Figure 2.8. Objectives, Metrics and Key Results for SDG 13, Climate Action

Key results are short-term steps to reach what the University wants to achieve to create an ethos of sustainable living. Projects will denote *how* key results will be achieved and thereby contribute to increasing the overall score.

2.5 PROJECT EVALUATION AND SELECTION

The fifth piece of the decision-making process is to improve the score above the baseline and begin to make progress toward the objectives and key results. This progress will be achieved through the completion of sustainability projects. In the OKR method, projects are the actions that make up *how* the key results, the objectives and, eventually, an ethos of sustainable living will be achieved. Their position in the project management hierarchy is shown in Figure 2.9.
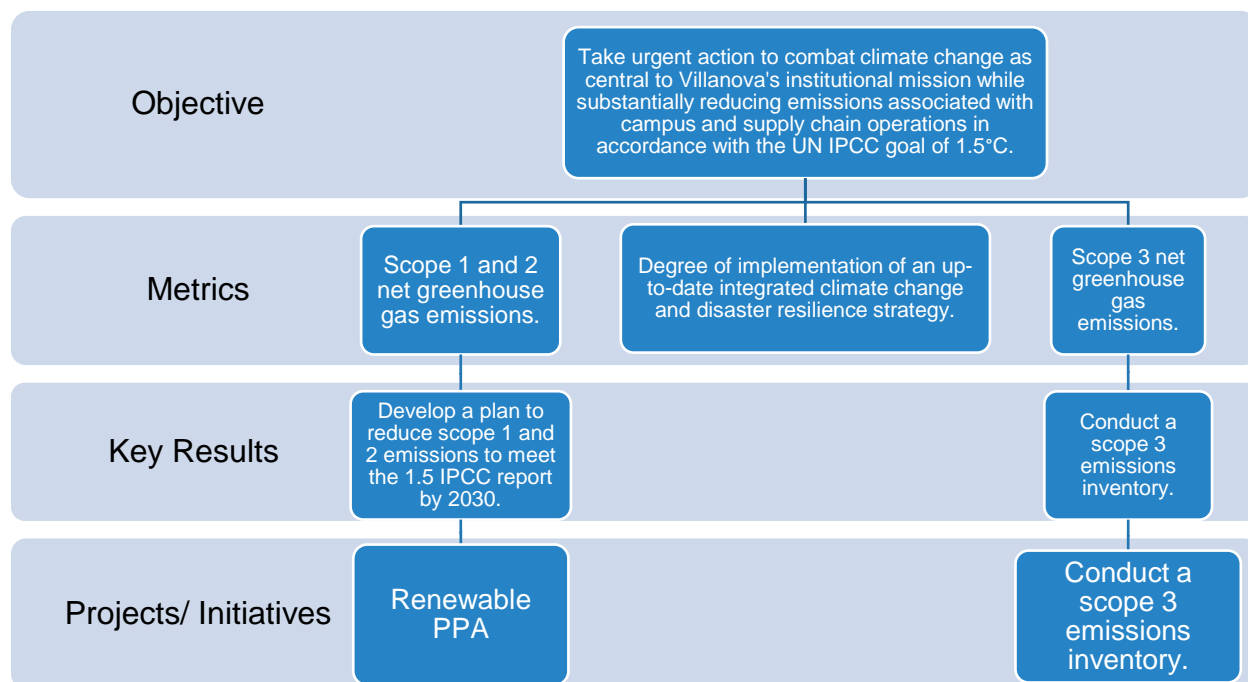
Figure 2.9. Objectives, Metrics, Key Results and Projects for SDG 13, Climate Action

The five committees brainstormed projects. The diversity of members and expertise allowed for the development of a wide range of projects that move us towards achieving all 41 key results. After VSLC adjusted and approved this list, the committees were tasked with managing and implementing the projects. While some projects have a short time span and achieve key results only for 2020–21, some projects have a longer one and aim to achieve key results in future time periods as well. Many projects contribute to the achievement of multiple key results in multiple time frames, while others may achieve only one or half of a key result in a single time frame. This variety in the relationship of key result to project shows the vast interconnectivity of the methodology and allows for the committees to creatively achieve the key result set by VSLC in whichever way it deems most efficient. Appendix C contains a full project list.

2.5.1 Project Score Improvement

To aid in project selection, council members evaluated the degree to which each project could improve Villanova's score. The Pahl and Beitz method was employed to perform the evaluation. In this method, the alternatives—in this case, the projects—are assessed against a set of

weighted criteria, or metrics. The metrics were already weighted from the materiality study discussed above.

First, the projects were assessed to see which metrics they directly affected. Most projects were relevant to at least three metrics. Next, they were evaluated in terms of how much they would improve the score for each metric. These estimates varied in accuracy depending on the amount of available data. Operations projects were most accurately predicted, due to their quantitative nature. The improvement for each affected metric was multiplied by the weight of the metric and summed across the metrics to determine the overall improvement to Villanova's sustainability score after completion of the project. Projects that would impact more metrics and more important metrics received a higher score increase and were prioritized. The score increase of each project can be found on the project profiles in Appendix C: Project Details.

2.5.2 Strategic Plan Integration

Villanova's new strategic plan, *Rooted. Restless,* lists sustainability as one of its foundational elements for the next decade. Many projects proposed in the Sustainability Plan align with the efforts of the Strategic Plan. To capture this alignment, VSLC matched each sustainability project with the associated strategic plan initiatives. Dr. Jim Trainer, the associate vice president and executive director of the Office of Strategic Planning and Institutional Effectiveness, led this matching. The projects were then assigned a score on a scale of 1–5 based on the degree of their alignment with the strategic initiatives. The distribution of scores that resulted from this exercise is shown in Figure 2.10. The roughly bell-shaped distribution demonstrates the majority of projects within a 3/5 alignment score. Projects from the Academics and Research Committee achieved the highest scores because the Strategic Plan also has a significant focus on academics. The Strategic Plan alignment score of each project can be seen in the project profiles in Appendix C.
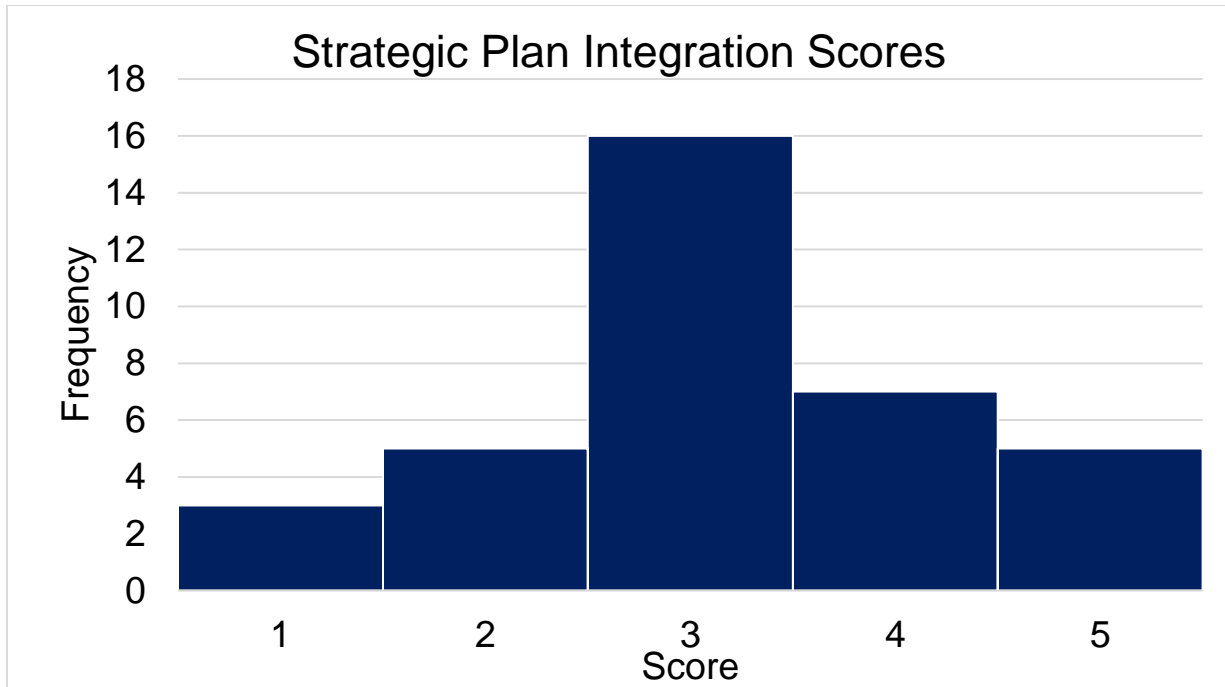
Figure 2.10. Strategic Plan Integration for Projects in the 2021 Key Result Period

2.5.3 Project Cost Estimation

Lastly, the projects were evaluated for their costs. For this evaluation, the projects were split into three new categories: Carbon Reduction Plan; Augustinian Institute for Climate, Justice, and Sustainability; and Community Focused. The first category contains roughly half a dozen projects associated with reductions in operational emissions. The second, the institute, an academic home for sustainability in curricula and research, contains eight daughter projects. The remaining projects for 2020–21 were bundled together as community focused.

Costs for the carbon reduction plan projects were deemed to be part of the University's preexisting commitment to carbon neutrality. As a result, the costs of these projects were not included in the cost of the Sustainability Plan. For the academic institute, the start-up costs for the first two years were estimated at $150,000 to $200,000. In the long term, the institute will be funded by a $10–$20 million endowment that the University will seek for this purpose. This money will support the salaries of the institute director, faculty fellows, visiting scholars and student scholars.

Villanova budgeting staff evaluated the community-focused projects on a case-by-case basis. The projects were assessed for the requirement of new hires, onetime costs, recurring costs and, in some cases, the revenue or savings generated. For the majority of projects, the costs are minimal and will be assumed by existing departmental budgets. Several projects, however, have larger costs and were assessed as new requests to the budget. These more expensive undertakings include two waste projects, stations for filling and cleaning water bottles, and new lactation rooms on campus. The total onetime new costs associated with these projects was estimated to be between $250,000 and $300,000.

3 CURRENT STATE OF VILLANOVA SUSTAINABILITY

3.1 STAKEHOLDER INPUT

As noted in Section 2, each SDG was adapted to an objective that best described Villanova's aspirations. All of the UN SDGs and Villanova objectives were weighted by stakeholders through survey sessions at Villanova using the AHP decision-making tool. The results from these stakeholder groups can be viewed in Figure 3.1, which is organized by the people, planet and prosperity categories. The people category was weighted the highest, with a weight of 41.4%. The next highest priority was the planet category, with a weight of 37.3%, followed by prosperity, with a weight of 21.3%. Each of these categories has a different number of goals.

Additionally, members of VSLC gave each metric a weight; consequently, they could compare the priority of metrics across objectives (see Figure 3.2). The VSLC and its committees could use these priority weights as a decision-making tool when creating key results and projects for the Sustainability Plan.

Table A.2 in Appendix A depicts all the details of each metric, including its current value, unit, bounds, weight and baseline score. Note that each metric in this table has an ID. The ID was given as (GOAL).(NUMBER OF METRIC IN GOAL). Explanations of why each metric as selected and how the bounds were set using the decision-tree method can be found in Section A.4 in Appendix A, as well as one-page summaries of each objective and goal.

Figure 3.1. Weight of Each Objective by Category Based on Stakeholder Input
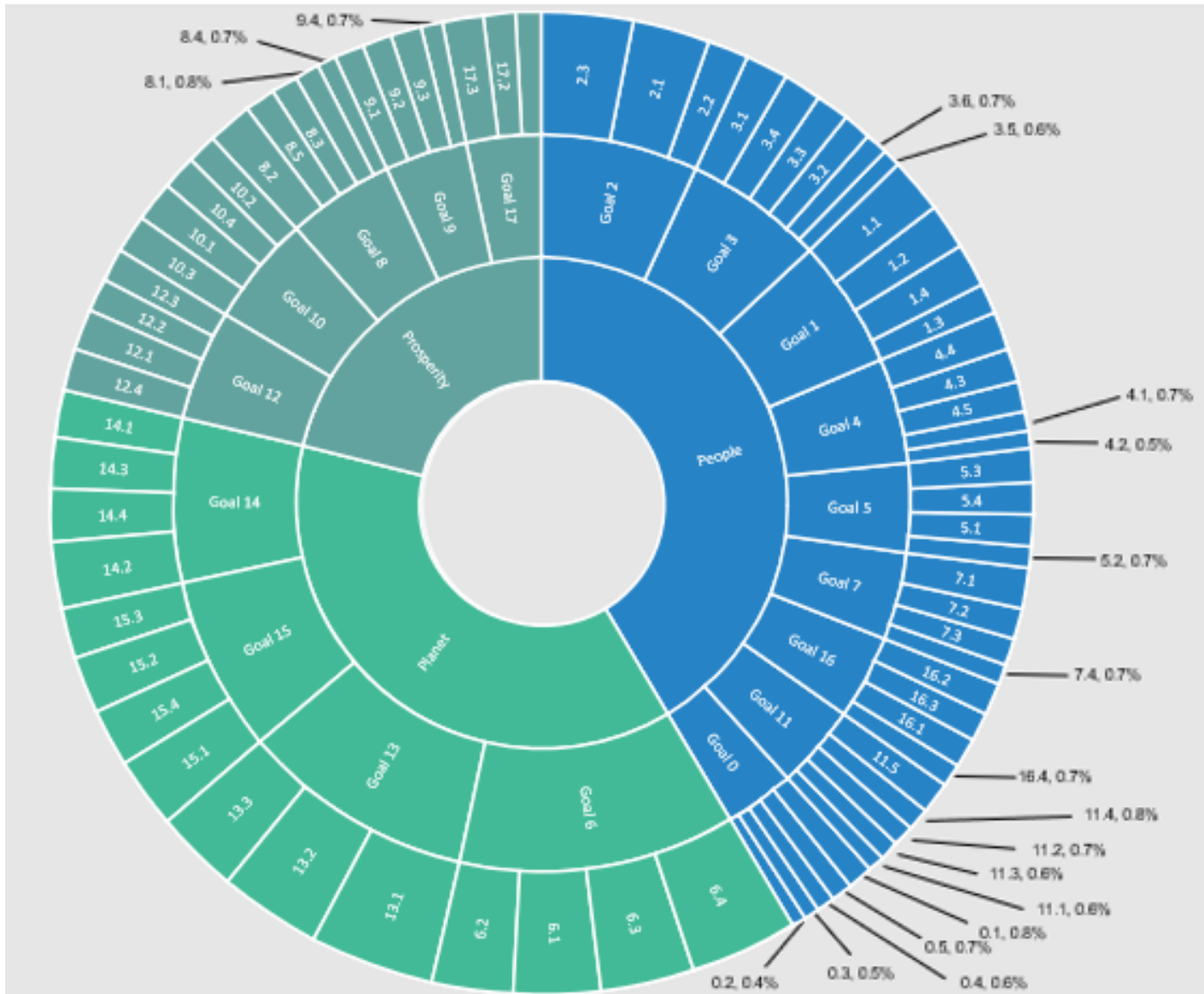
Figure 3.2. Weights of All Metrics in All Goals Based on Council Input

3.2 Sustainability Performance

Every three years, new data will be collected for all metrics in each goal to calculate a new score to track improvement in sustainability from 2018 to 2030. The data collected in 2018 contributes to Villanova's baseline score, or starting point, to track sustainability improvement. The score will be recalculated with new data in 2021, 2024 and 2027, and will be referred to as intermittent scores. The score achieved in 2030 will be Villanova's final score because this is the designated year by which Villanova hopes to achieve all 18 objectives adapted from the UN SDGs. It also is the year that the UN SDGs expire.

3.2.1 Baseline Score

The 2018 baseline score for Villanova is 31.9%, which means that Villanova is 68.1% away from achieving an ethos of sustainability on campus. This score can be broken down further by the score of each category (planet, people and prosperity), objective or metric, and then compared to the maximum score that can be obtained in each objective or metric (see Figure 3.3, Figure 3.4, and Figure 3.6). The difference between the maximum score and baseline score is called the score available; it can be used to evaluate which areas of sustainability Villanova needs to focus on the most.

Even though some categories and goals are weighted higher than others, this difference does not necessarily reflect the score available. For example, the planet category is weighted about 16% higher than that of prosperity. However, the planet's available score is 15.3%, whereas prosperity's score is 16.7%. These scores indicate that, although stakeholders think the planet category is more important than the prosperity one, Villanova needs to improve in the latter more than they do in the former as they work toward their ethos of sustainable living (see Figure 3.3). In another example, Goal 3 is weighted higher than Goal 1, but the available score for Goal 1 is 5.7%, whereas the available score for Goal 3 is 3.7%. Thus, the need to improve aspects of Goal 1 is a higher priority for 2020–21 than it is for Goal 3 (see Figure 3.4 and Figure 3.5). It is important to remember that all metrics in which Villanova did not have available data were assumed to have the value of the lower bounds or a baseline score of zero. This is especially prominent in Goals 1 and 8 (see Figure 3.4). Most metrics in Goals 1 and 8 use data collected by Human Resources at Villanova. Confidentiality issues prevent Villanova from publishing this data in the 2018 baseline score; therefore, Goals 1 and 8 have a baseline score of 0%. This large score available gives VSLC extra incentive to create a project in the next three years to obtain this data and get the

true score for these goals, as it is likely that Villanova is not performing at the lower bound for these metrics.

Figure 3.6 shows the baseline score and score available for each metric, ordered by goal. This plot shows that Goals 6, 13 and 2 have some of the highest-ranked metrics. Many of these metrics have a large score available due to lack of data or generally low-scoring performance. The large score available for these goals is reflected in the key results and projects created for 2020–21. More key results and projects were created for these goals than for other goals because Villanova is underperforming in these goals, and they are of higher importance to stakeholders (see Appendices A and B).

Although metrics and goals with more score available take a higher priority when it comes to action, metrics and goals with a smaller score available are still important. Villanova is striving for an ethos of sustainable living and for an overall score of 100%. Therefore, the score available simply indicates areas where Villanova can make greater improvements. As Villanova works toward closing the score gap on these metrics, its score will improve and the metrics that now have a high score available will rise to the top of the priority list. This cycle will continue until the overall score of all objectives and goals reaches 100%. Prioritizing metrics and objectives by "score available" highlights where immediate action is needed to achieve results by 2030.
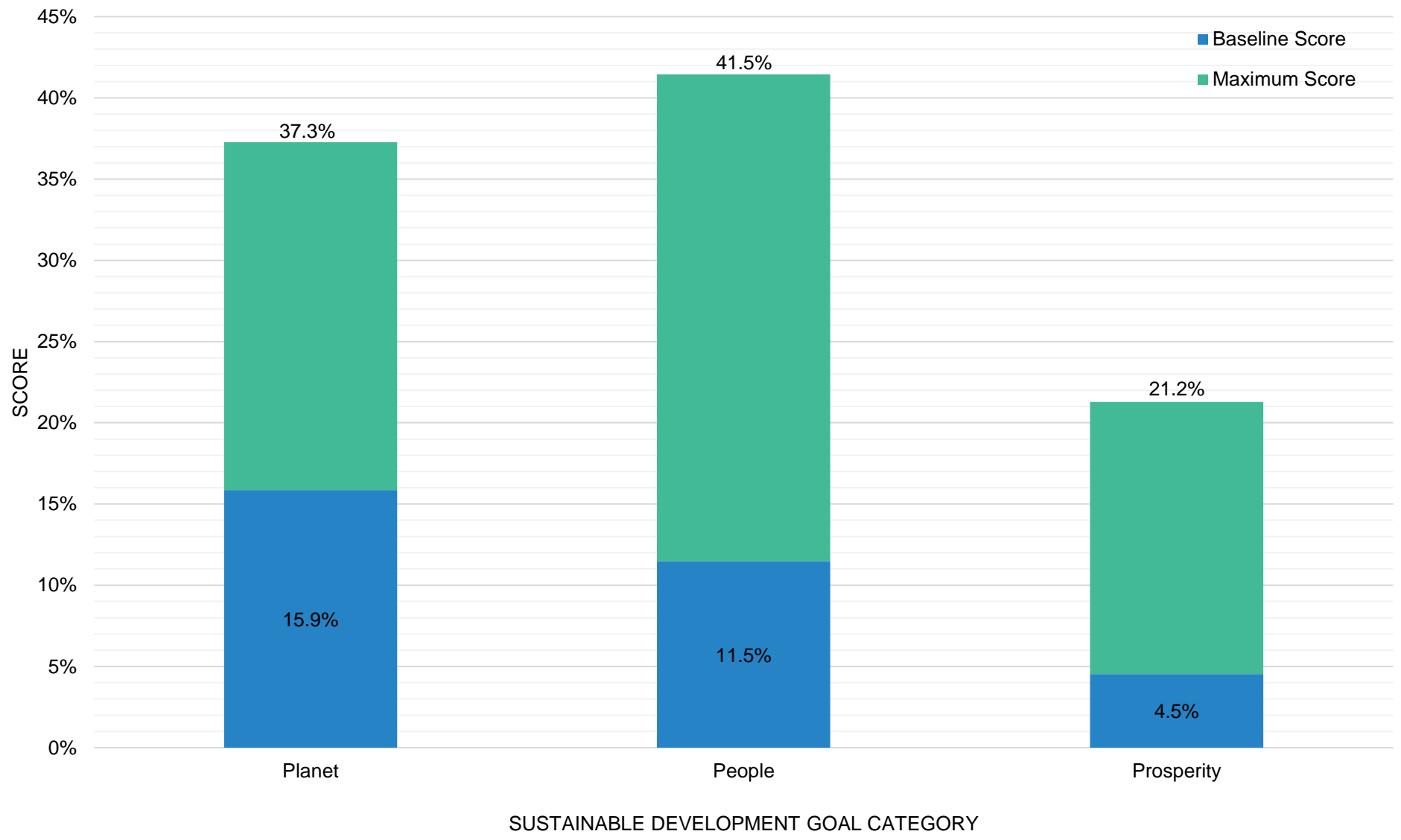
Figure 3.3. Baseline Score in 2018 Compared to the Maximum Score by People, Planet and Prosperity Categories
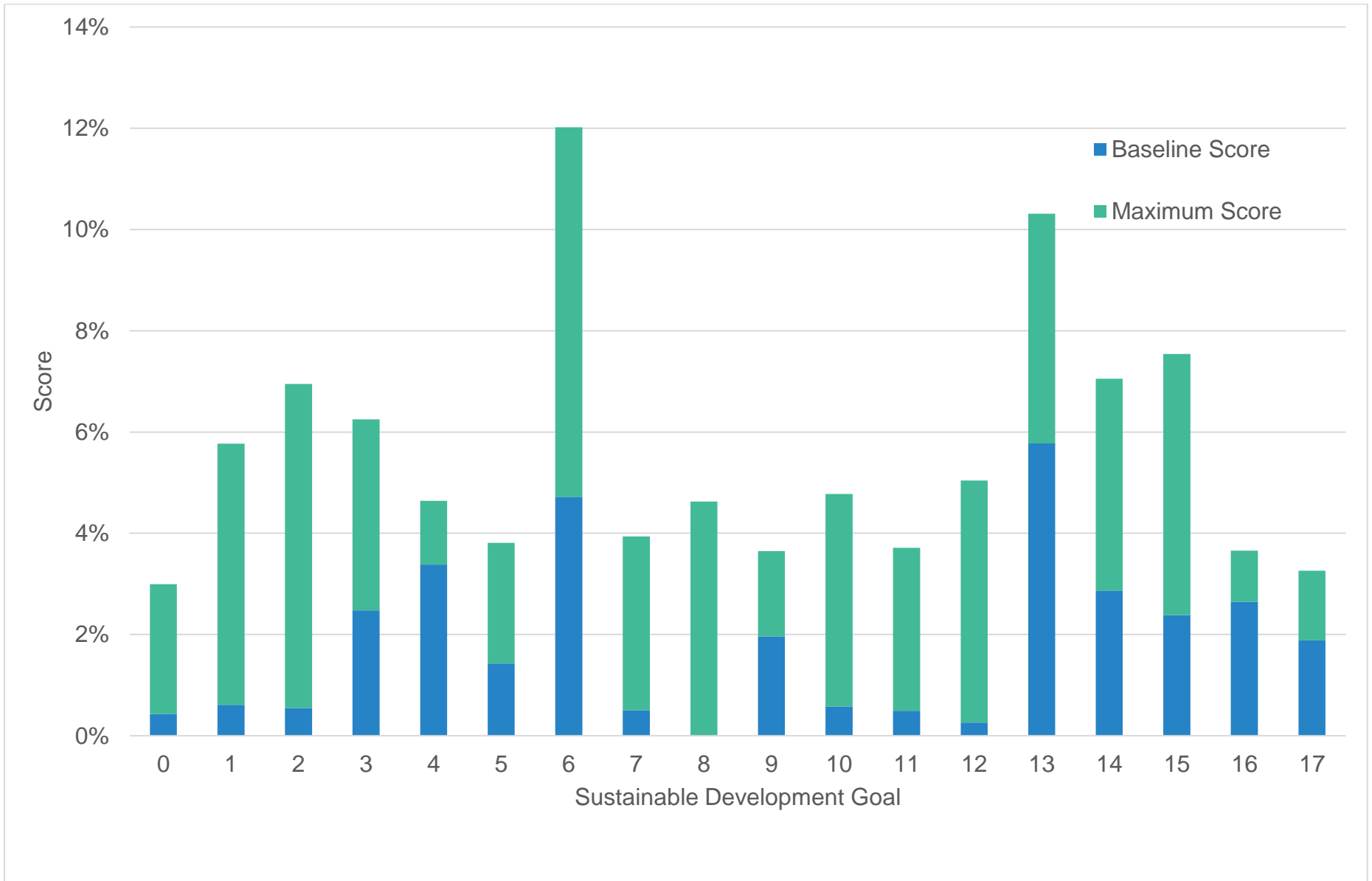
Figure 3.4. Baseline Score in 2018 Compared to the Maximum Score by Objective/SDG
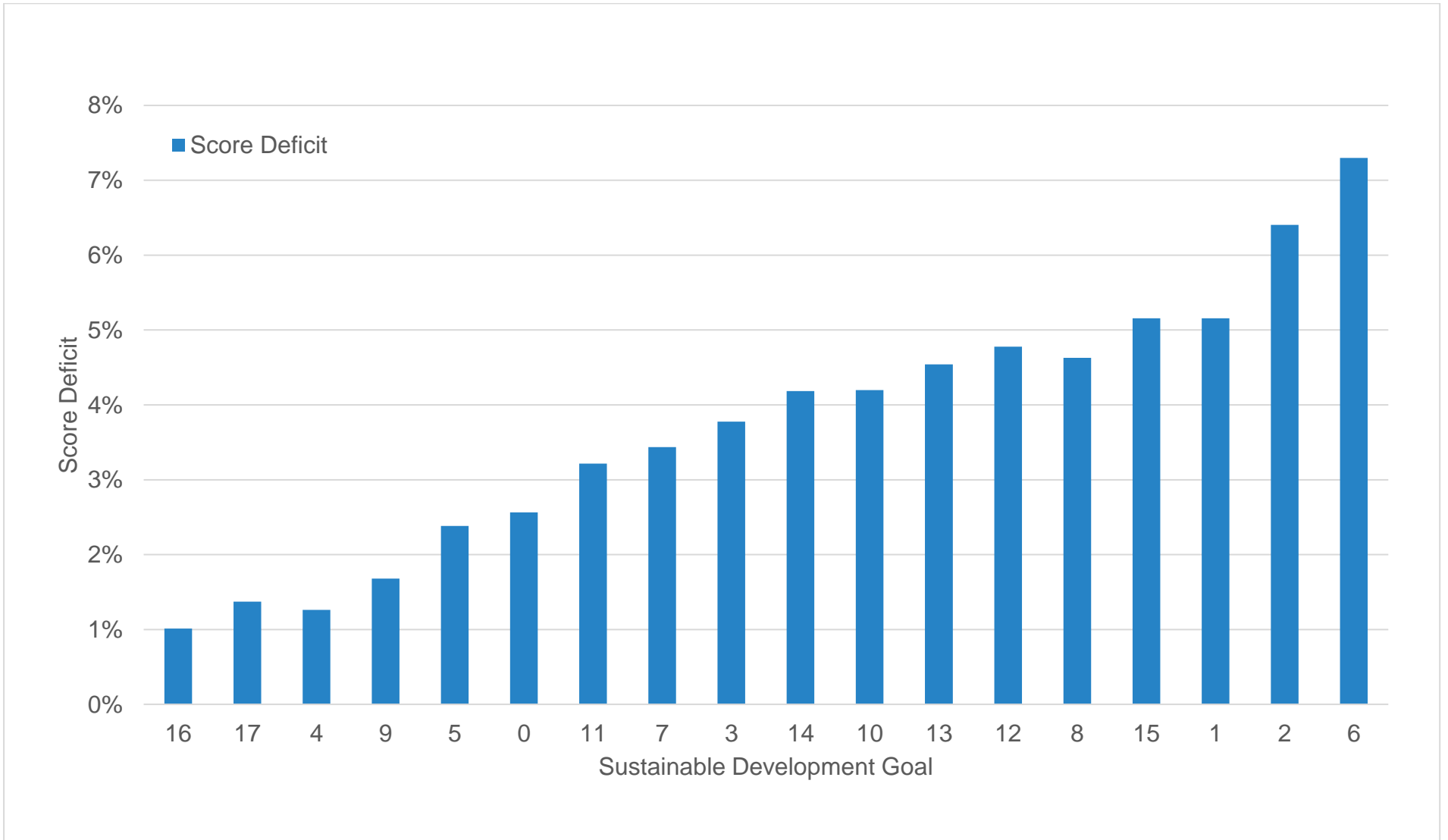
Figure 3.5. SDG/Objectives Ordered by Score Deficit
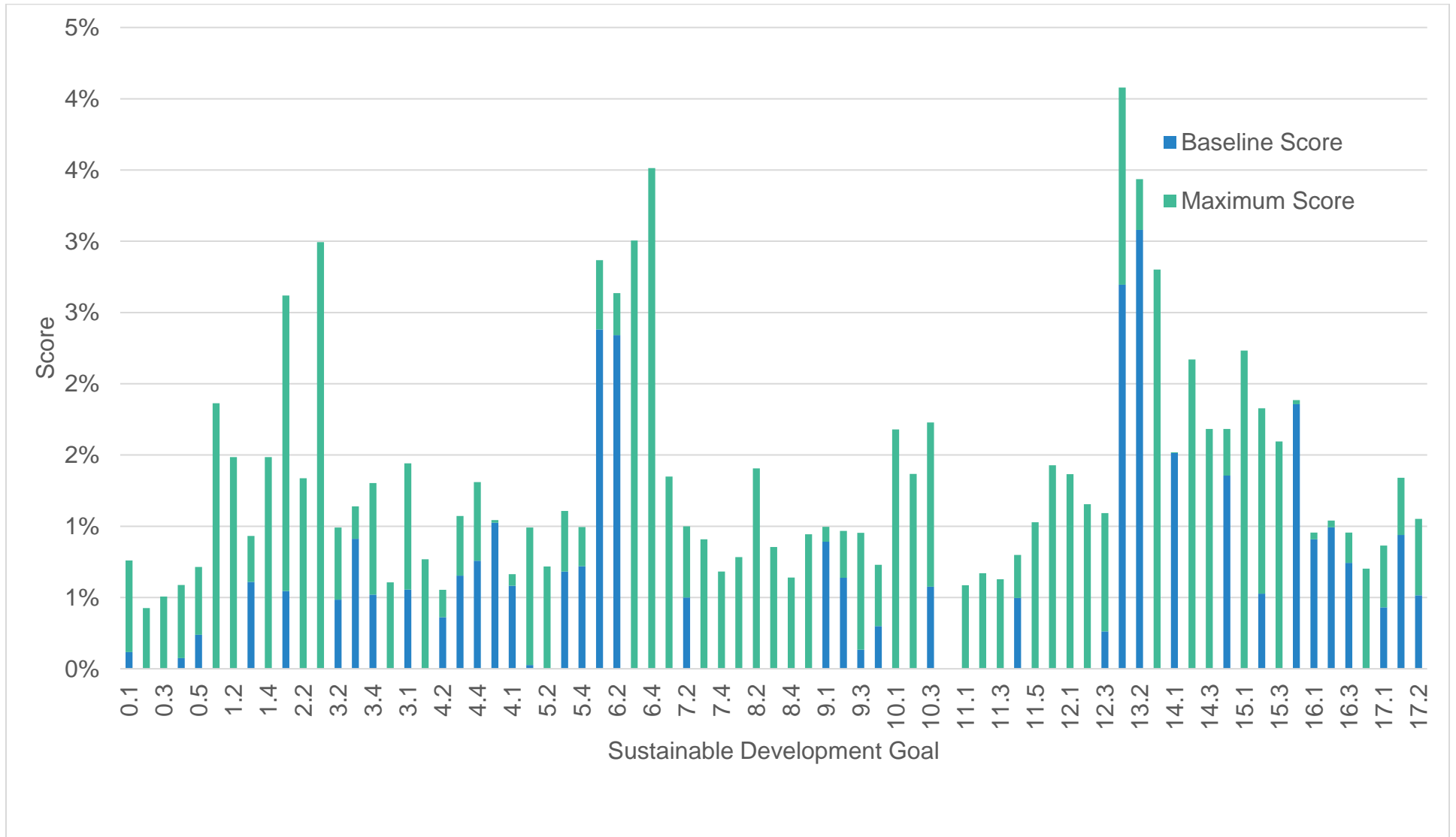
Figure 3.6. 2018 Baseline Score Compared to Maximum Score by Metric

4 IMPLEMENTATION AND ACTIONS

4.1 VILLANOVA SUSTAINABILITY LEADERSHIP COUNCIL AND COMMITTEES

To achieve an ethos of sustainability as measured by the scoring system in this plan, Villanova created VSLC, a governmental structure that develops key results and implements projects. VSLC, which is supported by five committees, comprises staff and faculty in leadership positions across the University who have the power to approve proposed initiatives on campus. In addition, a handful of student members represent the views of Villanova's largest stakeholder group.

In Spring 2019, VSLC created the first set of key results to be accomplished by the end of 2021. The members chose these key results based on the score available for metrics, as well as the need for data. VSLC also drafted key results for the years 2024, 2027 and 2030. (Table A.3 in Appendix A shows the key results set for 2021, as well as the drafted key results for 2024, 2027 and 2030.) The adoption of drafted key results will depend upon future developments and shifting priorities. At the beginning of each of these time periods, VSLC will meet to craft new key results for the immediate term. This process ensures that Villanova's sustainability goals are up to date with the technology and financial abilities of the University.

The working groups that act on the decisions of VSCL are called committees, and their leaders are members of the council. These committees are (1) Academics and Research, (2) Operations, (3) Social Justice, (4) Student Life, and (5) Health and Well-Being all of which include students, faculty and staff from across campus. The role of the committees is to consider the key results crafted by VSLC and brainstorm projects that achieve these key results, thereby effectively improving the metric scores and creating a more sustainable campus. VSLC evaluates, approves or rejects projects based on the implementation feasibility. The advantage of this process is that committees are composed of members of the University whose role is already to carry out projects and run day-to-day activities. The members of VSLC are upper-level managers, deans and administrators. This set-up ensures that all levels of faculty and staff at Villanova approve every project and thus minimizes the number of political roadblocks to completing a project. Additionally, the committees will submit quarterly updates to the VSLC on project progress. New projects or continuations of projects will be proposed after the creation of new key results at the start of each three-year period.

The VSLC and committees' memberships are listed in Table 4.1. VSLC Membership

Table 4.2. Academics and Research Committee Membership, Table 4.3. Operations Committee Membership, Table 4.4. Social Justice Committee Membership, Table 4.5. Student Life Committee Membership, and Table 4.6. Health and Well-Being Committee Membership.

Table 4.1. VSLC Membership

Name	University Position	Name	University Position
William Lorenz*	Faculty	Jonathan Doh	Faculty
Art Purcaro, OSA*	Staff	Raymond Duffy	Staff
Robert Morro*	Staff	Katie Fischer	Staff
Alfonso Ortega*	Faculty	Frank Galgano	Faculty
Joseph Lennon*	Faculty	Dan Griffin	Staff
Kathryn Getek Soltis*	Staff	Mark Hewlett	Staff
Liesel Schwarz*	Staff	Neil Horgan	Staff
Stacy Andes*	Staff	Kate Johnston	Staff
Todd Aagaard	Faculty	C. "Nat" Nataraj	Faculty
Brian Anderson	Staff	Paul Rosier	Faculty
Heather Brown	Staff	Jim Trainer	Staff
Kathy Byrnes	Staff	Randy Weinstein	Faculty

Note: William Lorenz and Art Purcaro, OSA, are the council co-chairs. Robert Morro is the Operations Committee chair. Joseph Lennon and Alfonso Ortega are the Academics and Research Committee co-chairs. Kathryn Getek Soltis is the Social Justice Committee chair. Liesel Schwarz is the Student Life Committee chair. Stacy Andes is the Health and Well-Being Committee Chair.

Table 4.2. Academics and Research Committee Membership

Name	University Position	Name	University Position
Joseph Lennon	Faculty	John Olson	Faculty
Alfonso Ortega	Faculty	James Peyton-Jones	Faculty
Todd Aagard	Faculty	Justinus Satrio	Faculty
Jonathan Doh	Faculty	Liesel Schwarz	Staff
Seth Fishman	Faculty	Virginia Smith	Faculty
Frank Galgano	Faculty	Pritpal "Pali" Singh	Faculty
Steven Goldsmith	Faculty	Robert Traver	Faculty
Calvin Li	Faculty	Bridget Wadzuk	Faculty
Sylvie Lorente	Faculty	Pete Watkins	Faculty
Jean Lutes	Faculty	Aaron Wemhoff	Faculty
Ruth McDermott-Levy	Faculty	Nathaniel Weston	Faculty

Table 4.3. Operations Committee Membership

Name	University Position	Name	University Position
Robert Morro	VP for Facilities Management	Alice Lenthe	Staff
Sunny Hallowell	Faculty	John Olson	Faculty
Patrick Higgins	Staff	Seri Park	Faculty
Joseph Hohman	Staff	Ashwin Puri	Staff
Shawn Howton	Faculty	Jared Rudy	Staff
Megan Jacobs	Staff	Robert Traver	Faculty
Jim Kolumban	Staff	Joseph Ungaro	Staff

Table 4.4. Social Justice Committee Membership

Name	University Position	Name	University Position
Kathryn Getek Soltis	Director, Center for Peace and Justice Education	George Kolb	Staff
Art Purcaro, OSA	Faculty/Staff	Jean Lutes	Faculty
Jerry Beyer	Faculty	Connor McKenzie	Undergraduate Student
Kevin DePrinzio	Staff	Christian Miller	Undergraduate Student
Allan Fitzgerald, OSA	Faculty/Staff	Terry Nance	Faculty/Staff
Kate Giancatarino	Staff	Madeline Ochabillo	Undergraduate Student
Sunny Hallowell	Faculty	Shawn Proctor	Staff
Mark Jackson	Staff	Claryn Spies	Graduate Student

Table 4.5. Student Life Committee Membership

Name	University Position	Name	University Position
Liesel Schwarz	Staff	Jade Labak	Student
Delaina Castillo	Student	Jameson Parker	Student
Katherine Garmer	Student	Jenna Kolano	Student
Gabriela Juniewicz	Student	Julia Ugras	Student
Leah Eastment	Student	John V. Nguyen	Student
Beatriz DeJesus	Student	Kathleen Deal	Student
Madison Bruns	Student	Kelly Ruane	Student
Alexa Schoeneborn	Student	Layla Defino	Student
Alexander Saad	Student	Mai Khuc	Student
Amelia Robinson	Student	Matthew Peterson	Student
Bella Yedman	Student	Nathaniel Roman	Student
Courtney McPheter	Student	Nishika Goel	Student
Daniela Sofia Nelson	Student	Olivia Brown	Student
Emma Tucker	Student	Shiyu Su	Student
Eric Devlin	Student	Simon Brooks	Student
Gillen Curren	Student	Siobhan Merrill	Student
Hannah Darenshourg	Student	Victoria Adams	Student

Table 4.6. Health and Well-Being Committee Membership

Name	University Position	Name	University Position
Stacy Andes	Staff	James Kolumban	Staff
Gretchen Bernatowicz	Staff	Amy McKeever	Faculty
Linda Coleman	Staff	Isabella Scala	Student
Mark Doorley	Faculty	Allison Venella	Staff

4.2 KEY RESULTS AND PROJECTS

As stated previously, key results were developed to improve the score of the metrics in each of the objectives. Key results are tied to a metric, which definitively states which goals the University aims to achieve within the four separate time periods, starting in 2020 and ending in 2030. Developed by VSLC members, key results are achieved through projects created and implemented by the committees. Below is the list of the projects being implemented that achieve the key results for the 2020–21 period, as well as some that have been deferred. As more key results are defined for each intermittent period, more projects will be created and implemented.

Some projects have longer-term outcomes, and their deliverables will be reevaluated in 2021, but they will continue to be implemented under the same project name. This list will be updated continually in appendix C as projects are completed and more are formed. Updates to the success of the projects will also be stated. Also available in Appendix C is each project's details, team members, cost estimates, estimated score improvement, milestones and integration into Villanova's Strategic Plan.

Academics and Research Committee Projects:

1. Villanova Institute for Climate Justice, and Sustainability (ICJS)
    a. Inventory of Courses on Climate, Sustainability, Environmental Justice (ICJS)
    b. Integration of Sustainability into Courses (ICJS)
    c. Sustainability Undergraduate Research Fellows (ICJS)
    d. Climate adaptation of community-based organization that serve older adults in Philadelphia (ICJS)
    e. Case definition of climate-related mortality and measurement of climate mortality 2009-2019 in Pennsylvania (ICJS)
    f. Augustinian Local and Global Outreach (ICJS)
    g. Community Partnership Initiative (ICJS)
    h. Campus Living Laboratory Initiative (ICJS)
    i. Sustainability Research Fund (ICJS)
2. Villanova Food Sustainability Initiative
3. Sustainability Colloquium
4. Earth Day and Climate Awareness Program
5. Biodiversity Assessment and Action Plan

Operations Committee Projects:

1. Renewable Power Purchase Agreement
2. Green Office and Lab Program
3. Commuting Emissions Reductions
4. Campus-Wide Energy Efficiency
5. Campus-Wide Smart Metering Program
6. Rewards for Taking Public Transport to Villanova Events
7. University Vehicle Emission Tracking
8. Promotion of Reusable Water Bottles

9. Waste Disposal Uniformity
10. Dining Services Sustainability
11. Waste Audit and Action Plan

Social Justice Committee Projects:

1. Hiring for Villanova's Future
2. Living Wage
3. Just Employment Policy
4. Dependent Care Support Project
5. Project to Procure from Living Wage and Fair-Trade Companies
6. TJEI: Donations
7. TJEI: Information Access

Student Life Committee Projects:

1. Encouraging Sustainable Behavior Changes
2. Villanova's Sustainable Diet
3. Plastic Reduction Project
4. Student Input on Construction Projects

Health and Well-Being Committee Projects:

1. Graduate Student Health Care
2. Extra Meal Donations Project
3. Sexual Justice Project
4. Binge Drinking and Drug Reduction Project
5. Women's Health
6. Nova-Nook Expansion
7. Expand NovaFit to Students

4.3 POTENTIAL OUTCOMES

The outcomes of Villanova's plan will be the true measures of success. The potential outcomes listed in this section will be the result of completing the projects listed above, which aim to achieve the first set of key results.

Villanova's objectives, metrics, and key results can be seen in detail in Appendix A. The first set of key results will be completed between 2019 and 2021 and the successful completion of 2021's key results will usher in improvements for the planet, the well-being of all people and the prosperity of the Villanova University community. A detailed range of positive social, economic and environmental impacts will directly follow the accomplishment of these key results, due to their development in accordance with Villanova's rendition of the UN SDGs.

Key results in the people sphere linked to the metrics assigned to Goals 0, 1, 2, 3, 4, 5, 7, 11 and 16 will lead to beneficial outcomes, including improved prioritization of social equality in efforts involved with Villanova University's student acceptance and graduation rates, assessment and improvement in the provision of resource support for familial and gender-related policies, and mandated diversity policy in hiring patterns across all levels of employment at Villanova University. Assessment of the effective integration of individual rights and opinions in administrative justice at Villanova University, as well as philanthropic expansion associated with the Strategic and Sustainability Plans, is also among these social-themed key results. The key results aimed at health and well-being will improve the nutritional and sustainable performance of Villanova's food network, assess the indicators of good-health practices throughout the campus community, and begin to provide equal access to resources that help to maintain these practices across all of the Villanova community.

Many key results in this plan will directly result in improved planetary, or environmental, sustainability throughout Villanova University's organization. Goals 6, 13, 14 and 15 all are directly related to environmental health. The key results set for 2021 linked to the metrics that measure these goals will yield improvements, including data collection on water consumption and waste, reduction of single-use waste involved in water consumption, on-site energy intensity and carbon emissions reduction and long-term planning, and establishment of plans to more effectively monitor air quality and campus ecosystem health. Biodiversity and campus ecosystem productivity assessments will also be included in this first round of key results. Additionally, 2021 will see the completion of a campus waste audit, elimination of pre-consumer waste, and marked improvements in recycling, waste-disposal, and sustainable procurement practices.

Finally, prosperity key results will evolve from work on metrics affiliated with Goals 8, 9, 10, 12 17. Successful achievement of these key results will lead to such positive impacts as assessing the efficacy of Villanova University and its vendors or contractors in providing employees with living wages and the establishment of commitments to employee-centered workplace rights

policies. These results can be simultaneously associated with more than one of the Villanova UN SDGs used to model this plan.

4.4 FUTURE PROGRESS TRACKING

A core group of graduate research assistants in the Sustainable Engineering program at Villanova will collect data every three years for the next ten years (2021, 2024, 2027 and 2030) to track Villanova's progress toward an ethos of sustainable living. The tasks of this research group include, among others, implementing data collection projects, analyzing data and progress, organizing committee and VSLC meetings, calculating new scores, and implementing their own projects to improve Villanova's sustainability. The funding for this group comes from the generous gift of the DiLoreto family. During 2022, Villanova may hire a full-time employee in a new sustainability leadership position to manage the plan and possibly become the chair of the VSLC.

This plan will be updated for each new key result period. New stakeholders will be polled using AHP, which will change the weights of the SDGs. As data acquisition projects are completed, a better understanding of Villanova's sustainability position will emerge. As other projects are completed, the score will increase and score available for each metric will change, revealing new priority areas. Achieving sustainability will be a moving target that will require consistent action.

4.5 THREE-TIER APPROACH AND SOFTWARE

An integrated three-tier approach was created to achieve an ethos of sustainable living. The three tiers are personal, community and institutional. A visual representation can be seen in Figure 4.1. Three-Tier Approach to Sustainable Action. The goal of this approach is to encourage action among all members of the Villanova community. Sustainability is a culmination of efforts that requires the dedicated cooperation of administration, students, faculty, staff and the surrounding community.

All levels of sustainability involvement should be integrated. The personal tier is focused on individual actions that bring about positive environmental change or those that reduce environmental impact. The community tier is focused on actions that a small group of individuals can achieve. Lastly, the institutional tier explores the impact that can be made at the administrative level of the University. This model can be used as a tool for administrative and community change,

while guiding positive individual action. If Villanova can positively influence the daily behavior of its community, it can greatly increase its sustainability handprint.

Two pieces of software that will facilitate the three-tier approach are being developed. The first is for the enterprise management of the Sustainability Plan, to be used by the VSLC and management team. The second is a mobile app to be used by all members of the community to help them measure, understand and reduce their impact. This app can be used as a learning tool in the classroom and will incorporate social contests and challenges to encourage action along four pathways of everyday life: Shelter & Energy, Food & Beverage, Transportation & Travel, and Consumer Purchasing. Together, the software will enable Villanova to make its campus safer, cleaner, healthier and more equitable. The enterprise software will be available for use at other colleges, universities and businesses, while the app will be made available to all.
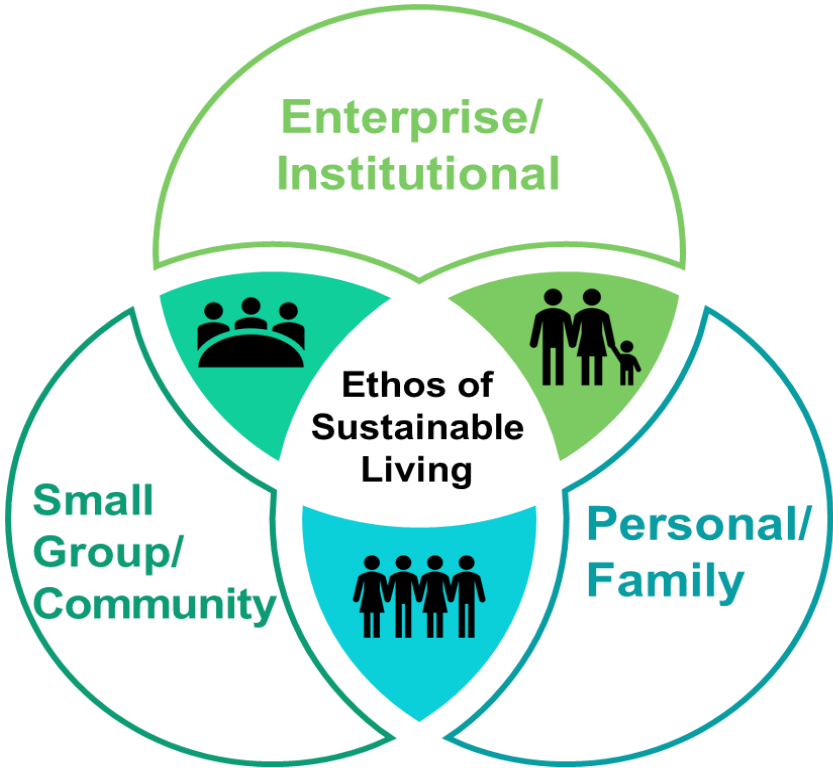
Figure 4.1. Three-Tier Approach to Sustainable Action

5 CONCLUSION

Villanova's Sustainability Plan, alongside its Strategic Plan, will guide the University through the next decade to improve personal, communal and institutional sustainability, positively impacting daily routines, systemic structures, equitability and quality of life. Uniting the sustainability actions of persons, communities and institutions will provide benefits to the campus, region and world that are greater than the sum of the parts. At the core of all sustainability activities, both large and small, is Villanova's vision for this plan: to establish an ethos of sustainable living.

A. APPENDIX A: OBJECTIVE, METRIC, AND KEY RESULT DETAILS

This appendix includes the following:

1. A table of Villanova objectives adjusted from UN SDGs.
2. A table of metrics with their unit, bounds, baseline value in 2018, maximum score, and baseline score.
3. A table of key results for all time periods.
4. Reasoning and details as to why metrics were selected and how they were bounded.

This section contains one-page summaries of each goal/ objective. Included in these summaries are the SDG, objective, baseline score, maximum score, metrics, and key results.

Table A.1. Wording of Adjusted Villanova Objectives from UN SDGs

UN SDG	Villanova Objective
Goal 0 – Sustainability in Academics	Integrate sustainability into campus curricula, research, and outreach to achieve an ethos of sustainable living at Villanova.
Goal 1 – End Poverty in All its Forms Everywhere	Assure that no Villanovan's compensation rate is below living wage guidelines; Villanova supports and participates in local and global initiatives to eradicate extreme poverty; Villanova assures Villanovans have equitable access to basic resources and requires livable wages in their supply chain.
Goal 2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Ensure that every Villanovan has access to and is educated on sustainably sourced and appropriate nutrition. Take action to ensure that food is used as efficiently as possible.
Goal 3 – Ensure healthy lives and promote well-being for all at all ages	Promote healthy lifestyles as well as provide access to affordable and quality physical and mental health care for all Villanovans.
Goal 4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Promote water conservation and reduce Villanova's impacts on terrestrial ecosystems as they relate to aquatic environments.
Goal 5 – Achieve gender equality and empower all women and girls	Promote and attain gender equality and empower all people at Villanova.
Goal 6 – Ensure availability and sustainable management of water and sanitation for all	Attain sustainable water practices at Villanova in terms of potable water, watershed, stormwater, water quality, and wastewater management.
Goal 7 – Ensure access to affordable, reliable, sustainable and modern energy for all	Reduce Villanova's energy intensity and increase the share of Villanova's energy coming from renewable sources.
Goal 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Achieve just working conditions and compensation at Villanova, while securing Villanova's long-term institutional economic growth.
Goal 9 – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Promote innovation by supporting research as well as designing, building, and maintaining sustainable and resilient infrastructure on the Villanova campus.
Goal 10 – Reduce inequality within and among countries	Reduce inequality within the Villanova community.

UN SDG	Villanova Objective
Goal 11 – Make cities and human settlements inclusive, safe, resilient and sustainable	Make Villanova's community inclusive, safe, resilient, and sustainable.
Goal 12 – Ensure sustainable consumption and production patterns	Achieve zero waste by building awareness of circular procurement/operational models at Villanova.
Goal 13 – Take urgent action to combat climate change and its impacts	Take urgent action to combat climate change as central to Villanova's institutional mission while substantially reducing emissions associated with campus and supply chain operations in accordance with the U.N. IPCC goal of 1.5°C.
Goal 14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Promote water conservation and reduce Villanova's impacts on terrestrial ecosystems as they relate to aquatic environments.
Goal 15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Integrate biodiversity, business practices, and research to protect natural ecosystems from degradation at Villanova.
Goal 16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Increase safety, satisfaction, healthy relationships, and transparency on the Villanova campus.
Goal 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development	Leverage Villanova's sustainable expertise and financial influence to connect people and advocate for sustainable ideas.

Table A.2. Details of Each Metric, Including Description, Unit, Bounds, Baseline Value, Maximum Score, and Baseline Score

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
0.1	Percentage of courses that include sustainability learning outcomes encompassed by the SDGs.	%	31%	0%	5%	0.78%	0.12%
0.2	Incentives for faculty across all disciplines to incorporate sustainability into existing courses or develop new sustainability courses.	$ per course	$2,000	$0	-	0.43%	0.00%
0.3	Existence of and performance on a sustainability literacy assessment for students.	%	100%	0%	0%	0.52%	0.00%
0.4	Percentage of students who graduate from programs that have adopted at least one sustainability learning outcome	% of Programs	100%	0%	12.75%	0.60%	0.08%
0.5	Percentage of research-producing departments that are engaged in sustainability research	%	100%	0%	33%	0.73%	0.24%
1.1*	Proportion of employees, including student employees, that earn below a living wage. A living wage is defined as at least 125% of the MIT calculator living wage for 1 adult with 0 dependents.	%	0%	39.60%	39.60%	1.85%	0.00%
1.2*	Minimum hourly earnings (lowest pay band) of employees disaggregated by students, part time, and full time.	$/hr	$15	$7.25	$7.25	1.47%	0.00%
1.3*	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	$	$71,454.00	$36,088.00	$36,088.00	0.92%	0.00%
1.4	Proportion of procurement expenses from tier 1 suppliers that have living wages or equivalent for its employees.	%	100%	0%	0%	1.47%	0.00%
2.1	Prevalence of moderate or severe food insecurity in the university population, based on the Food Insecurity Index.	%	0	48.0%	38.0%	2.59%	0.54%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
2.2*	The proportion of students, faculty, and staff that are meeting their caloric and nutritional needs without consuming in excess.	HEI Dietary Score on campus	100	57.8	57.8	1.32%	0.00%
2.3*	Percentage of food disposed of in a non-circular manner.	%	0%	100%	100%	2.96%	0.00%
3.1	Harmful drug abuse as measured by proportion binge drinking and proportion of student, faculty, and staff who use tobacco products or any illicit drug habitually.	%	0.00%	100.00%	61.4%	1.39%	0.54%
3.2	Percentage of sexually active students practicing safe sex and prevention of STDs (condoms, or abstinence).	%	100.00%	0.00%	49.0%	0.96%	0.47%
3.3	Percentage of University insurance provided physical and mental health care that is an out of pocket expense for a student, faculty, or staff member.	%	0%	100%	20.0%	1.10%	0.88%
3.4	Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	weeks	15	0	6	1.26%	0.50%
3.5*	Proportion of students, faculty, and staff receiving age appropriate sleep per night during the semester.	%	100%	0%	0%	0.59%	0.00%
3.6*	Thriving quotient. NOTE: Stacy Andes is conducting this study and the metric will be constructed around her data.	Thriving Quotient Scale	6	1	1	0.74%	0.00%
4.1	Graduation rate of Villanova undergraduate students in 4 years.	%	100%	19%	90%	0.66%	0.58%
4.2*	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	$	$71,454	$36,088	$36,088.00	0.55%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
4.3	Net annual aid for first time, first generation students whose family earnings are in the lowest income bracket of reported to IPEDs.	$	$68,231.00	$4,206.00	$43,299.00	1.06%	0.65%
4.4	Proportion of student population made up of underrepresented groups: Black, Hispanic, Asian, Native American.	%	41.5%	0%	24%	1.30%	0.75%
4.5	Percent difference of graduation rate in 4 years of the underrepresented groups.	%	0%	100%	2%	1.03%	1.01%
5.1	Proportion of faculty, staff, and students reporting sexual violence, discrimination, or harassment in their time at Villanova.	%	100%	0%	3%	1.01%	0.03%
5.2*	Average cost incurred by students, faculty, and staff to pay for dependent care while working at Villanova.	$/year	-	$48,000.00	$48,000.00	0.73%	0.00%
5.3	Proportion of seats held by women in leadership positions on the President's cabinet, council of deans, and provost council.	%	50%	0%	30.77%	1.13%	0.70%
5.4	Satisfaction of female and male employees in their work environment, work policies, and with family friendly services and facilities at Villanova.	%	6	1	4.61	1.02%	0.74%
6.1	Total potable water used per year.	gal/ weighted campus user	35.06	76,201.10	12933	2.90%	2.41%
6.2	Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing peak flow. This includes raingardens, constructed wetlands, and green roofs.	%	100%	0%	88.8%	2.67%	2.37%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
6.3*	Percentage of rainfall captured from impervious surfaces on campus.	%	100%	0%	0	3.04%	0.00%
6.4*	Mass of plastic due to water and beverage consumption sold on Villanova's campus (soda, sports drinks, water, coffee, etc.)	lb./ weighted campus user	0	0.006	0.006	3.56%	0.00%
7.1	Renewable energy share in the total campus energy consumption (Scope 1 and 2).	%	100%	0%	0%	1.33%	0.00%
7.2	Campus's energy intensity (site energy).	mmBtu/ GSF	0.0211086	0.298653	0.16	0.99%	0.49%
7.3	Percentage of the institution's investment pool in positive sustainability investments.	%	47.07%	0%	0.12%	0.90%	0.00%
7.4*	Equivalent Gallons of fossil fuel burned (gasoline, Diesel) per mile traversed by university vehicles.	gal/mile	0	0.045	0.045	0.67%	0.00%
8.1*	Annual growth rate of Villanova total revenue per employed person ($/full time employee equivalent).	$	7.96%	-	-	0.80%	0.00%
8.2*	Minimum hourly earnings (lowest pay band) of employees disaggregated by undergraduate and graduate students, part time, and full time.	$	$15	$7.25	$7.25	1.44%	0.00%
8.3*	Largest percent difference in attrition rates between genders and races.	%	0%	100%	100%	0.88%	0.00%
8.4*	Recordable injury rate. (OSHA)	Cases/ 100 full time employees	0	2.9	2.9	0.66%	0.00%
8.5	Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	weeks	15	6	6	0.97%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
9.1	Net carbon emissions emitted by student, faculty, and staff commuters.	MT CO2e/weighted campus user/ yr	0	3.61	0.37	0.99%	0.89%
9.2	Scope 1 and 2 net greenhouse gas emissions.	MT CO2e/ weighted campus user/ yr	0	13.32368	4.5	0.96%	0.64%
9.3	Percentage of campus building built and certified to current sustainable standards. (AASHE and LEED as of 2019)	%	100%	0%	14%	0.95%	0.13%
9.4	Percentage of students and faculty actively engaged in research.	%	100%	0%	41%	0.73%	0.30%
10.1*	Proportion of students and employees that earn below a living wage.	%	0%	100%	100%	1.29%	0.00%
10.2*	The average diversity level of new hires for each "band" of jobs hired on a five-year rolling basis.	%	100%	0%	0%	1.05%	0.00%
10.3	Proportion of minority members in leadership positions on the President's cabinet, council of deans, and council of provosts.	%	41.5%	0%	13.85%	1.32%	0.44%
10.4*	Salary gap at Villanova defined as the gap between the highest and lowest pay band.	Ratio of highest: lowest band	x	x	x	1.12%	0.00%
11.1	Proportion of non-utility and non-maintenance projects that have stakeholder input from students, faculty, and staff.	%	100%	0%	0%	0.58%	0.00%
11.2*	Indoor and outdoor air quality based on EPA and OSHA regulations	AQI	0	500	500	0.67%	0.00%
11.3	Degree of implementation of a campus disaster risk reduction strategy in line with the industry standards or expert recommendation.	%	100%	0%	0%	0.62%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
11.4	Percentage of campus managed under sustainable landscape management practices.	%	100%	0.00%	62%	0.79%	0.49%
11.5*	Proportion of commuter miles traveled using low carbon transportation (public transit, carpooling, walking, biking, and electric vehicles).	%	100%	0%	0%	1.02%	0.00%
12.1*	Proportion of total waste disposed of in a non-circular manner.	%	0%	100.00%	100%	1.32%	0.00%
12.2*	Percentage of food disposed of in a non-circular manner.	%	100%	0%	0%	1.11%	0.00%
12.3	Campus recycling rate.	%	100%	0%	24%	1.05%	0.25%
12.4*	Proportion of campus products sourced sustainably as verified by third party certifications.	%	100%	0%	0%	1.38%	0.00%
13.1	Scope 1 and 2 net greenhouse gas emissions.	MT CO2e per weighted campus user	0	13.32368	4.5	4.04%	2.67%
13.2	Scope 3 net greenhouse gas emissions.	MT CO2e per weighted campus user	0	3.61	0.37	3.40%	3.05%
13.3	Degree of implementation of an up-to-date integrated climate change and disaster resilience strategy.	% Implementation	100%	0%	0%	2.77%	0.00%
14.1	Annual mass of nitrogen and phosphorus used in fertilizer on campus.	N lb./acre	0	256	81%	1.55%	1.54%
14.2*	Percent of unrecycled plastic waste produced on campus.	%	0%	100%	100%	2.21%	0.00%
14.3	Proportion of seafood consumed on campus that is sustainably caught or raised and certified sustainable by third party standards.	%	100%	0%	100%	1.72%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
14.4	Load of pollutants in runoff.	%	100%	0%	81%	1.72%	1.38%
15.1*	Carbon sequestered per year by Villanova's campus ecosystem.	MTCO2e	15755.13	0	0	2.28%	0.00%
15.2	Portion of campus considered Green space and/or covered by trees. Includes green roofs.	%	27%	0%	8%	1.86%	0.54%
15.3*	Proportion of campus biosphere considered to be an alien or invasive species.	%	0%	100%	100%	1.63%	0.00%
15.4	Percentage of campus managed under sustainable landscape management practices or an equivalent third-party certification.	%	100%	0%	98%	1.92%	1.89%
16.1	Proportion of population that feel safe walking alone around the campus.	%	100%	0%	95%	0.97%	0.92%
16.2	Annual crime rate per capita on Villanova's campus.	crimes/ 1,000 students	0.05	117.82	5.5	1.05%	1.01%
16.3	Proportion of students, faculty, and staff that feel like they are a part of an institution that is just and fair to its members.	%	100%	0%	78%	0.97%	0.75%
16.4*	Proportion of campus departments that adopt and implement policies that guarantee public access to information.	%	100%	0%	0%	0.71%	0.00%
17.1	University philanthropic contributions (hours) associated with advancing the UN SDGs.	hrs/student/yr	51.07	0	25.50	0.86%	0.43%
17.2	Proportion of active partnerships from tier 1 suppliers, research grants, and service-learning partnerships that are contributing to a sustainable world (e.g. report to GRI, CDP, have a Science-Based Target, or contribute to UN SDGs).	%	100%	0%	49%	1.05%	0.51%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Baseline Value (2018)	Metric Weight	Baseline Score (2018)
17.3	Annual student, faculty, and staff hours spent on off-campus service-learning projects.	hours/student / year	51.07	0	35.8	1.34%	0.94%

Table A.3. Key Results and Associated Metrics

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
0.1	Percentage of courses that include sustainability learning outcomes encompassed by the SDGs.	All Villanova department and program offer sustainability learning opportunities.	Integrate sustainability into the common core.	x	Incorporate sustainability learning outcomes into 100% of degree programs.
0.2	Incentives for faculty across all disciplines to incorporate sustainability into existing courses or develop new sustainability courses.	Establish a fund for faculty incentives to incorporate sustainability in their courses.	x	x	x
0.3	Existence of and performance on a sustainability literacy assessment for students.	Develop a sustainability literacy assessment.	Implement a sustainability literacy assessment	x	x
0.4	Percentage of students who graduate from programs that have adopted at least one sustainability learning outcome	x	x	x	100% of students graduate from a program that has adopted at least one sustainability learning outcome.
0.5	Percentage of research-producing departments that are engaged in sustainability research	Develop plan to implement a sustainability research network	Establish a sustainability research network across all colleges	x	x
1.1	Proportion of employees, including student employees, that earn below a living wage. A living wage is defined as at least 125% of the MIT calculator living wage for 1 adult with 0 dependents.	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	Reduce the number of students and employees earning below a living wage to zero.	Continue to maintain living wages for all students and employees.
1.2	Minimum hourly earnings (lowest pay band) of employees disaggregated by full time, part time, and students.	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	x	x

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
1.3	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	x	x	x	x
1.4	Proportion of procurement expenses from tier 1 suppliers that have living wages or equivalent for its employees.	Confirm how many tier 1 suppliers provide living wages and request change from those that currently do not.	Impose a contractually obligated living wage for all tier 1 suppliers.	x	x
2.1	Prevalence of moderate or severe food insecurity in the university population, based on the Food Insecurity Index.	Reduce food insecurity for Villanova students to no more than 10%.	x	x	Reduce food insecurity to 0% among Villanova students, faculty, and staff.
2.2	Proportion of students, faculty, and staff that are meeting their caloric and nutritional needs without consuming in excess.	Measure the nutritional health of Villanova's population and assess the needs of those with restricted diets due to allergies, religious restrictions, or other dietary restrictions.	x	x	x
2.3	Percentage of food disposed of in a non-circular manner.	Divert 100% of pre-consumer food waste from landfill or incineration.	Pilot the collection of post-consumer food waste.	?	Eliminate all of Villanova's pre- and post-consumer food waste from landfill or incineration.
3.1	Harmful drug abuse as measured by proportion binge drinking and proportion of student, faculty, and staff who use tobacco products or any illicit drug habitually.	Update student climate survey and health survey to better measure binge drinking and tobacco and drug abuse.	x	x	Villanova is a tobacco free campus.
3.2	Percentage of sexually active students practicing safe sex and prevention of STDs (condoms, or abstinence).	x	x	x	x

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
3.3	Percentage of University insurance provided physical and mental health care that is an out of pocket expense for a student, faculty, or staff member.	x	x	x	x
3.4	Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	Equal leave of 12 weeks for all employees without the use of sick or vacation time.	x	x	x
3.5	Proportion of students, faculty, and staff receiving age appropriate sleep per night during the semester.	x	Expand education, awareness, and mindfulness of the benefits of restful sleep and good health.	x	x
3.6	Thriving quotient.	Complete Thriving Quotient study.	x	x	x
4.1	Graduation rate of Villanova undergraduate students in 4 years.	Maintain 2018 4 and 6 year graduation rates.	x	x	x
4.2	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	x	x	x	x
4.3	Net annual aid for first time, first generation students whose family earnings are in the lowest income bracket of reported to IPEDs.	x	x	x	x
4.4	Proportion of student population made up of underrepresented groups: Black, Hispanic, Asian, Native American.	Develop a plan and commitment to meet 100% of need by 2030 while remaining need blind.	Expand applicant pool to reflect demographics of top 4-year national college applicants.	x	Meet 100% of financial need.
4.5	Percent difference of graduation rate in 4 years of the underrepresented groups.	Maintain current overall graduation rate for underrepresented student demographics.	Equate the overall graduation rate and underrepresented student graduation rate.	Maintain equal graduation rates across all demographics.	x

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
5.1	Proportion of faculty, staff, and students reporting sexual violence, discrimination, or harassment in their time at Villanova.	Measure per capita incidence of violence, discrimination, and harassment for gender or sexual orientation.	Establish a normative range per capita to reduce incidence.	x	x
5.2	Average cost incurred by students, faculty, and staff to pay for dependent care while working at Villanova.	Increase subsidy for dependent and elder care to reduce average incurred cost by 10%.	x	x	x
5.3	Proportion of seats held by women in leadership positions on the President's cabinet, council of deans, and provost council.	x	x	x	50% of seats in managerial or leadership positions are women.
5.4	Satisfaction of female and male employees in their work environment, work policies, and with family friendly services and facilities at Villanova.	Determine the campus satisfaction with "family friendly" services via survey.	Expand facilities to ensure all expectant and new mothers have access to lactation rooms.	Create an environment at Villanova in which all lifestyles are respected and valued and where people can live their lives openly.	x
6.1	Total potable water used per year.	Sub-meter the potable water consumption of the ten highest consumption buildings on campus.	X	X	X
6.2	Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing peak flow. This includes raingardens, constructed wetlands, and green roofs.	Measure the peak wastewater discharge from campus.	X	X	X
6.3	Percentage of rainfall captured from impervious surfaces on campus.	Measure the average inches of rainfall captured from impervious surfaces on campus. Evaluate capture systems.	X	X	For an average storm, zero storm water leaves the campus boundary without first being captured and processed.
6.4	Mass of plastic due to water and beverage consumption sold on Villanova's campus (soda, sports drinks, water, coffee, etc.)	Reduce the sale and availability of single use plastics by 50%.	Eliminate the sale and availability of single use plastics on campus.	X	X

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
7.1	Renewable energy share in the total campus energy consumption (Scope 1 and 2).	Develop a plan to reduce scope 1 and 2 emissions to meet the 1.5 IPCC report by 2030.	Reduce scope 1 emissions by 5%	Reduce scope 1 emissions by 10%	Reduce scope 1 emissions by 20%
7.2	Campus's energy intensity (site energy).	Buy at least 10% of electricity from renewable sources	Buy 25% of electricity from renewable sources.	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources
7.3	Percentage of the institution's investment pool in positive sustainability investments.	Develop a plan to reduce energy intensity.	Reduce overall energy intensity by a percentage determined by the energy planning effort.	x	x
7.4	Equivalent Gallons of fossil fuel burned (gasoline, Diesel) per mile traversed by university vehicles.	x	x	x	x
8.1	Annual growth rate of Villanova total revenue per employed person ($/full time employee equivalent).	Maintain current revenue growth rate.	x	x	x
8.2	Minimum hourly earnings (lowest pay band) of employees disaggregated by undergraduate and graduate students, part time, and full time.	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	Reduce the number of students and employees earning below a living wage to zero.	Continue to maintain living wages for all students and employees.
8.3	Largest percent difference in attrition rates between genders and races.	x	x	x	x
8.4	Recordable injury rate. (OSHA)	x	x	x	x
8.5	Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	x	x	x	x
9.1	Net carbon emissions emitted by student, faculty, and staff commuters.	Develop comprehensive plan to reduce commuting related carbon emissions	Initiate plan to reduce car commuter miles by X%	x	x

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
9.2	Scope 1 and 2 net greenhouse gas emissions.		Increase proportion of commuters using public transit to x%		
9.3	Percentage of campus building built and certified to current sustainable standards. (AASHE and LEED as of 2019)	Develop a plan to reduce scope 1 and 2 emissions to meet the 1.5 IPCC report by 2030.	Reduce scope 1 emissions by 5%	Reduce scope 1 emissions by 10%	Reduce scope 1 emissions by 20%
9.4	Percentage of students and faculty actively engaged in research.	Buy at least 10% of electricity from renewable sources	Buy 25% of electricity from renewable sources.	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources
10.1	Proportion of employees, including student employees, that earn below a living wage. ($12.64/hr for 1 adult)	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	x	x
10.2	The average diversity level of new hires for each band of jobs hired on a five-year rolling basis.	Require all five colleges to comply with guidelines set out in "Hiring for Villanova's Future".	x	x	x
10.3	Proportion of minority members in leadership positions on the President's cabinet, council of deans, and council of provosts.	x	x	x	x
10.4	Salary gap at Villanova defined as the gap between the highest and lowest pay band.	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	Reduce the number of students and employees earning below a living wage to zero.	Continue to maintain living wages for all students and employees.
11.1	Proportion of non-utility and non-maintenance projects that have stakeholder input from students, faculty, and staff.	x	x	x	x
11.2	Indoor and outdoor air quality based on EPA and OSHA regulations	Establish appropriate network of air quality monitoring and weather stations on campus.	Ensure indoor air quality never dips below EPA or OSHA standards despite any outdoor conditions.	x	x

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
11.3	Degree of implementation of a campus disaster risk reduction strategy in line with the industry standards or expert recommendation.	x	x	x	x
11.4	Percentage of campus managed under sustainable landscape management practices.	Develop a goal to plant a certain number of native plants.	Implement the Villanova Biodiversity plan to increase native species while sequestering additional carbon	x	x
11.5	Proportion of commuter miles traveled using low carbon transportation (public transit, carpooling, walking, biking, and electric vehicles).	Develop a plan to reduce commuting miles by car.	x	x	x
12.1	Proportion of total waste disposed of in a non-circular manner.	Conduct a waste audit and develop an action plan.	x	Zero waste to landfill or incineration	.x
12.2	Percentage of food disposed of in a non-circular manner.	Divert 100% of pre-consumer food waste from landfill or incineration.	x	x	Eliminate all of Villanova's pre- and post-consumer food waste from landfill or incineration.
12.3	Campus recycling rate.	Conduct a waste audit and develop an action plan.	x	x	x
12.4	Proportion of campus products sourced sustainably as verified by third party certifications.	Evaluate options for low carbon and green procurement	Develop framework for calculating comprehensive scope 3 emissions reductions	x	Establish Villanova as a leader in low carbon procurement and green office management
13.1	Scope 1 and 2 net greenhouse gas emissions.	Develop a plan to reduce scope 1 and 2 emissions to meet the 1.5 IPCC report by 2030.	Reduce scope 1 emissions by 5%	Reduce scope 1 emissions by 10%	Reduce scope 1 emissions by 20%
13.2	Scope 3 net greenhouse gas emissions.	Buy at least 10% of electricity from renewable sources	Buy 25% of electricity from renewable sources.	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
13.3	Degree of implementation of an up-to-date integrated climate change and disaster resilience strategy.	Conduct a comprehensive scope 3 emissions inventory.	x	X	Reduce scope 3 greenhouse gas emissions consistent with IPCC 1.5C world.
14.1	Annual mass of nitrogen and phosphorus used in fertilizer on campus.	Assess the load of pollutants in Villanova's wastewater and storm water runoff.	x	x	x
14.2	Percent of unrecycled plastic waste produced on campus.	Conduct a waste audit and develop an action plan.	x	Zero unrecycled plastic waste.	x
14.3	Proportion of seafood consumed on campus that is sustainably caught or raised and certified sustainable by third party standards.	Assess third party sustainable seafood standards for adoption.	x	x	x
14.4	Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing pollutant loads. This includes raingardens, constructed wetlands, and green roofs.	Assess the load of pollutants in Villanova's runoff.	x	x	x
15.1	Carbon sequestered per year by Villanova's campus ecosystem.	Measure the total mass of carbon captured by biomass on campus.	x	x	x
15.2	Portion of campus considered Green space and/or covered by trees. Includes green roofs.	Develop a comprehensive report of Villanova's campus biodiversity.	x	x	x
15.3	Proportion of campus biosphere considered to be an alien or invasive species.	Develop a comprehensive report of Villanova's campus biodiversity.	Implement the Villanova Biodiversity plan to increase native species while sequestering additional carbon.	x	x

Metric I.D.	Metric Description	Key Result 2021	Key Result 2024	Key Result 2027	Key Result 2030
15.4	Percentage of campus managed under sustainable landscape management practices or an equivalent third-party certification.	x	x	x	x
16.1	Proportion of population that feel safe walking alone around the campus.	x	x	x	x
16.2	Annual crime rate per capita on Villanova's campus.	x	x	x	X
16.3	Proportion of students, faculty, and staff that feel like they are a part of an institution that is just and fair to its members.	Add questions to the climate survey to better represent satisfaction with Villanova's administrative justice.	x	x	x
16.4	Proportion of campus departments that adopt and implement policies that guarantee public access to information.	Publish Villanova board and cabinet meeting minutes after each meeting.	Ensure that all faculty and student research is published open source.	x	x
17.1	University philanthropic contributions (hours) associated with advancing the UN SDGs.	Develop a plan for philanthropic integration between current efforts, the strategic plan, and the sustainability plan.	x	x	x
17.2	Proportion of active partnerships from tier 1 suppliers, research grants, and service- learning partnerships that are contributing to a sustainable world (e.g. report to GRI, CDP, have a Science-Based Target, or contribute to UN SDGs).	x	100% of Villanova partners actively committed to working towards a sustainable world	x	x
17.3	Annual student, faculty, and staff hours spent on off-campus service-learning projects.	Maintain position as a leader in philanthropic service hours from faculty, staff, and students.	x	x	x

A.1 Objective Details; Metrics, Bounds, Baseline Score, and Key Results

The purpose of using metrics to measure sustainability at Villanova is to be able to quantitatively track the University's progress towards an *Ethos of Sustainable Living* at the University, and to know exactly what aspects to improve upon to get there and by how much. Choosing the correct metrics to measure an *Ethos of Sustainable Living* is important. However, it is also important to correctly bound these metrics so the University can judge how well they are performing on each metric. As stated in the methodology section, these bounds were determined based on a decision tree of bounding options.

Seventy-four metrics were chosen and distributed among the 18 goals compiled from several sources. Many of the metrics were taken from the U.N. indicators assigned to the individual SDGs. These indicators were then scaled to be applicable to a university setting, rather than a global one. Another source of metrics was the U.S. Cities Index, whose metrics were likewise scaled from a city context to fit with university sustainability measurement. Other sources of metrics were a study conducted by Villanova's sustainability manager with the President's Environment Sustainability Committee, VSLC, and Villanova faculty and staff whose expertise was in the area covered by each goal. On-campus sources that were consulted can be seen in Table A.4.

Table A.4. Metric Advisors or Sources

Expert, Source, or Department Consulted	Metrics Advised
Human Resources(R. Duffy, personal communication, August 2018)	1.2, 3.4, 8.2, 8.3, 10.1, 10.2, 10.3 10.4
Climate Survey	3.1, 3.2, 16.1, 16.2, 16.3
Health Center	3.1 3.2, 3.3
Ryan Rost Title IX Coordinator(R. Rost, personal communication, August 2018)	5.1
Department of Facilities(L. Schwartz, personal communication, January 2019)	6.1, 6.2, 6.4, 7.1, 7.3, 11.2, 11.3
Dr. Robert Traver(R. Traver, personal communication, January 2019)	6.1, 6.2
Office of Planning and Institution Research(OPIR, personal communication, May 2019)	5.2
Terry Nance, Office of Diversity(T. Nance, personal communication, October 2018)	10.2, 10.3

Of the 74 metrics, 37 could be bounded using ideal absolute percentages for both the upper and lower bound. All these metrics range either from 0% to 100% or 100% to 0% depending on whether the metric was ascending or descending. An example of this is metric 0.4 and is shown in Table A.5. The worst possible performance in that metric would be if 0% of students at a university graduated from programs that offered sustainability learning outcomes, whereas the ideal score would be if 100% of students graduated from such a program.

Table A.5. Metric with Absolute Percentage Bounds

Metric ID	Metric Description	Unit	Upper Bound	Lower Bound
0.4	Percentage of students who graduate from programs that have adopted at least one sustainability learning outcome	% of Courses	100%	0%

Twenty-four metrics could be bounded with either the upper or lower bound, but not both, being set using an ideal value. Of those 24, nine of the metrics used the best or worst performing 2.5% of AASHE reporting schools to set either the upper or lower bound. The other 15 metrics had the

other boundary set by data from another relevant source, in most cases a government agency. Metric 17.3, shown in Table A.6., is an example of one such metric.

Table A.6. Metric with One Bound as Ideal Value

Metric ID	Metric Description	Unit	Upper Bound	Lower Bound
17.3	Annual student, faculty, and staff hours spent on off-campus service-learning projects.	hours/student / year	51.0	0

The remaining 13 metrics could not be bound either in the best or worst performing end by an idealized value. Two of the 13 metrics could be bounded on both ends by the top and bottom performing 2.5% of AASHE reporting school for those metrics, while the remaining twelve were bound by data from other sources. Two examples of metrics bound in this way are shown in Table A.7. and Table A.8..

Table A.7. Metric with Science-Based Bounds

Metric ID	Metric Description	Unit	Upper Bound	Lower Bound
8.2	Minimum hourly earnings (lowest pay band) of employees disaggregated by undergraduate and graduate students, part-time, and full time.	$	15	7.25

Table A.8. Metric with Two Average Based Bounds

Metric ID	Metric Description	Unit	Upper Bound	Lower Bound
7.2	Campus's energy intensity (site energy).	MMBTU/ GSF	0.02	0.30

A.2 Final Metric Framework and Justification

A.2.1 Goal 0: Sustainability in Academics

Objective: Integrate sustainability into campus curricula, research, and outreach to achieve an ethos of sustainable living at Villanova

Table A.9. Metrics for Goal 0

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
0.1	Percentage of courses that include sustainability learning outcomes encompassed by the SDGs.	%	0.3	0	25.4%
0.2	Incentives for faculty to incorporate sustainability into existing courses or develop new sustainability courses.	$	2000	0	14.2%
0.3	Existence of and performance on a sustainability literacy assessment.	%	100	0	16.9%
0.4	Percentage of students who graduate from programs that have adopted at least one sustainability learning outcome	%	100	0	19.6%
0.5	Percentage of research-producing departments that are engaged in sustainability research	%	100	0	23.9%

Metric 0.1 measures the number of courses that include sustainability learning outcomes, with those outcomes being part of the scope of the U.N. SDGs. This metric is meant to encourage the inclusion of sustainability topics in existing courses, and promote the creation of new courses that include sustainability. The metric was adapted from an AASHE credit and has an absolute lower bound of zero courses with at least one sustainability learning outcome. The upper bound is set at 30.86%, which is the average of the best performing 2.5% of AASHE reporting schools.

Like Metric 0.1, 0.2 looks to promote the inclusion of sustainability into existing courses and the creation of new courses with sustainability learning outcomes. Specifically, 0.2 measures the monetary incentives provided to instructors to make the changes described. This metric was adapted from AASHE, with an absolute lower bound of $0. The upper bound of $2,000 is the average of the upper 2.5% of AASHE reporters for this credit.

While it is vital for schools to teach about sustainability by including it in their curriculum, as promoted by the first two metrics of Goal 0, it is even more important than the students of a school are absorbing the material. For a university to instill real change in the world, beyond its own

campus, it is critical that it imparts enough knowledge about the global issues involved in sustainable development on its students to drive behavioral changes in their lives that will last far beyond when they graduate. It is therefore important that a school is tracking the knowledge instilled in its students over their time. One method of doing this is by conducting a sustainability literacy assessment. This involves testing students when they first begin attending a college or university to determine the extent of their knowledge of issues surrounding sustainability. Metric 0.3 was adapted from VSLC input. It is bound by absolute maximum and minimum percentages, with the ideal value being students assessed for the second time receiving a 100% score on the assessment. 0% corresponds to no improvement compared to the first assessment.

Metric 0.4 measures the percentage of students who graduate from programs that have at least one sustainability learning outcome. This metric is meant to promote the inclusion of tracks, majors, or minors that focus on sustainability within existing programs. It is looking to promote the inclusion of sustainability topics at a higher and more structural level than Metrics 0.1 and 0.2. The metric was adapted from AASHE and VSLC input. It is bound using absolute percentages, with the ideal value being 100% of programs.

Metric 0.5 measures the percentage of research-producing departments that are engaged in sustainability research. Much like Metric 0.3, this metric looks to measure a college or university's influence beyond the scope of its campus. This metric was adapted from AASHE and VSLC input. It is bound by absolute percentages, with the best possible score being set at 100% of departments.

A.2.2 Goal 1: No Poverty

Objective: Assure that no Villanovan's compensation rate is below living wage guidelines. Villanova will assure Villanovans have equitable access to basic resources and require livable wages in their supply chain.

Table A.10. Metrics for Goal 1

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
1.1	Proportion of employees, including student employees, that earn below a living wage. A living wage is defined as at least 125% of the MIT calculator living wage for 1 adult with 0 dependents.	%	0	39.6	32.3%
1.2	Minimum hourly earnings (lowest pay band) of employees disaggregated by students, part-time, and full time.	$/hr	15	7.25	25.8%
1.3	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	$	71,454	36,088	16.2%
1.4	The proportion of procurement expenses from Tier 1 suppliers that have living wages or equivalent for its employees.	%	100	0	25.8%

Metric 1.1 was adapted from U.N. Indicator 1.2.1. A metric with the same wording is also listed in the Cities Index. Additionally, the VSLC determined that poverty amongst employees and students was a relevant issue. However, inspired by efforts made at other institutions of higher learning, the metric was changed to reflect the percentage of students, faculty, and staff who earn less than a living wage. This was deemed appropriate as it gives a university more room to improve and varies with the location of the university. This allows for Metric 1.1 to more accurately measure appropriate minimum compensation of disparate communities.

The upper bound of Metric 1.1 is an absolute value of 0%, meaning no student or faculty member earns below the living wage value for the location of the college or university. The upper bound of 39.6% comes from the percentage of workers in the worst-performing state, Idaho, who earn below $12/hour (Oxfam, 2019). This is not ideal as it would be preferable to have values related to institutions of higher learning. However, data of this type is not available.

Metric 1.2 is another measure of the lowest compensation level. This metric seeks to determine what the actual lowest pay level is for the campus and is disaggregated by employment type. This differs from Metric 1.1 which measures the percentage of employees earning below a living wage because 1.2 measures what the actual lowest pay level is. Metric 1.2 was adapted from input from VSLC, the Cities Index, and input from the Villanova Sustainability Leadership Council.

For the bounds of this metric, no idealized values exist. For this reason, national trends in compensation had to be used for both the upper and lower bound. The upper bound for Metric 1.2, $15/hour, is taken from a generalized living wage that is often cited by efforts to raise the national minimum wage (S. 1832. Pay Workers a Living Wage Act. U.S. Senate, 2015). The lower bound is the current minimum wage in Pennsylvania (Office of Governor Tom Wolf, 2018).

Metric 1.3 measures the starting salary of recent college graduates. The metric is both a measure of potential future poverty for the students of a university and measures the value imparted on a student from an education at that university. This metric was taken from input from the VSLC.

The upper and lower bound come from the average of the best and worst-performing 2.5% of schools in terms of early career compensation for graduates (Payscale.com, 2019).

The last metric for Goal 1 measures the percentage of Tier 1 suppliers to a university that pay their employees a living wage. Tier 1 suppliers are those that directly supply a college or university with a product. This is a significant measurement for an institution of higher learning due to the sheer quantity of materials that are purchased at a college or university each year. The vast range of items purchased by an organization of this type, including food, office supplies, clothing, athletic equipment, landscaping chemicals, etc. demonstrate the need for a college or university to have a strong stance when demanding fair compensation practices from their suppliers. Colleges and universities have a unique ability to demand change along their supply chains, and this metric ensures that they are doing so. This metric was adapted from VSLC input and is bound by absolute maximum and minimum percentages, with the ideal value being every Tier 1 supplier.

A.2.3 Goal 2: Zero Hunger

Objective: Ensure that every Villanovan has access to, and is educated on, sustainably sourced and appropriate nutrition. Take action to ensure that food is used as efficiently as possible.

Table A.11. Metrics for Goal 2

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
2.1	Prevalence of moderate or severe food insecurity in the university population, based on the Food Insecurity Index.	%	0	48.0	37.7%
2.2	The proportion of students, faculty, and staff that are meeting their caloric and nutritional needs without consuming in excess.	HEI Dietary Score on campus	100	57.8	19.2%
2.3	Percentage of food disposed of in a non-circular manner.	%	0	100	43.1%

Metric 2.1 measures the prevalence of food insecurity at a college or university. Food insecurity is the measure of several factors that describe a household's ability to obtain food. This is a significant problem on college campuses due to the high cost of living associated with obtaining a degree, according to a Harvard University study (Harvard Graduate School of Education, 2019). This metric was adapted from U.N. Indicator 2.1.2. The upper bound for this metric is 0%, meaning no students are food insecure. The lower bound is 48%, which is the percentage of students who were considered food insecure within the previous 30 days as reported by a study called "Hunger on Campus" measuring the levels of food insecurity via survey for 3,765 college students at 34 colleges and universities (Cady et al., 2016).

Metric 2.2 is meant to ensure that every member of a college or university receives proper nutrition without overconsuming to the detriment of their health. This metric is adapted from topics discussed in the Cities Index, though it was not used as a metric in the actual index. There are also existing efforts to educate about this issue ongoing at Villanova University. Metric 2.2 is measured by the Healthy Eating Index (HEI), which is a measurement of the population's adherence to their recommended dietary guidelines (United States Department of Agriculture, Food and Nutrition Service, 2019). The index ranges from 0 to 100, with a score of 100 indicating that recommendations on average are being met or exceeded in a positive way(United States Department of Agriculture, Food and Nutrition Service, 2019). For this reason, the upper bound of this metric is set to 100, and the lower bound is 57.8, which is the most recent adherence value of the U.S. population ages two years and older as measured by the U.S. Office of Disease Prevention and Health Promotion(United States Department of Agriculture, Food and Nutrition Service, 2019). Data more relevant to institutions of higher education could not be reliably found.

The last metric in Goal 2, Metric 2.3, is a measure of food waste. It determines the percentage of food at a university that is disposed of in a non-circular manner, with non-circular defined as not being recycled, donated, composted, hydrothermally carbonized, or otherwise re-used. This metric was adapted from U.N. SDG Indicator 12.3.1, which is the food loss index. This indicator is more relevant to the efficiency of agriculture from cultivation to consumption and was adapted to food waste to make it more relevant to the collegiate scale. Though listed by the U.N. under Goal 12, the VSLC deemed it to fit more appropriately in Goal 2. This metric is bound by the ideal and worst possible values of 0% and 100% respectively. Metric 2.3 is repeated as Metric 12.2.

A.2.4 Goal 3: Good Health and Wellbeing

Objective: Promote healthy lifestyles as well as provide access to affordable and quality physical and mental health care for all Villanovans.

Table A.12. Metrics for Goal 3

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
3.1	Harmful drug abuse as measured by proportion binge drinking and proportion of student, faculty, and staff who use tobacco products or any illicit drug habitually.	%	0	100	23.1%
3.2	Percentage of sexually active students practicing safe sex and prevention of STIs.	%	100	0	15.9%
3.3	Percentage of University insurance-provided physical and mental health care that is an out of pocket expense for a student, faculty, or staff member.	%	0	100	18.2%
3.4	Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	weeks	15	6	20.9%
3.5	Proportion of students, faculty, and staff receiving age appropriate sleep per night during the semester.	%	100	0	9.7%
3.6	Thriving quotient. NOTE: Stacy Andes is conducting this study and the metric will be constructed around her data.	Thriving Quotient Scale	6	1	12.3%

Metric 3.1 measures the percentage of a campus population binge drinking or using tobacco or other harmful drugs habitually. This metric is particularly relevant to college campuses given recent studies concerning the habits of college students (Substance Abuse and Mental Health Services Administration, 2016). This metric was adapted from U.N. Indicators 3.5.1 and 3.A.1 and is bounded by idealized best and worst performances, with ideally 0% of community members engaging in the activity described by the metric.

Metric 3.2 measures safe sex practices towards the prevention of new sexually transmitted infection (STI) cases and was adapted from UN Indicator 3.3.1 for HIV, and from the cities index for the other STI's. The issue of STI's on university campuses is made even more relevant by the discrepancies between the efforts taken by colleges and universities to prevent the spread of new STIs. The current metric is bound by absolute percentages, with the ideal value being 100% of the campus population reporting to be actively practicing safe sex, and the worst value is 0% of the population.

Metric 3.3 looks to determine the amount of money paid by members of a university community out of pocket for mental and physical health-related expenses. Health care expenses have become a frequent topic, particularly in the United States, in recent years. On college campuses, the issue is compounded by the fact that in many cases, including at Villanova, health coverage is required but not always affordable. Dependent care health insurance expires when the dependent turns 26, an age at which many students attend graduate school. For this reason, it is important that a school tracks how much money members of their community are paying out of pocket for health insurance. This metric was not adapted from any of the metric pools used for most of the other goals but was instead crafted by VSLC. The bounds for this metric are idealized maximum and minimum percentages of 100% cost coverage and 0% cost coverage. While 100% cost coverage may be unattainable given the current structure of the U.S. health care industry, it was considered a valid upper bound given the health care system in Canada (Tsasis et al., 2019).

Metric 3.4 was adapted from suggestions given by the VSLC. Dependent care includes caring for a newborn, sick child, parent, or grandparent. This topic is potentially controversial, especially at Villanova, given the unequal dependent care rules for faculty versus staff. Faculty are given a full semester (15 weeks) off due to the inconvenience of an instructor leaving work in the middle of an academic semester, whereas staff is given 6 weeks of paid leave (L. Schwartz, personal communication, January 2019). The lower bound is set to 0 weeks, as the U.S. government does not currently guarantee any paid time off for dependent care. The upper bound was set to 15

weeks which is the guaranteed value in Canada, one of the world's highest-performing countries in this metric (Evans, 2007).

A particularly relevant statistic for college campuses is measured by Metric 3.5, age-appropriate sleep. Many students report not receiving enough sleep in a given week for a variety of reasons (Jennings, 2014). The recommended hours of sleep for a person vary depending on several factors, and it can be detrimental for people to not receive at least that recommended value of sleep. This metric was taken from a suggestion provided by the Villanova University health center. The metric is bounded using idealized percentages, with the best possible score being 100% of community members receiving the proper amount of sleep, and the worst possible score is 0%.

Metric 3.6 is not crafted in its entirety as of the writing of this report. The Villanova health center is conducting a study to calculate how well students of a university thrive using a metric known as the Thriving Quotient. This value is a calculation that looks to determine how well a student is thriving in a college environment. While not fully complete, this metric was included in the framework due to its potential value in measuring material issues for college campuses.

A.2.5 Goal 4: Quality Education

Objective: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Table A.13. Metrics for Goal 4

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
4.1	Graduation rate of undergraduate students in 4 years.	%	100	33%	14.3%
4.2	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	$	71,454	36,088	11.9%
4.3	Net annual aid for first time, first generation students whose family earnings are in the lowest income bracket of reported to IPEDs.	$	68,231	4,206	23.1%
4.4	Proportion of student population made up of underrepresented groups: Black, Hispanic, Asian, Native American.	%	41.5	0	28.2%
4.5	Percent difference of graduation rate in 4 years of the underrepresented groups.	%	0	100	22.1%

Metric 4.1 measures the graduation rate of undergraduate students in four years. This is an important metric for institutions of higher education as it not only determines how effective the school is at graduating students but also determines how much money students are paying as additional years of schooling result in additional costs. This metric was inspired by the Cities Index metric for Goal 4 that measures the percentage of the population with an undergraduate degree, however as every student at a university is at least attempting to get a degree a metric of this form would be irrelevant. For this reason, it was determined that the percentage of students who graduate in the typical time frame is more material. The upper bound of this metric is 100%. This is the ideal value, speaking to both the school's ability to graduate students on time and its ability to keep costs low. The lower bound was set to 33%, as this was the average percentage of students in 2017 that graduated in four years or less from non-profit public universities (*Complete College America*, 2019).

Metric 4.2 is a repeat and identical to Metric 1.3. It was included in Goal 4, as well as Goal 1, as it relates to the quality of education provided by a university. Repeating the metric in multiple goals models the interconnectivity of the whole system of the SDGs.

Metric 4.3 measures the amount of aid given to students whose family background has disadvantaged their ability to attend school. This metric specifically looks at the amount of university aid given to students who are the first in their family to attend an institution of higher education, and whose income is in the lowest income bracket reported to the Integrated Postsecondary Education Data System (IPEDs), a subdivision of the National Center for Education Statistics, which is a U.S. government agency. This metric is important as it measures the outreach a university or college provides towards familial improvement to those who may be disadvantaged by their background. It is set with an upper bound of the current cost of tuition at the university or college in question, meaning that ideally the entire tuition of the students who qualify for this type of aid is paid for. The lower bound is $4,206.00, which is the average of the lowest 25% of aid given as reported to IPEDs (*The Integrated Postsecondary Education Data System*, 2019).

Metric 4.4 measures the proportion of the population made up of underrepresented groups. This metric's purpose is to measure the diversity level of a college or university's population and was adapted from suggestions by the VSLC and PESC committee. The lower bound is set to the absolute percentage of 0%, meaning no part of the population is made up of underrepresented groups. The upper bound was set to 41.5%, which is the U.S. Census statistic for the percentage of the U.S. population made up of minorities (U.S. Census Bureau, 2018).

Metric 4.5 is similarly concerned with underrepresented groups. It measures the difference in graduation rates between white and non-white students. This provides crucial information regarding the way a school teaches varying groups of people and seeks to ensure that one group is not unfairly advantaged. This metric was adapted from suggestions given by the VSLC and is bound by idealized percentages. The upper bound is 0%, which refers to a school having no difference between the graduation rates of the various racial demographics that attend it.

A.2.6 Goal 5: Gender Equality

Objective: Promote and attain gender equality and empower all people at Villanova.

Table A.14. Metrics for Goal 5

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
5.1	Proportion of faculty, staff, and students reporting sexual violence, discrimination, or harassment in their time at school.	%	100	0	26.0%
5.2	Average cost incurred by students, faculty, and staff to pay for dependent care while working at Villanova.	$/year	0	48,000	18.9%
5.3	Proportion of seats held by women in leadership positions on the President's cabinet, council of deans, and provost council.	%	50	0	29.1%
5.4	Satisfaction of female and male employees in their work environment, work policies, and with family friendly services and facilities at Villanova.	%	100	0	26.1%

Sexual violence is another issue that is particularly material to an institution of higher education. According to the most recent study conducted by the National Institute of Justice, 3,459 college students experienced forced sexual contact in 2006 (National Institute of Justice, 2008). Metric 5.1 seeks to measure sexual violence, discrimination, or harassment for a college and university. This metric was adapted from U.N. Indicators 5.2.1 and 5.2.3, as well as the Cities Index and PESC and is bounded by idealized percentages from 0% to 100%. This would indicate that 100% of instances of sexual violence, discrimination, or harassment are reported. The lower bound (0%) would indicate that none of the victims or bystanders associated with these crimes report them.

Like Metric 3.4, Metric 5.2 measures resources allocated for dependent care. This metric seeks to measure the cost associated with caring for a dependent, which is often not included in health insurance. The upper bound is set to $0 per year, and the lower is set to the average geriatric dependent care cost of $48,000 per year (National Council for Aging Care, 2019).

Metric 5.3 is designed to measure and prevent institutional sexism. It measures the proportion of seats held by women in leadership positions on the president's cabinet, council of deans, and provost council. This metric is important to ensure that women or men are not being discriminated against for promotion or hiring to leadership positions. It is meant to prevent the proverbial glass ceiling from being present in institutions of higher education. This metric was adapted from PESC,

the Cities Index, and VSLC. The lower bound of this metric was set at the absolute value of 0%, meaning no positions of power are held by women while the upper bound is set at 50%.

Metric 5.4 is unique in that it measures the subjective quality of a college or university. It is adapted from UN Metric 16.6.2 which measures the level of satisfaction of the population of a country with the services provided by their local and federal agencies. An example might be the satisfaction of a crime victim with the police and judicial effort to carry out justice. While this type of measurement is certainly related to sustainability on a national scale, its relevance may not appear as obvious on a smaller scale, like for a college or university. In fact, it would not be relevant was it not for certain issues related to gender equality that do not fit under other metrics. For instance, a topic that has gained quite a lot of attention in recent years is the prevalence of breastfeeding and lactation rooms in the workplace. By law, an employer has to provide "a place other than a bathroom, that is shielded from view and free from intrusion from coworkers and the public, which may be used by an employee to express breast milk" according to the U.S. Department of Labor Wage and Hour Division (U.S. Department of Labor, 2018). However, there is no requirement that these rooms be of a certain quality or that they are used exclusively for this purpose. A supply closet is legal to be used as a lactation room, though it may not be comfortable for the new mother. For this reason, it is important to measure the satisfaction of members of the community of an institution of higher learning with services provided to them like lactation and breast-feeding rooms. It was deemed that this metric was material for inclusion in the framework based on VSLC member input. Additionally, this metric was sorted into the gender equality goal to ensure that members of both genders are equally satisfied with the services provided to them. This metric is bound by absolute percentages with 0% as the lower bound, indicating no members of the community are satisfied with the services provided to them, and upper bound of 100%, meaning the entire community is satisfied.

A.2.7 Goal 6: Clean Water and Sanitation

Objective: Attain sustainable water practices at Villanova in terms of potable water, watershed, stormwater, water quality, and wastewater management.

Table A.15. Metrics for Goal 6

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
6.1	Total potable water used per year.	gal/WCU	35.1	7,6201	23.9%
6.2	Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing peak flow. This includes raingardens, constructed wetlands, and green roofs.	%	100	0	21.9%
6.3	Percentage of rainfall captured from impervious surfaces on campus.	%	100	0	25.0%
6.4	Mass of plastic due to water and beverage consumption sold on Villanova's campus (soda, sports drinks, water, coffee, etc.)	Lb./ECU	0	5.6×10^{-3}	29.2%

College and university campuses are unique in their high consumption of water. Often thousands of students live at a university, everyone consuming water in their daily lives for drinking and showering. For this reason, it is important schools measure their potable water usage. While less of an issue on the East Coast, much of the United States suffers from droughts, and many places in the world suffer from water scarcity. Colleges and universities must limit the amount of potable water that they use, as to not deplete the local supply. Metric 6.1 measures potable water use. It is adapted from 6.4.1, PESC, AASHE STARS, and VSLC suggestions. Its inclusion ensures that institutions of higher education seek to increase the efficiency of their water consumption, reduce unnecessary water use, and develop innovative means to reduce potable water intake like rain-water collection and greywater recycling. Therefore, the metric is bound by benchmarked values of AASHE stars reporters. Of all the schools that listed their potable water consumption, the average of the least consuming 2.5% was used as an upper bound, the ideal value. The average of the highest consuming 2.5% was used as the worst possible value, or the lower bound. In taking these averages, several institutions on both the high and low end were excluded. These colleges or universities used an unusually high or low amount of water-based on unique circumstances. For instance, some schools of forestry and agriculture used very large amounts

of water, and schools without dorms used very little. Outlier schools were determined and not included in the top and bottom 2.5%.

Metric 6.2 measures the average efficiency of green and best management practice infrastructure in terms of reducing peak flow. This includes rain gardens, constructed wetlands, and green roofs. Here, efficiency is defined as reduction in peak flow runoff. 100% percent efficiency means reduction is 100% of peak flow or all water is infiltrated and goes into the groundwater. This measurement is used to determine how much individual installations reduce the water that they collect from entering the sewer system. This metric was adapted from suggestions from the VSLC and operations committee. The upper bound is set to 100% and the lower bound is 0%.

Metric 6.3 measures the amount of water captured by impervious surfaces. This measurement is particularly important for college and university settings as they frequently have large impervious areas. Therefore, it is important to measure the amount of water that is captured from these surfaces. This metric is adapted from suggestions from the operations committee and the VSLC. It is bound by absolute percentages, where the ideal upper bound is capturing 100% of all rainfall on impervious surfaces, and the worst possible score is 0%, meaning no rainfall is captured.

In the past few years, there has been a growing anti-plastic sentiment across the world. The increase in ocean plastic pollution and its effect on the environment have caused many people and organizations to rethink the way that they use plastic, especially in the consumption of water. There have been campaigns at colleges and universities to reduce single-use plastic by providing refillable water bottles, water bottle refilling stations, and promoting reusable coffee mugs. Still, most colleges and universities sell beverages in their stores that are contained in single-use plastic bottles. While these plastic bottles can be, and are often, recycled, they are also frequently just thrown away or inappropriately placed in recycling in such a way that they contaminate or are contaminated by the rest of the objects in that batch of recyclables. Additionally, some of the countries to which the U.S. was exporting its recyclables have stopped accepting them. This means that it is important to not only properly recycle plastics in the U.S. but to also reduce the total amount of plastic consumed. For this reason, Metric 6.4 is designed to measure the amount of water sold on a college or university campus that is delivered via single-use plastic. This metric is adapted from suggestions from VSLC, Student Sustainability Committee (SSC), and operations committee.

The upper ideal bound for this metric was set at 0 lb./weighted campus user. In this ideal situation, no water or beverages would be consumed via single-use plastic. The lower bound was calculated

given a worst-case scenario. The average daily consumption of water was divided by the amount of water available in a standard water bottle. This determined the amount of water bottle plastic that would hypothetically be used by a person in a day if they consumed all their water out of single-use plastics.

A.2.8 Goal 7: Affordable and Clean Energy

Objective: Reduce Villanova's energy intensity and increase the share of Villanova's energy coming from renewable sources.

Table A.16. Metrics for Goal 7

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
7.1	Renewable energy share in the total campus energy consumption (Scope 1 and 2).	%	100	0	34.2%
7.2	Campus's energy intensity (site energy).	MMBtu/ GSF	0.02	0.30	25.4%
7.3	Percentage of the institution's investment pool in positive sustainability investments.	%	47.1	0	23.1%
7.4	Equivalent Gallons of fossil fuel burned (gasoline, Diesel) per mile traversed by university vehicles.	gal/mile	0	0.05	17.3%

One of the most popular topics in sustainability, and for reducing the carbon emissions of college and university campuses, is the idea of renewable energy. Metric 7.1 measures the renewable energy share of the electricity used by a college or university. It was adapted from U.N. Indicator 7.1, the Cities Index, PESC and VSLC. The upper and lower bounds are set at absolute percentages, with the ideal upper bound is 100% renewable energy share, and the lower bound is 0%.

Another material metric for colleges and universities to consider is their energy intensity. While it is less important if an institution's energy share is 100% renewable, it is still important to measure how much energy it consumes. Metric 7.2 was adapted from U.N. Indicator 7.3.1, PESC, and VSLC suggestions. It is bounded using the best and worst-performing schools as reported to AASHE. As with many of the metrics bound by using AASHE reporters, schools that performed unusually well or poorly were omitted. These include schools that are energy-intense due to

owning hospitals or labs consuming large amounts of electricity, or schools with minimal or no dorms who consume very little compared to others. The upper bound was set to 0.0211 Million British Thermal Units per Gross Square Feet (MMBTU/GSF) and the lower bound was set to 0.298 MMBTU/GSF

Metric 7.3 measures university investment or grants in support of clean energy investment, research, development, and renewable energy implementation on campus. This metric is particularly important for an institution of higher education as it reflects the amount of academic research that is devoted to developing renewable energy. Many of the innovations that surround improving technology come from the world of academia, and this metric is meant to ensure that colleges and universities are contributing in some way to the improvement and implementation of renewable energy for the betterment of the environment. This metric was adapted from U.N. Indicator 7.A.1, which is set with a lower bound of 0%, meaning no money invested. The upper bound is set to 47.07%, which is the average of the best performing 2.5% of AASHE reporters.

Many colleges and universities have fleets of vehicles that serve various purposes. Therefore, it is important for institutions of higher learning to monitor their consumption of gasoline and diesel. This is captured in Metric 7.4 which measures the equivalent gallons of fossil fuel burned per mile traversed by university vehicles. The metric was worded in this way as many vehicles are not available in non-fossil fuel-burning models, or they would be technically or monetarily infeasible to own given current technology, like a garbage truck. This metric was taken from a combination of two PESC suggested metrics, the proportion of fleet that uses alternative fuels and miles per gallon of the conventional fleet. It is bound by an ideal value of 0 gallons per mile, signifying an entirely alternative fleet, and the worst possible value is 0.045 which is the average large vehicle gallon per mile consumption according to the official U.S. fuel economy database (U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 2019).

A.2.9 Goal 8: Decent Work and Economic Growth

Objective: Achieve just working conditions and compensation at Villanova, while securing Villanova's long-term institutional economic growth.

Table A.17. Metrics for Goal 8

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
8.1	Annual growth rate	%	7.8	0	16.9%
8.2	Minimum hourly earnings (lowest pay band) of employees disaggregated by undergraduate and graduate students, part time, and full time.	$	15	7.25	30.4%
8.3	Difference in attrition rate of all employees by race and gender.	%	0	100	18.5%
8.4	Recordable injury rate. (OSHA)	Cases/ 100 full time employees	0	2.9	13.9%
8.5	Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	weeks	15	6	20.4%

For an organization to remain environmentally and socially sustainable, it must be financially prosperous. Metric 8.1 measures the growth rate of a college or university. The metric was adapted from the Cities Index. Its upper bound is 7.96%, which is the average return of the S&P 500 (Maverick, 2019). This value was chosen as it represents sustained economic growth in line with the overall U.S. economy.

Metric 8.2 is Metric 1.2 repeated. It is included in both Goals 1 and 8 because it speaks to both the prevention of poverty but also the financial stability of an institution. It is bound the same way as it is in Goal 1, with an ideal value of $15 per hour and a worst possible value of $7.25 per hour.

Metric 8.3 measures the attrition rate of employees at Villanova, specifically the difference in attrition rate between different demographics of employees. This is an indirect measurement of the satisfaction of different demographics with the community of a university by determining if members of certain groups feel more compelled to leave the organization than others. This metric was adapted from U.N Indicator 8.5.2, PESC, and a metric from the Cities Index. It is bound by

absolute percentages with the ideal difference in attrition rate being 0% and the worst possible value is 100%.

Metric 8.4 measures work-related injuries and illnesses as reported to the Occupational Safety and Health Administration (OSHA). This metric measures the recordable injury rate, or cases per 100 full-time employees. While institutions of higher education are not as prone to work-related injuries and illnesses, there are still roles within a college or university setting in which OSHA regulations are relevant. These include working in labs and shops that house dangerous equipment or chemicals, as well as grounds crew and operational staff.

The metric was adapted from U.N. Indicator 8.8.1, and VSLC. The metric has an ideal lower bound of 0 cases per 100 employees. The upper bound is set at 2.9, which is the 2016 private industry employer injury occurrence rate (Bureau of Labor Statistics, U.S. Department of Labor, 2017).

Metric 8.5 is a repeat of Metric 3.4, measuring paid time off for employees for dependent care.

A.2.10 Goal 9: Industry, Innovation, and Infrastructure

Objective: Promote innovation by supporting research as well as designing, building, and maintaining sustainable and resilient infrastructure on the Villanova campus.

Table A.18. Metrics for Goal 9

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
9.1	Net carbon emissions emitted by student, faculty, and staff commuters.	MT CO_2e/ wcu/ yr.	0	3.6	27.3%
9.2	Scope 1 and 2 net greenhouse gas emissions.	MT CO_2e/ wcu/ yr.	0	13.3	26.5%
9.3	Percentage of campus building built and certified to current sustainable standards.	%	100	0	26.2%
9.4	Percentage of students and faculty actively engaged in research.	%	100	0	20.0%

One of the major difficulties in measuring net carbon emissions is the calculation for determining Scope 3. Scope 3 refers to procurement and transportation-related emissions. While it is both possible and important for an organization to measure the entirety of their Scope 3 emissions, it is a massive and potentially expensive undertaking. Proper Scope 3 emission calculations would require extensive work with an organization's suppliers of every material they purchase, for each item's entire supply chain.

Compared to procurement emissions, calculating the transportation aspect of Scope 3 emissions is relatively simple and low cost. For this reason, it has been separated out of a holistic Scope 3 emission metric and encompassed in Metric 9.1, as transportation-related emissions from students, faculty, and staff. This metric was adapted from U.N. Indicators 9.1.2 and 9.4.1, AASHE metrics, and VSLC input. The upper bound was set to the ideal value for this metric would be zero-emissions associated with transportation. The lower bound is set at 3.61 MT CO_2e/weighted campus user/yr., which is the average of the worst-performing 2.5% of AASHE reporting schools, except for several whose transportation emissions far exceeded most other reporters.

One of the most important steps for any organization to make towards improved sustainability is achieving large reductions in CO_2 emissions. As significant consumers of electricity, it is vital that institutions of higher learning reduce their carbon emissions, with the ideal goal of obtaining

carbon neutrality. As previously discussed, there are three scopes of carbon emissions, with Scope 3 being the most difficult to calculate and reduce. In contrast, Scope 1 emissions, being comprised of emissions directly created on an organization's property by processes carried out by the organization, and Scope 2, emissions created in the production of the electricity consumed by an organization, are easier to measure and control. Metric 9.2 was adapted from U.N. Indicator 9.4.1 and AASHE stars and measures the first two scopes of carbon emissions, with an absolute upper bound of 0 MT CO_2e/WCU/yr. The lower bound is set at 13.32 MT CO_2e/WCU/yr., which is the average of the lower 2.5% of AASHE reporters, excluding schools with unusually higher emissions compared to other poorly performing schools.

Leadership in Energy and Environmental Design (LEED), has developed standards and practices, as well as a certification process, that ensures that buildings are constructed to minimize their overall emissions. This is measured by Metric 9.3, which indicates the percentage of new buildings constructed to the highest LEED standards. This metric is bounded by absolute percentages for both the upper and lower bound, with the ideal value being 100% of new buildings and the worst possible score being 0% of new buildings. Metric 9.3 was adapted from PESC and AASHE stars.

Goal 9 endeavors to improve infrastructure and research of any kind, even beyond the types that would fall under the heading of sustainable development. According to the U.N., innovation of any kind is important for progress and should, therefore, be encouraged. This sentiment can be translated to the scale of an institution of higher learning by developing a metric for general research. This is encompassed in Metric 9.4, which measures the percentage of students and faculty actively engaged in any type of research. The knowledge that can be disseminated to the public that is developed through active research is one of the primary outputs of an institution of higher education, and so it is important that colleges and universities are maximizing that academic pursuit. Metric 9.4 is bounded by absolute percentages, with the ideal value being 100% participation and the worst possible value being 0%.

A.2.11 Goal 10: Reduced Inequalities

Objective: Reduce inequality within the Villanova community.

Table A.19. Metrics for Goal 10

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
10.1	Proportion of students and employees that earn below a living wage.	%	0	100	26.9%
10.2	The average diversity level of new hires for each "band" of jobs hired on a five-year rolling basis.	%	100	0	21.9%
10.3	Proportion of minority members in leadership positions on the President's cabinet, council of deans, and council of provosts.	%	41.5	0	27.7%
10.4	Salary gap at Villanova defined as the gap between the highest and lowest pay band.	Ratio of highest to lowest band	x	x	23.5%

Metric 10.1 is a repeat of Metric 1.1. It is replicated in Goal 10 with the same bounds.

In any organization, it is vital that hiring practices are not unfair to members or certain demographics. For this reason, Metric 10.2 measures the diversity level of new hires within the same type of job. This metric is bound in a piecewise method. The national demographic percentage of every race within the U.S. is represented by its portion out of the total population. Ideally, the diversity level of each job would have the same percentage of employees of each racial demographic as the national percentage. However, diversity levels can vary regionally. For this reason, a plus or minus 10% band is added to the national percentage of each demographic. If the diversity level of that demographic for each job type at a college or university fits within plus or minus 10% of the national average, then the national percentage value is added to the score for that metric. National demographics can be seen in Table A.19. Metrics for Goal 10.

**Table A.20. National Demographics According to the U.S. Census
(U.S. Census Bureau, 2018)**

Race/ Gender	National Average
White	60.7%
Black	13.4%
Asian	5.8%
Latino/ Hispanic	18.1%
Other	1.5%

For example, if a job level had 62% white employees, 15% black employees, and the rest of the demographics in Table A.20. were greater or smaller than plus or minus 10% of the value in the table, the score for that metric would be 74.1%. The upper bound for this metric is 100%, meaning all the racial demographics are represented at every job level at their plus or minus 10% of their national average. The lower bound is 0%, meaning no demographic is properly represented.

Equally as important as hiring a diverse workforce is having a diverse leadership team. Metric 10.3 seeks to ensure a diverse administration. It measures the diversity level of people in positions of power at a university. The lower bound is an absolute percentage of 0% diverse leadership. The upper bound is 41.5% diverse, which is the non-white population level of the United States(U.S. Census Bureau, 2018).

As of Winter 2019, bounds have not determined for Metric 10.4. This metric measures the pay gap at Villanova, which is the difference in salary between the highest and lowest paid employee at the school. This metric presents issues as the school has staff who are paid minimum wage but also has at least one high profile employee who makes far more than any other employee of the school. For this reason, the proper way to bound this metric will be determined by the council in early 2020.

A.2.12 Goal 11: Sustainable Cities and Communities

Objective: Make Villanova's community inclusive, safe, resilient, and sustainable.

Table A.21. Metrics for Goal 11

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
11.1	Proportion of non-utility and non-maintenance projects that have stakeholder input from students, faculty, and staff.	%	100	0	15.8%
11.2	Indoor and outdoor air quality based on EPA and OSHA regulations	AQI	0	500	18.1%
11.3	Degree of implementation of a campus disaster risk reduction strategy in line with the industry standards or expert recommendation.	%	100	0	16.9%
11.4	Percentage of campus managed under sustainable landscape management practices.	%	100	0	21.5%
11.5	Proportion of commuter miles traveled using low carbon transportation (public transit, carpooling, walking, biking, and electric vehicles).	%	100	0	27.7%

An important factor to consider when planning large development projects at any organization is stakeholder engagement. Metric 11.1 seeks to measure the number of non-maintenance and non-utility projects that receive input from relevant stakeholders. These can include students, faculty, staff, neighbors, parents, and community and local government officials. This metric is bounded by absolute percentages with the ideal value being 100% of projects receiving stakeholder input, and the worst value is 0%. It was adapted from U.N. Indicator 11.3.2 and AASHE stars.

Air quality on a college and university campus is important as it can affect the health of the students, faculty, and staff. This issue is particularly material for urban schools and those near industrial areas or roads. Metric 11.2 measures the air quality using an indicator known as the Air Quality Index (AQI). This is an EPA scale that ranges from 0 to 500, with a range of 0-50 being considered the best, 51 to 100 considered moderate, and 101-150 as the range that begins to become problematic (U.S. Environmental Protection Agency, 2019). The bounds for this metric were set according to the AQI range, with the best value being 0 and the worst being 500.

Colleges and universities have many people contained in a relatively small space. This can lead to potential issues when an emergency or disaster occurs. Recent upticks in school shootings and natural disasters demonstrate the need for institutions of higher education to have comprehensive disaster and emergency plans developed. Metric 11.3 measures the degree of implementation of such a plan at a college or university. This metric is bound by absolute percentages with the ideal value being 100% implementation of a plan. This metric was adapted from U.N. Indicators 11.b.1 and 11. b.2.

Often, universities have large open greens, extensive lawns, gardens, and various types of flower displays. Conventional groundskeeping uses fertilizer that is included in runoff, contributing to problems like eutrophication (Dokulil & Teubner, 2011). To reduce their impact on the environment, it is important that colleges and universities utilize sustainable landscaping practices. Sustainable landscaping practices include those defined as sustainable by AASHE Stars which are integrated pest management and organic land care standards. Metric 11.4 measures the percentage of a college or university campus that is managed using sustainable practices. Adapted from PESC and AASHE indicators, this metric is bound by absolute percentages with the ideal value being 100% of a campus managed sustainably.

One method for reducing Scope 3 emissions is for community members to change the method with which they commute. This means rather than taking a conventional gasoline-powered car,

they would travel via low carbon options. These include public transit, carpooling, walking, biking, and electric vehicles. Metric 11.5 measures the percentage of the campus community that uses these methods of transportation to get to and from a college or university. This metric is bound by absolute maximum and minimum percentages, with the ideal value being 100% of community members using low carbon transportation.

A.2.13 Goal 12: Responsible Consumption and Production

Objective: Achieve zero waste by building awareness of circular procurement/operational models at Villanova.

Table A.22. Metrics for Goal 12

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
12.1	Proportion of total waste disposed of in a non-circular manner.	%	0	100	27.1%
12.2	Percentage of food disposed of in a non-circular manner.	%	0	100	22.9%
12.3	Campus recycling rate.	%	100	0	21.7%
12.4	Proportion of campus products sourced sustainably as verified by third party certifications.	%	100	0	28.3%

Metric 12.1 measures the proportion of total waste disposed of in a non-circular manner. For Metric 12.1, "non-circular" means anything other than landfill or incineration. Adapted from U.N. Indicators 12.2.1 and 12.5.1, as well as from input from the VSLC, it is bound by absolute percentages with the ideal value being 0% of waste being disposed of in a non-circular way.

While it is important to measure the total amount of waste that is disposed of non-circularly, there are some kinds of waste that are important to measure separately because of the implications associated with its use. One such item is food. Metric 12.2 measures food that is disposed of non-circularly to incentivize colleges and universities to improve the method with which they dispose of their food. Institutions of higher education often have several dining options, which can lead to an abundance of food waste. This metric can incentivize the dining services department at a college or university to implement the innovative food disposal methods mentioned above to

reduce its overall impact. Metric 12.2 is a repeat of Metric 2.3 and is therefore bounded with the same absolute percentages with 0% as the highest bound and 100% as the lowest.

Metric 12.3 measures a campus's recycling rate. This metric is very important because there are many factors that determine the performance of a school in this metric. One major factor is student, faculty, and staff behavior. If members of a campus community are properly recycling, the recycling rate can be high. However, even if a small portion of the campus community is improperly using the recycling receptacles, it can cause contamination that will divert entire batches of recyclable material to landfill. This behavior can be affected by signage and advanced receptacles, but often comes down to the willingness of community members to sort through their trash. Because of the material intense nature of many campus communities, having a high recycling rate is vital to reducing a college or university's overall impact. Metric 12.3 measures the recycling rate as defined as the percentage of recyclable materials that are actually recycled. It is bound by absolute percentages, with the ideal value being 100%.

No matter what changes a school makes to be greener, many colleges and universities by their nature will be material intense. Often institutions of higher education house thousands or even tens of thousands of students, and these students and their teachers and support staff need materials to properly do their jobs and live comfortably. It is therefore not enough to simply measure the end of life of the materials consumed on campus, as is done by the first three metrics for Goal 12, but supply-side impacts must also be measured.

Metric 12.4 measures the proportion of campus products sourced sustainably as verified by third-party certifications. This ensures that a school is purchasing using green procurement practices while removing the burden of paying for the analysis to guarantee the supplies are sustainable. This metric was adapted from VSLC input and is bound by absolute percentages, with the ideal value being 100% green procurement as certified by a third party.

A.2.14 Goal 13: Climate Action

Objective: Take urgent action to combat climate change as central to Villanova's institutional mission while substantially reducing emissions associated with campus and supply chain operations in accordance with the IPCC (Intergovernmental Panel on Climate Change) 1.5°C report.

Table A.23. Metrics for Goal 13

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
13.1	Scope 1 and 2 net greenhouse gas emissions.	MT CO_2e per weighted campus user	0	13.3	39.5%
13.2	Scope 3 net greenhouse gas emissions.	MT CO_2e per weighted campus user	0	3.6	33.3%
13.3	Degree of implementation of an up-to-date integrated climate change and disaster resilience strategy.	% Implementation	100	0	27.2%

Metric 13.1 and 13.2 are repeated from Metrics 9.1 and 9.2 and are bound in the same way. Metric 13.3 measures the degree of implementation of a climate change and disaster resilience strategy. As global warming progresses, many colleges and universities will have to contend with issues they never had in the past. These include the increased frequency and severity of storms, rising sea levels for coastal schools, and increased wildfire danger. This means it is vitally important that every college and university assess what their unique climate-related risks are and implement a plan to deal with them. Metric 13.3 is adapted from U.N. Indicators 13.1.2 and 13.3.1. It is bound by absolute percentages where the ideal value is 100% implementation.

A.2.15 Goal 14: Life Below Water

Objective: Promote water conservation and reduce Villanova's impacts on terrestrial ecosystems as they relate to aquatic environments.

Table A.24. Metrics for Goal 14

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
14.1	Annual mass of nitrogen and phosphorus used in fertilizer on campus.	N lb./acre	0	256	21.5%
14.2	Percent of unrecycled plastic waste produced on campus.	%	0	100	30.8%
14.3	Proportion of seafood consumed on campus that is sustainably caught or raised and certified sustainable by third party standards.	%	100	0	23.9%
14.4	Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing pollutant loads. This includes raingardens, constructed wetlands, and green roofs.	%	100	0	23.9%

As previously mentioned in the discussion of Metric 11.4, the large landscaping area that is included in the campuses of many colleges and universities has the potential for major impacts. Many of these impacts can come from the use of fertilizers that can be present in runoff. For this reason, it is important for landscaping practices to use as little fertilizer as possible. Most fertilizer is made of either phosphorus or nitrogen, which when introduced into water ecosystems can cause eutrophication (Dokulil & Teubner, 2011). Metric 14.1 measures the amount of these fertilizers used at a college or university, as measured in pounds of nitrogen equivalent per acre, to incentivize the reduction in overall fertilizer use. The upper bound is set at the absolute value of 0 lb. N eq./acre. The lower bound is set at 256, which is lower 2.5% of all reporting AASHE schools. This metric was adapted from U.N. indicator 14.1.1.

Like Metric 6.4, Metric 14.2 looks to measure unrecycled plastic. More specifically, the percentage of plastic waste that is not recycled. As previously discussed, colleges and universities are large consumers of single-use plastic, and for behavioral reasons, it is often not recycled. The metric is adapted from U.N. Indicator 14.1.1 and from the VSLC. The metric is bound by absolute percentages, with the ideal value being 0% of plastic not being recycled.

As a major consumer of food, colleges and universities have a responsibility to ensure that the animal protein-based products are responsibly sourced. This is especially important for fish, as overfishing is an issue that is currently causing issues for the world's oceans (Jetson, n.d.). For this reason, Metric 14.3 measures the proportion of seafood consumed on campus that is sustainably caught or raised and certified sustainable by third party standards. Much like Metric

12.4, this metric uses third party verification to remove the burden of investigating the sustainability of the sourced fish from the school but ensures that the college or university is purchasing responsibly. The metric is bound by absolute percentages with the ideal value being 100% of fish consumed coming from third-party certified sustainable vendors.

Metric 14.4 measures how well Villanova's green and best management practice infrastructure is working to reduce pollutant loads to those that are acceptable to stream water quality standards in Pennsylvania. The bounds are set to ideal values with an upper bound of 100% efficiency and a lower bound of 0% efficiency. The upper bound indicates a total removal of pollutants below detection levels and the lower bound indicates removal of pollutants to Pennsylvania code standards (Pennsylvania Water Quality Code, Title 25, Chapter 16, 2019).

A.2.16 Goal 15: Life on Land

Objective: Integrate biodiversity, business practices, and research to protect natural ecosystems from degradation at Villanova.

Table A.25. Metrics for Goal 15

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
15.1	Carbon sequestered per year by Villanova's campus ecosystem.	$MTCO_2e$	15,755	0	29.6%
15.2	Portion of campus considered Green space and/or covered by trees. Includes green roofs.	%	27%	0	24.2%
15.3	Proportion of campus biosphere considered to be an alien or invasive species.	%	0	100	21.2%
15.4	Percentage of campus managed under sustainable landscape management practices or an equivalent third-party certification.	%	100	0	25.0%

One method for climate change prevention that is sometimes overlooked discussing GHG emissions is carbon sequestration. This is the process of using trees, plants, or other methods to capture carbon from the air and hold it in some form so that it does not remain in the atmosphere contributing to the greenhouse effect. Metric 15.1 measures total carbon sequestered on campus, with a worst possible performance of 0 metric tons of CO_2e sequestered. The best possible score is the average of the best performing 2.5% of AASHE reporters. This metric was adapted from an AASHE credit.

An important measurement for the sustainability of urban areas is green space. Greenspace has benefits for rain collection, carbon sequestration, and even the health and psychology of area residents (Ward Thompson et al., 2012). Metric 15.2 measures the percentage of a college or university campus that is considered green space, with a lower bound of 0%. The upper bound is set to 27% (*New York Department of City Planning*, 2019), which is the green space percentage of New York City, which is considered a high achiever in the area of green space implementation for climate change mitigation (García Sánchez et al., 2018).

A major issue in the world of biodiversity is the presence of invasive species. These plants and animals are non-native to a region and can kill off native plant and animal life that are vital to a local ecosystem. Preventing the spread of invasive species is important for the preservation of local ecosystems, especially when compounded with the threat of anthropogenic development. Metric 15.3 measures the percentage of a campus' biosphere considered to be an alien or invasive species. It is bound with absolute percentages with the ideal being 0% invasive or alien species present in the campus biosphere. The metric was developed from U.N. Indicator 15.8.1.

Metric 15.4 is a repeat of Metric 11.4 and is bound and derived from the same sources.

A.2.17 Goal 16: Peace, Justice, and Strong Institutions

Objective: Increase safety, satisfaction, healthy relationships, and transparency on the Villanova campus.

Table A.26. Metrics for Goal 16

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
16.1	Proportion of population that feel safe walking alone around the campus.	%	100	0	26.2%
16.2	Annual crime rate per capita on Villanova's campus.	Crimes committed per 1,000 Students	0.05	5.47	28.5%
16.3	Proportion of students, faculty, and staff that feel like they are a part of an institution that is just and fair to its members.	%	100	0	26.2%
16.4	Proportion of campus departments that adopt and implement policies that guarantee public access to information.	%	100	0	19.2%

Metric 16.1 measures the proportion of the population of a college community that feel safe while on campus. This is an important metric because of the myriad of locations and security options that colleges and universities use. This was adapted from U.N. Indicator 16.1.4. It is measured in absolute proportions, with the ideal value being 100% of the population feeling safe.

In the same spirit of Metric 16.1, Metric 16.2 measures the crime rate at a college campus. This metric is measured as crimes per 1,000 students which are the standard for crime rate calculations (Federal Bureau of Investigations, 2019). Crime rate includes murder, negligent manslaughter, rape, fondling, incest, statutory rape, robbery, aggravated assault, burglary, vehicular theft, and arson (U.S. Department of Education, 2019). Total cases for a year are added up and divided into a per 1,000 student basis. The metric is bound using the upper and lower 2.5% of school reporting to the U.S. Department of Education's Campus Safety and Security division (U.S. Department of Education, 2019).

Metric 16.3 measures the proportion of students, faculty, and staff that feel that they are a part of the campus community. The degree to which someone feels a part of a school community is determined by their response to eight questions asked on a survey. Each question can be scored out of six points for a total of 48 possible points. This metric is bound by absolute percentages with 0% as the lower bound, indicating no one feels a part of the community, and upper bound of 100%, meaning the entire community feels welcome as represented by a 48 on the satisfaction survey.

The last metric in Goal 16 measures the proportion of campus departments that adopt and implement policies that guarantee public access to information. This metric is intended to ensure open and fair policies and practices across a university or college. This metric was adopted from U.N. Indicator 16.10.2 and is bound using absolute percentages. The ideal value is 100% of departments having this type of policy.

A.2.18 Goal 17: Partnerships for the Goals

Objective: Leverage Villanova's sustainability expertise and financial influence to connect people and advocate for sustainable ideas.

Table A.27. Metrics for Goal 17

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Weight
17.1	University philanthropic contributions (hours) associated with advancing the UN SDGs.	hours/ student/year	51.1	0	26.5%
17.2	Proportion of active partnerships from tier 1 suppliers, research grants, and service-learning partnerships that are contributing to a sustainable world (e.g. report to GRI, CDP, have a Science-Based Target, or contribute to UN SDGs).	%	100	0	32.3%
17.3	Annual student, faculty, and staff hours spent on off-campus service-learning projects.	hours/ student/year	51.1	0	41.2%

Metric 17.1 measures a college or university's philanthropic contribution towards the global achievement of the SDGs. This is a broad topic many forms of philanthropy can be covered by the vast categories covered by the SDGs. The lower bound is set using the worst possible philanthropic performance, which is zero hours per student per year. The upper bound is set at the value of the average of the best performing 2.5% of reporting schools to AASHE, excluding those that were outside of the general trend of high performing schools. As mentioned, the metric was adapted from an AASHE credit, as well as U.N. Indicator 17.9.1.

Metric 17.2 measures the proportion of partnerships a university has with suppliers and service-learning partners that contribute in some way to a more sustainable world. This means active partnerships a school has in which the other entity has science-based targets, plans, or goals to improve their own and promote external, sustainability as measured by GRI, CDP, or the U.N. SDGs. The desire for this metric is like Metrics 1.4 and 12.4 in that they seek to measure the sustainable practices of organizations with which Villanova does business. This metric was taken directly from VSLC input and is bounded by absolute percentages, with the best possible score being 100% of partnerships.

Metric 17.3 measures the number of hours students spend on off-campus service-learning opportunities. This is distinct from Metric 17.1 which measures philanthropy. While both types of service can provide benefits to external partners, philanthropy is aimed at benefiting the external partner whereas service-learning is meant to teach the students by means of working with an external partner. This metric is adapted from U.N. Indicator 17.9, and VSLC input. It is bound the

same way as Metric 17.1 as no data was available about service-learning hours at institutions of higher education.

APPENDIX B: GOAL SNAPSHOTS

This appendix contains each UN SDG on one page with all the information outlined in this paper. These details include:

1. UN SDG title
2. Villanova adjusted objective
3. Objective baseline score
4. Objective weight
5. Metric description
6. Metric baseline value
7. Metric weight
8. Key results

GOAL 0 – Sustainability in Academics

"Sustainability is not just about adopting the latest energy-efficient technologies or turning to renewable sources of power. Sustainability is the responsibility of every individual every day. It is about changing our behavior and mindset to reduce power and water consumption, thereby helping to control emissions and pollution levels."
-Joe Kaeser, Siemens AG CEO

"To make the changes we need to make and to reach a safer future, we will need the resources of everybody here — the scientists, the policy makers, and the industrialists — all working together towards a common goal. And that goal is a planet that can continue to support life."
-Dr. Piers Sellers, American astronaut

Villanova 2030 Objective

Integrate sustainability into campus curricula, research, and outreach to achieve an ethos of sustainable living at Villanova.

OBJECTIVE WEIGHT	BASELINE SCORE
3.0% / 100%	0.43% / 3.0%

Metric	2018 Baseline Score	Maximum Score
0.1 Percentage of courses that include sustainability learning opportunities encompassed by the SDGs.	0.1%	0.8%
0.2 Incentives for faculty across all disciplines to incorporate sustainability into existing courses or develop new sustainability courses.	0.0%	0.4%
0.3 Existence of and performance on a sustainability literacy assessment for students.	0.0%	0.5%
0.4 Percentage of students who graduate from programs that have adopted at least one sustainability track or 10% of courses that include sustainability	0.1%	0.6%
0.5 Percentage of research-producing departments that are engaged in sustainability research	0.2%	0.7%
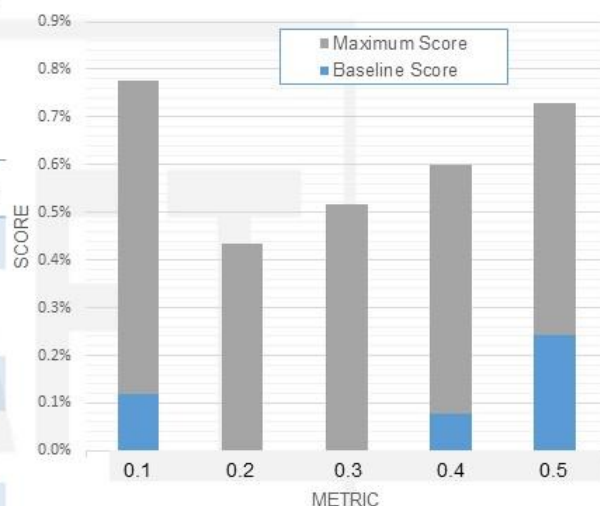
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
0.1	All Villanova department and program offer sustainability learning opportunities.	Integrate sustainability into the common core.	x	Incorporate sustainability learning outcomes into 100% of degree programs.
0.2	Establish a fund for faculty incentives to incorporate sustainability in their courses.	x	x	x
0.3	Develop a sustainability literacy assessment.	Implement a sustainability literacy assessment	x	x
0.4	x	x	x	100% of students graduate from a program that has adopted at least one sustainability learning outcome.
0.5	Develop plan to implement a sustainability research network	Establish a sustainability research network across all colleges	x	x

GOAL 1 – End poverty in all its forms everywhere

"While global poverty rates have been cut by more than half since 2000, one in ten people in developing regions are still living with their families on less than the international poverty line of US$1.90 a day... Poverty is more than the lack of income and resources to ensure a sustainable livelihood. Its manifestations include hunger and malnutrition, limited access to education and other basic services, social discrimination and exclusion as well as the lack of participation in decision-making."

-United Nations

Villanova 2030 Objective

Assure that no Villanovan's compensation rate is below living wage guidelines; Villanova supports and participates in local and global initiatives to eradicate extreme poverty; Villanova assures Villanovans have equitable access to basic resources and requires livable wages in their supply chain.

OBJECTIVE WEIGHT	BASELINE SCORE
5.8% / 100%	0.61% / 5.8%

Metric	2018 Baseline Score	Maximum Score
1.1 Proportion of Villanova employees, including student employees, that earn below a living wage. ($12.64/hr for 1 adult)	0.0%	1.86%
1.2 Minimum hourly earnings (lowest pay band) of employees disaggregated by full time, part time and student employees	0.0%	1.49%
1.3 Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	0.61%	0.93%
1.4 Proportion of tier 1 suppliers with at least $500,000 in annual business that published policies, programs, or disclosures about having living wages or equivalent for their employees.	0.0%	1.49%

Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
1.1	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	Reduce the number of students and employees earning below a living wage to zero.	Continue to maintain living wages for all students and employees.
1.2	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	x	x
1.3	x	x	x	x
1.4	Confirm how many tier 1 suppliers provide living wages and request change from those that currently do not. Impose a contractually obligated living wage for all tier 1 suppliers.	x	x	x

2 ZERO HUNGER

GOAL 2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture

"A profound change of the global food and agriculture system is needed if we are to nourish the 815 million people who are hungry today and the additional 2 billion people expected to be undernourished by 2050. Investments in agriculture are crucial to increasing the capacity for agricultural productivity and sustainable food production systems are necessary to help alleviate the perils of hunger."

-United Nations

Villanova 2030 Objective

Ensure that every Villanovan has access to and is educated on sustainably sourced and appropriate nutrition. Take action to ensure that food is used as efficiently as possible.

OBJECTIVE WEIGHT	BASELINE SCORE
6.9% / 100%	0.55% / 6.9%

Metric	2018 Baseline Score	Maximum Score
2.1 Prevalence of moderate or severe food insecurity in the university population, based on the Food Insecurity Index.	0.55%	2.62%
2.2 Proportion of students, faculty, and staff that are meeting their caloric and nutritional needs without consuming in excess.	0.0%	1.34%
2.3 Percentage of food disposed of in a non circular manner.	0.0%	2.99%

Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
2.1	Reduce food insecurity for Villanova students to no more than 10%.	?	x	Reduce food insecurity to 0% among Villanova students, faculty, and staff.
2.2	Measure the nutritional health of Villanova's population and assess the needs of those with restricted diets due to allergies, religious restrictions, or other dietary restrictions.	x	x	x
2.3	Divert 100% of pre-consumer food waste from landfill or incineration.	Pilot the collection of post-consumer food waste.	?	Eliminate all of Villanova's pre- and post-consumer food waste from landfill or incineration.

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3 GOOD HEALTH AND WELL-BEING

GOAL 3 – Ensure healthy lives and promote well-being for all at all ages

"Many more efforts are needed to fully eradicate a wide range of diseases and address many different persistent and emerging health issues. By focusing on providing more efficient funding of health systems, improved sanitation and hygiene, increased access to physicians and more tips on ways to reduce ambient pollution, significant progress can be made in helping to save the lives of millions."

-United Nations

Villanova 2030 Objective

Promote healthy lifestyles as well as provide access to affordable and quality physical and mental health care for all Villanovans.

OBJECTIVE WEIGHT	BASELINE SCORE
6.2% / 100%	2.47% / 6.2%

Metric	2018 Baseline Score	Maximum Score
3.1 Harmful drug abuse as measured by proportion binge drinking and proportion of student, faculty, and staff who use tobacco products or any illicit drug habitually.	0.56%	1.44%
3.2 Percentage of sexually active students practicing safe sex and prevention of STDs (condoms, or abstinence).	0.49%	0.99%
3.3 Percentage of University insurance provided physical and mental health care that is an out of pocket expense for a student, faculty, or staff member.	0.91%	1.14%
3.4 Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	0.52%	1.3%
3.5 Proportion of students, faculty, and staff receiving age appropriate sleep per night during the semester.	0.0%	0.61%
3.6 Thriving quotient.	0.0%	0.77%
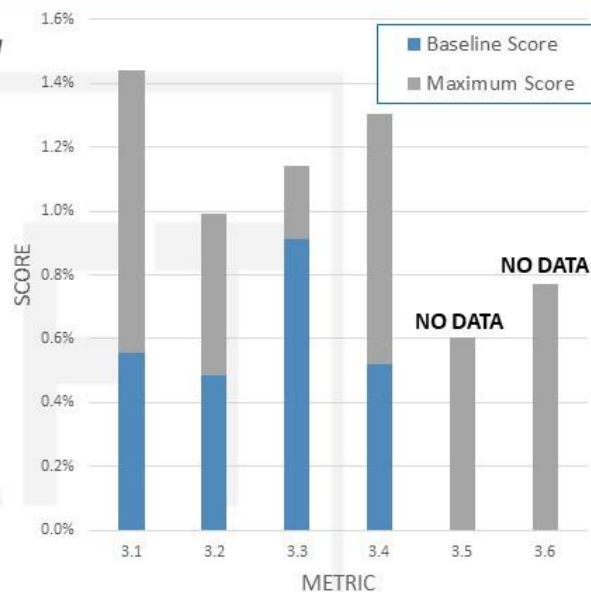
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
3.1	Update student climate survey and health survey to better measure binge drinking and tobacco and drug abuse.	x	x	Villanova is a tobacco free campus.
3.2	x	x	x	x
3.3	x	x	x	x
3.4	Equal leave of 12 weeks for all employees without the use of sick or vacation time.	x	x	x
3.5	x	Expand education, awareness, and mindfulness of the benefits of restful sleep and good health.	x	x
3.6	Complete Thriving Quotient study.	x	x	x

GOAL 4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

"Obtaining a quality education is the foundation to creating sustainable development. In addition to improving quality of life, access to inclusive education can help equip locals with the tools required to develop innovative solutions to the world's greatest problems."

-United Nations

Villanova 2030 Objective

Improve the value of a Villanova education and increase its accessibility to all groups of people.

OBJECTIVE WEIGHT	BASELINE SCORE
4.6% / 100%	3.38% / 4.6%

Metric	2018 Baseline Score	Maximum Score
4.1 Graduation rate of Villanova undergraduate students in 4 years.	0.58%	0.66%
4.2 Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	0.36%	0.55%
4.3 Net annual aid for first time, first generation students whose family earnings are in the lowest income bracket of reported to IPEDs.	0.65%	1.07%
4.4 Proportion of student population made up of underrepresented groups: Black, Hispanic, Asian, Native American.	0.76%	1.31%
4.5 Percent difference of graduation rate in 4 years of the underrepresented groups.	1.02%	1.04%
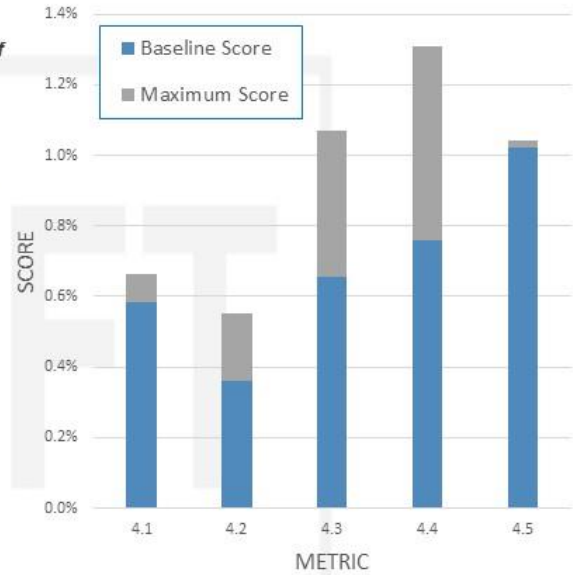
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
4.1	Maintain 2018 4 and 6 year graduation rates.	x	x	x
4.2	x	x	x	x
4.3	x	x	x	x
4.4	Develop a plan and commitment to meet 100% of need by 2030 while remaining need blind.	Expand applicant pool to reflect demographics of top 4-year national college applicants.	x	Meet 100% of financial need.
4.5	Maintain current overall graduation rate for underrepresented student demographics.	Equate the overall graduation rate and underrepresented student graduation rate.	Maintain equal graduation rates across all demographics.	x

5 GENDER EQUALITY

GOAL 5 – Achieve gender equality and empower all women and girls

"Gender equality is not only a fundamental human right, but a necessary foundation for a peaceful, prosperous and sustainable world. Providing women and girls with equal access to education, health care, decent work, and representation in political and economic decision-making processes will fuel sustainable economies and benefit societies and humanity at large."

-United Nations

Villanova 2030 Objective

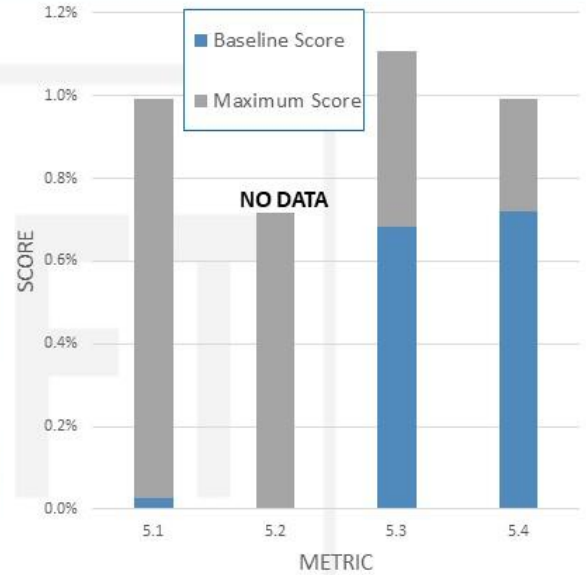*Promote and attain gender equality and empower all people at Villanova.*

OBJECTIVE WEIGHT	BASELINE SCORE
3.8% / 100%	1.43% / 3.8%

Metric	2018 Baseline Score	Maximum Score
5.1 Proportion of faculty, staff, and students reporting sexual violence, discrimination, or harassment in their time at Villanova.	0.03%	0.99%
5.2 Average cost incurred by students, faculty, and staff to pay for dependent care while working at Villanova.	0.0%	0.72%
5.3 Proportion of seats held by women in leadership positions on the President's Cabinet, Council of Deans, and Provost Council.	0.68%	1.11%
5.4 Satisfaction of female and male employees in their work environment, work policies, and with family friendly services and facilities at Villanova.	0.72%	0.99%

Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
5.1	Measure per capita incidence of violence, discrimination, and harassment for gender or sexual orientation.	Establish a normative range per capita to reduce incidence.	x	x
5.2	Increase subsidy for dependent and elder care to reduce average incurred cost by 10%.	x	x	x
5.3	Women's leadership training. Diverse applicant pools (hiring basis)	x	x	50% of seats in managerial or leadership positions are women.
5.4	Determine the campus satisfaction with "family friendly" services via survey.	Expand facilities to ensure all expectant and new mothers have access to lactation rooms.	Create an environment at Villanova in which all lifestyles are respected and valued and where people can live their lives openly.	x

GOAL 6 – Ensure availability and sustainable management of water and sanitation for all

"Despite progress, billions of people still lack safe water, sanitation and handwashing facilities. Data suggests that achieving universal access to even basic sanitation service by 2030 would require doubling the current annual rate of progress. More efficient use and management of water are critical to addressing the growing demand for water, threats to water security and the increasing frequency and severity of droughts and floods resulting from climate change"
-United Nations

Villanova 2030 Objective

Attain sustainable water practices at Villanova in terms of potable water, watershed, stormwater, water quality, and wastewater management.

OBJECTIVE WEIGHT
12% / 100%

BASELINE SCORE
4.72% / 12.0%

Metric	2018 Baseline Score	Maximum Score
6.1 Total potable water used per year.	2.38%	2.87%
6.2 Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing peak flow. This includes raingardens, constructed wetlands, and green roofs.	2.34%	2.64%
6.3 Percentage of rainfall captured from impervious surfaces on campus.	0.0%	3.01%
6.4 Mass of plastic due to water and beverage consumption sold on Villanova's campus (soda, sports drinks, water, coffee, etc.)	0.0%	3.51%
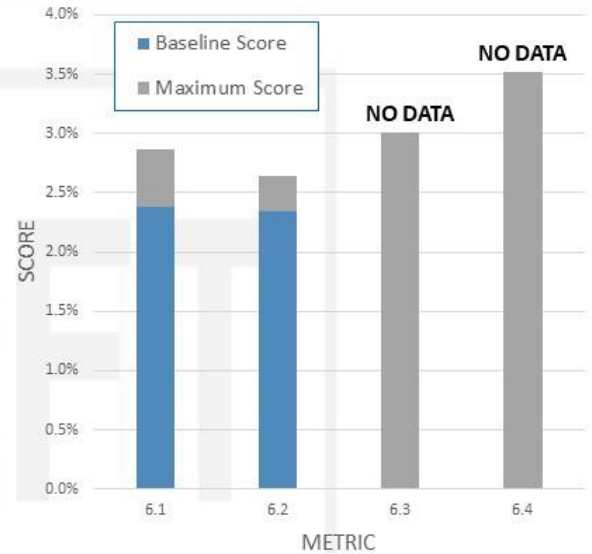
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
6.1	Sub-meter the potable water consumption of the ten highest consumption buildings on campus.	X	X	X
6.2	Measure the peak wastewater discharge from campus.	X	X	X
6.3	Measure the average inches of rainfall captured from impervious surfaces on campus. Evaluate capture systems.	X	X	For an *average* storm, zero storm water leaves the campus boundary without first being captured and processed.
6.4	Reduce the sale and availability of single use plastics by 50%.	Eliminate the sale and availability of single use plastics on campus.	X	X

GOAL 7 – Ensure access to affordable, reliable, sustainable and modern energy for all

"Energy is central to nearly every major challenge and opportunity the world faces today. Be it for jobs, security, climate change, food production or increasing incomes, access to energy for all is essential."

-United Nations

Villanova 2030 Objective

Reduce Villanova's energy intensity and increase the share of Villanova's energy coming from renewable sources.

OBJECTIVE WEIGHT	BASELINE SCORE
3.9% / 100%	0.50% / 3.9%

Metric	2018 Baseline Score	Maximum Score
7.1 Renewable energy share in the total campus energy consumption (Scope 1 and 2).	0.0%	1.35%
7.2 Campus's energy intensity (site energy).	0.5%	1.0%
7.3 Percentage of the institution's investment pool in positive sustainability investments.	0.0%	0.91%
7.4 Equivalent Gallons of fossil fuel burned (gasoline, Diesel) per mile traversed by university vehicles.	0.0%	0.68%
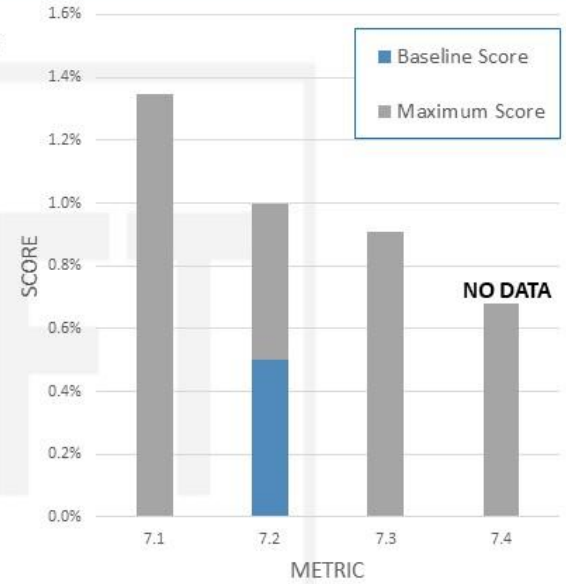
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
7.1	Buy at least 10% of electricity from renewable sources	Buy 25% of electricity from renewable sources.	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources
7.2	Develop a plan to reduce energy intensity.	Reduce overall energy intensity by a percentage determined by the energy planning effort.	x	x
7.3	x	x	x	x
7.4	x	x	x	x

8 DECENT WORK AND ECONOMIC GROWTH

GOAL 8 – Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

"A continued lack of decent work opportunities, insufficient investments and under-consumption lead to an erosion of the basic social contract underlying democratic societies: that all must share in progress."

-United Nations

Villanova 2030 Objective

Achieve just working conditions and compensation at Villanova, while securing Villanova's long-term institutional economic growth.

OBJECTIVE WEIGHT	BASELINE SCORE
4.6% / 100%	0.00% / 4.6%

Metric	2018 Baseline Score	Maximum Score
8.1 Annual growth rate of Villanova total revenue per employed person ($/full time employee equivalent).	0.0%	0.78%
8.2 Minimum hourly earnings (lowest pay band) of employees disaggregated by undergraduate and graduate students, part time, and full time.	0.0%	1.41%
8.3 Largest percent difference in attrition rates between genders and races for each job grouping.	0.0%	0.85%
8.4 Recordable injury rate. (OSHA)	0.0%	0.64%
8.5 Minimum paid time allowed for faculty and staff who need to give care (maternal, paternal, dependent care) not including sick time or vacation time.	0.0%	0.94%
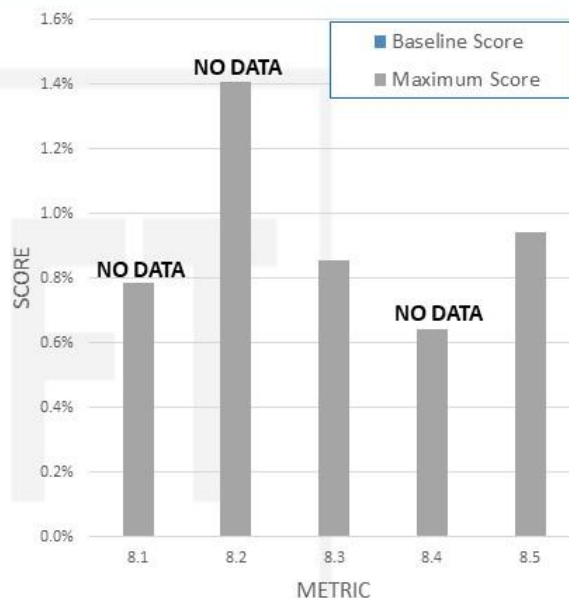
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
8.1	Maintain current revenue growth rate.	x	x	x
8.2	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	Reduce the number of students and employees earning below a living wage to zero.	Continue to maintain living wages for all students and employees.
8.3	x	x	x	x
8.4	x	x	x	x
8.5	x	x	x	x

GOAL 9 – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

"Technological progress is the foundation of efforts to achieve environmental objectives, such as increased resource and energy-efficiency. Without technology and innovation, industrialization will not happen, and without industrialization, development will not happen."

-United Nations

Villanova 2030 Objective

Promote innovation by supporting research as well as designing, building, and maintaining sustainable and resilient infrastructure on the Villanova campus.

OBJECTIVE WEIGHT	BASELINE SCORE
3.6% / 100%	1.97% / 3.6%

Metric	2018 Baseline Score	Maximum Score
9.1 Net carbon emissions emitted by student, faculty, and staff commuters.	0.89%	1.0%
9.2 Scope 1 and 2 net greenhouse gas emissions.	0.64%	0.97%
9.3 Percentage of campus building built and certified to current sustainable standards. (AASHE and LEED as of 2019)	0.13%	0.95%
9.4 Percentage of students and faculty actively engaged in research.	0.3%	0.73%
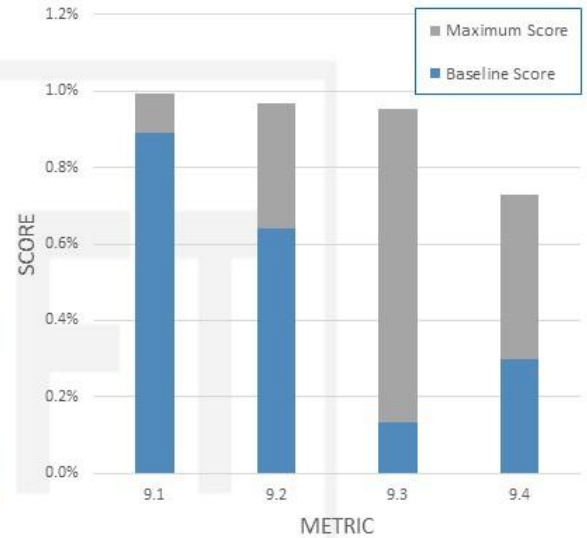
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
9.1	Develop comprehensive plan to reduce commuting related carbon emissions	Initiate plan to reduce car commuter miles by X% Increase proportion of commuters using public transit to X%	x	x
9.2		Increase proportion of commuters using public transit to X%	x	
9.3	Develop a plan to reduce scope 1 and 2 emissions to meet the 1.5 IPCC report by 2030.	Reduce scope 1 emissions by 5%	Reduce scope 1 emissions by 10%	Reduce scope 1 emissions by 20%
9.4	Buy at least 10% of electricity from renewable sources	Buy 25% of electricity from renewable sources.	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources

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GOAL 10 – Reduce inequality within and among countries

"The international community has made significant strides towards lifting people out of poverty. The most vulnerable nations – the least developed countries, the landlocked developing countries and the small island developing states – continue to make inroads into poverty reduction. However, inequality persists and large disparities remain regarding access to health and education services and other assets."

-United Nations

Villanova 2030 Objective

Reduce inequality within the Villanova community.

OBJECTIVE WEIGHT	BASELINE SCORE
4.8% / 100%	0.58% / 4.8%

Metric	2018 Baseline Score	Maximum Score
10.1 Proportion of Villanova employees, including student employees, that earn below a living wage. ($12.64/hr for 1 adult)	0.0%	1.7%
10.2 The average diversity level of new hires for each job grouping hired on a 5-year rolling basis.	0.0%	1.4%
10.3 Proportion of minority members in leadership positions on the President's cabinet, council of deans, and provost council.	0.58%	1.7%
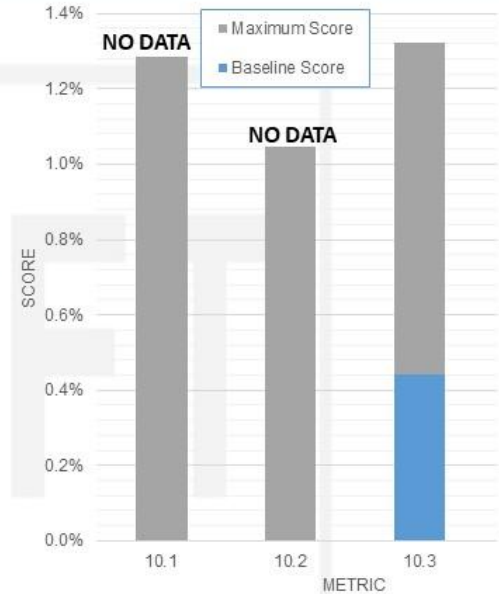
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
10.1	Develop and demonstrate a commitment to increase wages over time to livable wages for all employees.	x	x	x
10.2	Require all five colleges to comply with guidelines set out in "Hiring for Villanova's Future".	x	x	x
10.3	x	x	x	x

GOAL 11 – Make cities and human settlements inclusive, safe, resilient and sustainable

"Cities are hubs for ideas, commerce, culture, science, productivity, social development and much more. At their best, cities have enabled people to advance socially and economically. With the number of people living within cities projected to rise to 5 billion people by 2030, it's important that efficient urban planning and management practices are in place to deal with the challenges brought by urbanization."

-United Nations

Villanova 2030 Objective

Make Villanova's community inclusive, safe, resilient, and sustainable.

OBJECTIVE WEIGHT	BASELINE SCORE
3.7% / 100%	0.50% / 3.7%

Metric	2018 Baseline Score	Maximum Score
11.1 Proportion of non-utility and non-maintenance projects that have stakeholder input from students, faculty, and staff.	0.0%	0.6%
11.2 Indoor and outdoor air quality based on EPA and OSHA regulations.	0.0%	0.7%
11.3 Degree of implementation of a campus disaster risk reduction strategy in line with the industry standards or expert recommendation.	0.0%	0.6%
11.4 Percentage of campus managed under sustainable landscape management practices.	0.5%	0.8%
11.5 Proportion of commuter miles traveled using low carbon transportation (public transit, carpooling, walking, biking, and electric vehicles).	0.0%	1.0%

Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
11.1	x	x	x	x
11.2	Establish appropriate network of air quality monitoring and weather stations on campus.	Ensure indoor air quality never dips below EPA or OSHA standards despite any outdoor conditions.	x	x
11.3	x	x	x	x
11.4	Develop a goal to plant a certain number of native plants.	Implement the Villanova Biodiversity plan to increase native species while sequestering additional carbon	x	x
11.5	Develop a plan to reduce commuting miles by car.	x	x	x

GOAL 12 – Ensure sustainable consumption and production patterns

"Sustainable consumption and production is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs and a better quality of life for all. Its implementation helps to achieve overall development plans, reduce future economic, environmental and social costs, strengthen economic competitiveness and reduce poverty."

-United Nations

Villanova 2030 Objective

Achieve zero waste by building awareness of circular procurement/operational models at Villanova.

OBJECTIVE WEIGHT
5.0% / 100%

BASELINE SCORE
0.26% / 5.0%

Metric	2018 Baseline Score	Maximum Score
12.1 Proportion of total waste disposed of in a non-circular manner.	0.0%	1.4%
12.2 Percentage of food disposed of in a non-circular manner.	0.0%	1.2%
12.3 Campus recycling rate.	0.26%	1.1%
12.4 Proportion of campus products sourced sustainably as verified by third party certifications.	0.0%	1.4%
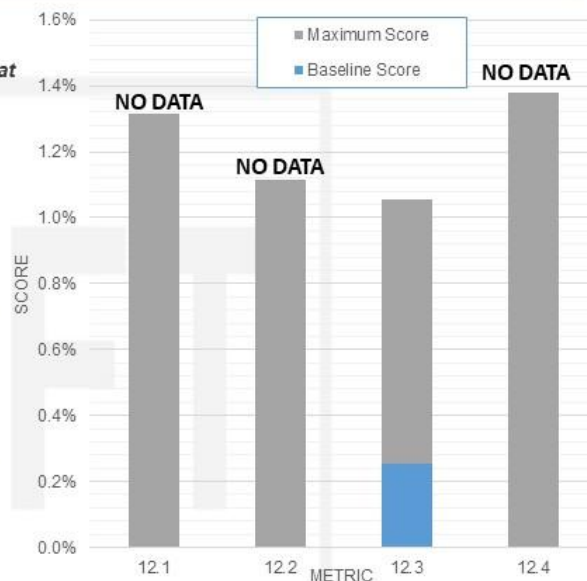
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
12.1	Conduct a waste audit and develop an action plan.	x	Zero waste to landfill or incineration	.x
12.2	Divert 100% of pre-consumer food waste from landfill or incineration.	x	x	Eliminate all of Villanova's pre- and post-consumer food waste from landfill or incineration.
12.3	Conduct a waste audit and develop an action plan.	x	x	x
12.4	Evaluate options for low carbon and green procurement	Develop framework for calculating comprehensive scope 3 emissions reductions	x	Establish Villanova as a leader in low carbon procurement and green office management

GOAL 13 – Take urgent action to combat climate change and its impacts

"Climate change is now affecting every country on every continent. It is disrupting national economies and affecting lives, costing people, communities and countries dearly today and even more tomorrow. Weather patterns are changing, sea levels are rising, weather events are becoming more extreme and greenhouse gas emissions are now at their highest levels in history. Without action, the world's average surface temperature is likely to surpass 3 degrees centigrade this century."

-United Nations

Villanova 2030 Objective

Take urgent action to combat climate change as central to our institutional mission while substantially reducing emissions associated with campus and supply chain operations in accordance with the U.N. IPCC goal of 1.5°C.

OBJECTIVE WEIGHT	BASELINE SCORE
10.3% / 100%	5.77% / 10.3%

Metric	2018 Baseline Score	Maximum Score
13.1 Scope 1 and 2 net greenhouse gas emissions.	2.7%	4.1%
13.2 Scope 3 net greenhouse gas emissions.	3.1%	3.4%
13.3 Degree of implementation of an up-to-date integrated climate change and disaster resilience strategy.	0%	2.8%
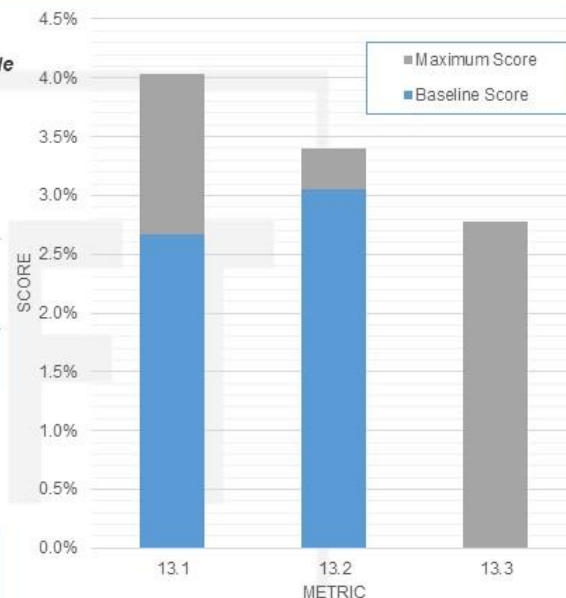
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
13.1	Develop a plan to reduce scope 1 and 2 emissions to meet the 1.5 IPCC report by 2030.	Reduce scope 1 emissions by 5%	Reduce scope 1 emissions by 10%	Reduce scope 1 emissions by 20%
	Buy at least 10% of electricity from renewable sources	Buy 25% of electricity from renewable sources.	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources
13.2	Conduct a comprehensive scope 3 emissions inventory.	Buy 25% of electricity from renewable sources	Buy 50% of electricity from renewable sources	Buy 100% of electricity from renewable sources
13.3	Develop and publish a comprehensive resilience strategy including an updated climate action plan.	x	x	Reduce scope 3 greenhouse gas emissions consistent with IPCC 1.5C world.

14 LIFE BELOW WATER

GOAL 14 – Conserve and sustainably use the oceans, seas and marine resources for sustainable development

"Careful management of this essential global resource is a key feature of a sustainable future. However, at the current time, there is a continuous deterioration of coastal waters owing to pollution and ocean acidification is having an adversarial effect on the functioning of ecosystems and biodiversity."

-United Nations

Villanova 2030 Objective

Promote water conservation and reduce Villanova's impacts on terrestrial ecosystems as they relate to aquatic environments.

OBJECTIVE WEIGHT	BASELINE SCORE
7.1% / 100%	2.8% / 7.1%

Metric	2018 Baseline Score	Maximum Score
14.1 Annual mass of nitrogen and phosphorus used in fertilizer on campus.	1.4%	1.5%
14.2 Percent of unrecycled plastic waste produced on campus.	0.0%	2.2%
14.3 Proportion of seafood consumed on campus that is sustainably caught or raised and certified sustainable by third party standards.	0.0%	1.7%
14.4 Average efficiency of green and best management practice (BMP) infrastructure in terms of reducing pollutant loads. This includes raingardens, constructed wetlands, and green roofs.	1.4%	1.7%
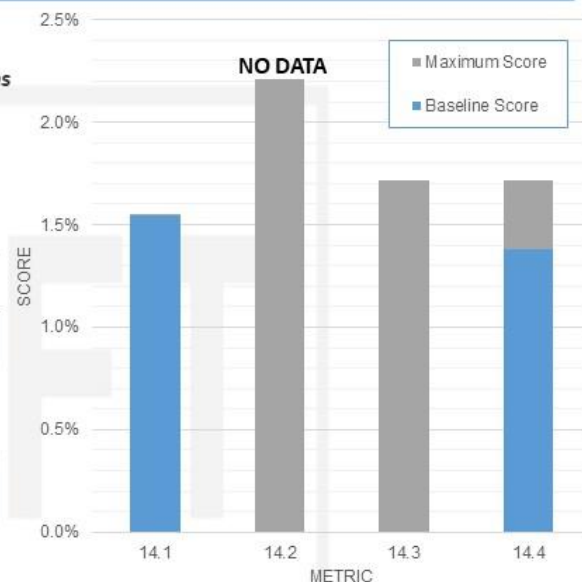
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
14.1	Assess the load of pollutants in Villanova's wastewater and storm water runoff.	x	x	x
14.2	Conduct a waste audit and develop an action plan.	x	Zero unrecycled plastic waste.	x
14.3	Assess third party sustainable seafood standards for adoption.	x	x	x
14.4	Assess the load of pollutants in Villanova's runoff.	x	x	x

GOAL 15 – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

"Forests cover 30.7 per cent of the Earth's surface and, in addition to providing food security and shelter, they are key to combating climate change, protecting biodiversity and the homes of the indigenous population"
-United Nations

Villanova 2030 Objective

Integrate biodiversity, business practices, and research to protect natural ecosystems from degradation at Villanova.

OBJECTIVE WEIGHT	BASELINE SCORE
7.5% / 100%	2.38% / 7.5%

Metric	2018 Baseline Score	Maximum Score
15.1 Carbon sequestered per year by Villanova's campus ecosystem.	0.0%	2.2%
15.2 Portion of campus considered Green space and/or covered by trees. Includes green roofs.	0.5%	1.8%
15.3 Proportion of campus biosphere considered to be an alien or invasive species.	0.0%	1.6%
15.4 Percentage of campus managed under sustainable landscape management practices or an equivalent third-party certification.	1.9%	1.9%
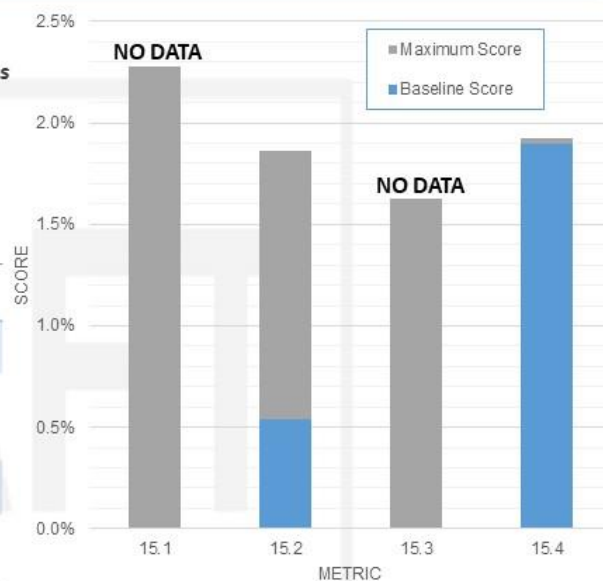
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
15.1	Measure the total mass of carbon captured by biomass on campus.	x	x	x
15.2	Develop a comprehensive report of Villanova's campus biodiversity.	x	x	x
15.3	Develop a comprehensive report of Villanova's campus biodiversity.	Implement the Villanova Biodiversity plan to increase native species while sequestering additional carbon	x	x
15.4	x	x	x	x

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GOAL 16 – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

"The threats of international homicide, violence against children, human trafficking and sexual violence are important to address to promote peaceful and inclusive societies for sustainable development. They pave the way for the provision of access to justice for all and for building effective, accountable institutions at all levels."

-United Nations

Villanova 2030 Objective

Increase safety, satisfaction, healthy relationships, and transparency on the Villanova campus.

OBJECTIVE WEIGHT

3.7% / 100%

BASELINE SCORE

2.64% / 3.7%

Metric	2018 Baseline Score	Maximum Score
16.1 Proportion of population that feel safe walking alone around the campus.	0.9%	1.0%
16.2 Annual crime rate per capita on Villanova's campus.	1.0%	1.0%
16.3 Proportion of students, faculty, and staff that feel like they are a part of an institution that is just and fair to its members.	0.7%	1.0%
16.4 Proportion of campus departments that adopt and implement policies that guarantee public access to information.	0.0%	0.7%
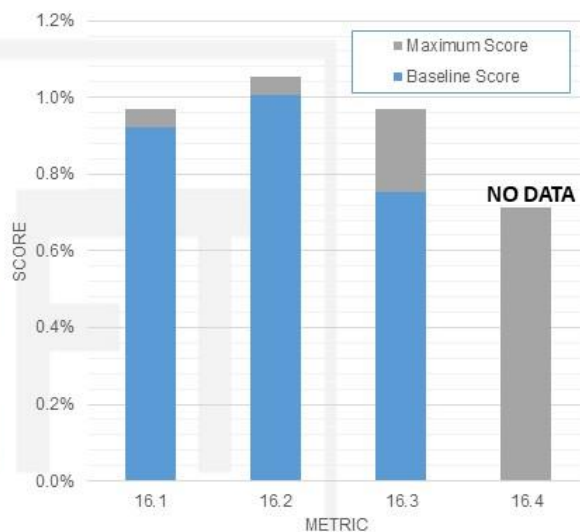
Metric	2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
16.1	x	x	x	x
16.2	x	x	x	x
16.3	Add questions to the climate survey to better represent satisfaction with Villanova's administrative justice.	x	x	x
16.4	Publish Villanova board and cabinet meeting minutes after each meeting.	Ensure that all faculty and student research is published open source.	x	x

GOAL 17 – Strengthen the means of implementation and revitalize the global partnership for sustainable development

"A successful sustainable development agenda requires partnerships between governments, the private sector and civil society. These inclusive partnerships built upon principles and values, a shared vision, and shared goals that place people and the planet at the center, are needed at the global, regional, national and local level."

-United Nations

Villanova 2030 Objective

Leverage Villanova's sustainable expertise and financial influence to connect people and advocate for sustainable ideas.

OBJECTIVE WEIGHT

3.3% / 100%

BASELINE SCORE

1.37% / 3.3%

Metric	2018 Baseline Score	Maximum Score
17.1 University philanthropic contributions (hours) associated with advancing the UN SDGs.	0.4%	0.9%
17.2 Proportion of active partnerships from tier 1 suppliers, research grants, and service-learning partnerships that are contributing to a sustainable world (e.g. report to GRI, CDP, have a Science-Based Target, or contribute to UN SDGs).	0.0%	1.1%
17.3 Annual student, faculty, and staff hours spent on off-campus service-learning projects.	0.9%	1.3%
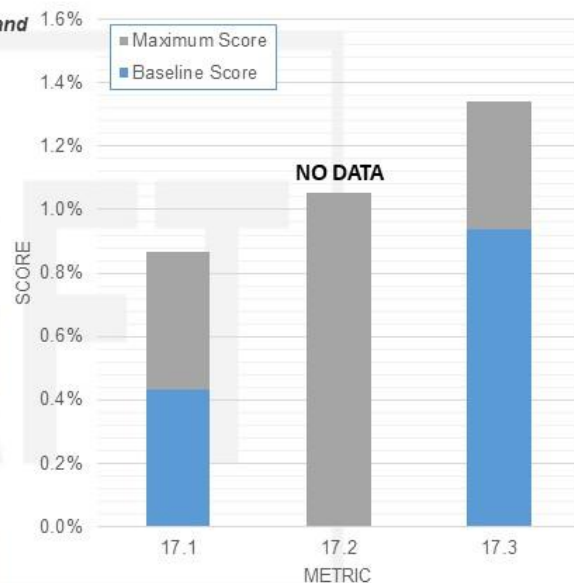
2021 Key Results	2024 Key Result	2027 Key Result	2030 Key Result
Develop a plan for philanthropic integration between current efforts, the strategic plan, and the sustainability plan.	x	x	x
x	100% of Villanova partners actively committed to working towards a sustainable world	x	x
Maintain position as a leader in philanthropic service hours from faculty, staff, and students.	x	x	x

APPENDIX C: PROJECT DETAILS

This appendix contains the details of all projects listed in the plan. All details of each project are on one page which includes:

1. Title and details
2. Committee implementing project
3. Net present value broken down by capital cost, labor cost, maintenance cost, savings, and revenue.
4. Team members
5. Estimated score improvement
6. Integration with the strategic plan
7. Project timeline with key milestones

Academics and Research Project Profiles

Committee Chairs: Alfonso Ortega, Joseph Lennon

Villanova Institute for Climate, Justice, and Sustainability [ICJS]

Committee: **Academics and Research**

An interdisciplinary university institute will be the academic home for research, curricula, and community outreach with focus on climate, environmental justice, health, and sustainability. The work of the institute will be performed by faculty fellows, undergraduate and graduate student assistantships, and by visiting scholars. The institute will oversee academic and project work. The institute will empower new leaders and develop innovative strategies to address the highly complex interdisciplinary challenges of climate, justice, and sustainability.

The institute will launch as an initiative in the first two years of operation.

Outcomes:
1. Academics: Interdisciplinary research and education
2. Operations & Policy: Campus as a 'Living Laboratory'
3. Advocacy and Engagement: Engage surrounding communities for Local Action for Global Impact

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
Alfonso Ortega
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Alfonso.ortega@villanova.edu

Assistant Team Lead:
name
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Team Members:
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project

STRATEGIC PLAN INTEGRATION

Integration Score: 5/5

Strategic Initiatives:

Center for Augustinian Education

Embed Inclusion in the Villanova Community

Center for the Common Good

Innovation in Teaching and Learning

Enhanced Student Engagement with Faculty on Research

Fund for Faculty Recruitment and Retention

SCORE IMPROVEMENT
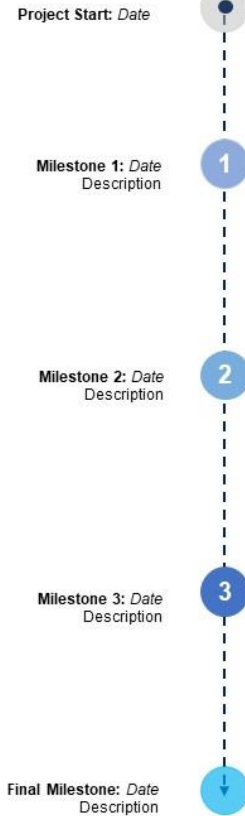
Metrics Affected	0.1, 0.2, 0.4, 0.5, 9.4, 17.1
Optimistic Score Improvement	0.541%
Conservative Score Improvement	0.074%
Midpoint Score Improvement	0.308%

Inventory of Courses on Climate, Sustainability, Environmental Justice (ICJS)

Committee: **Academics and Research**

Perform a comprehensive inventory of classes that are currently being taught that have significant content in climate, sustainability, and environmental justice. This inventory will form the baseline for future work on curriculum development.

Create an inventory of sustainability research in all colleges, departments, and programs. The inventory will highlight the existing scholastic efforts towards sustainability and develop a comprehensive approach to sustainability education on campus.

Outcomes:
1. Understand how many students are being exposed to sustainability concepts
2. Identify programs and departments with strong sustainability focus as well as those that should bolster their sustainability offerings
3. Map the sustainability research effort of the university

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Innovation in Teaching and Learning

Enhanced Student Engagement with Faculty on Research

SCORE IMPROVEMENT

Metrics Affected	0.1, 0.4
Optimistic Score Improvement	0.08%
Conservative Score Improvement	0.001%
Midpoint Score Improvement	**0.041%**

Integration of Sustainability into Courses (ICJS)

Committee: **Academics and Research**

Encourage the creation of more sustainability courses and integrate sustainability concepts in courses across all colleges. Develop a plan to integrate options for sustainability classes in every department by 2021 to achieve 100% departmental coverage by 2030. Project Kaleidoscope and the AAC&U have developed a program that demonstrates how to incorporate sustainability into course curricula. Education about sustainability will empower students to change the way they think and work towards a sustainable future.

Outcomes:
1. Introduce sustainability from cross disciplinary perspectives
2. Increase the exposure of students to sustainability concepts
3. Improve the ability of students to discuss important topics with others
4. Influence the lifelong habits of students and their families

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Innovation in Teaching and Learning

SCORE IMPROVEMENT

Metrics Affected	0.1, 0.2, 0.4, 6.1, 7.2, 12.1, 13.2
Optimistic Score Improvement	0.617%
Conservative Score Improvement	0.149%
Midpoint Score Improvement	**0.383%**

Sustainability Undergraduate Research Fellows (ICJS)

Committee: **Academics and Research**

Create a summer undergraduate fellowship program to fund summer research in relevant areas including environment, climate, climate justice, health, policy, and energy. These will be additional VURF and graduate grants, not part of the pre-existing group. The fellowship program will strength our scholastic efforts toward sustainability and develop innovative solutions to sustainability issues.

Outcomes:
1. Empower undergraduates and graduates to grow their research capabilities while working towards important world issues
2. Encourage faculty to undertake sustainability research that requires student research assistance

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Assistant Team Lead:
name
Title
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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 5/5

Strategic Initiatives:

Enhanced Student Engagement with Faculty on Research

SCORE IMPROVEMENT

Metrics Affected	0.5, 4.2, 9.4, 17.2
Optimistic Score Improvement	0.178%
Conservative Score Improvement	0.024%
Midpoint Score Improvement	0.101%
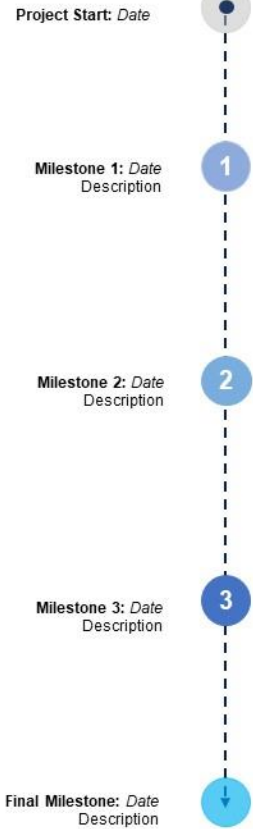
Case definition of climate-related mortality and measurement of climate mortality 2009-2019 in Pennsylvania (ICJS)

Committee: **Academics and Research**

A scoping review is being conducted of the peer-reviewed and gray literature to systematically identify the climate-related conditions (heat, floods, wildfires, vector-borne diseases, food & water-borne illnesses) that have been responsible for human death in the past ten years. Our findings will be reviewed by a panel of climate and health experts.

The case definition will be used to review the deaths in Pennsylvania from 2009-2019 to quantify climate-related mortality in the Commonwealth.

Outcomes:
1. Improve our understanding of the impacts of environmental health on human health
2. Increase awareness of interconnections between all types of health

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 2/5

Strategic Initiatives:

Center for the Common Good

Enhanced Student Engagement with Faculty on Research

SCORE IMPROVEMENT

Metrics Affected	0.5, 3.3, 9.2, 9.4, 11.2, 13.1
Optimistic Score Improvement	0.055%
Conservative Score Improvement	0.009%
Midpoint Score Improvement	0.032%

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Climate adaptation of community-based organization that serve older adults in Philadelphia (ICJS)

Committee: **Academics and Research**

Literature is being reviewed to develop a survey of community-based organizations that serve older adults. The survey will address specific issues related to climate adaptation for older adults. Older adults are at risk of added morbidity and early mortality related to the health impacts of climate change (heat, climate-related disasters, and vector, food, and water-related illnesses). By determining the adaptation capacity of the organizations that serve older adults, we can identify strengths and gaps in services throughout the city. From these findings, intervention programs can be developed that could lead to state and federal funding.

Outcomes:
1. Improve our understanding of the impacts of environmental health on human health
2. Increase awareness of interconnections between all types of health

TEAM

Team Lead:
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Team Members:
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

STRATEGIC PLAN INTEGRATION

Integration Score: 2/5

Strategic Initiatives:

Center for the Common Good

Enhanced Student Engagement with Faculty on Research

SCORE IMPROVEMENT

Metrics Affected	0.5, 3.3, 9.2, 9.4, 11.2, 13.1
Optimistic Score Improvement	0.055%
Conservative Score Improvement	0.009%
Midpoint Score Improvement	**0.032%**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Augustinian Local and Global Outreach (ICJS)

Committee: Academics and Research

This project will integrate outreach, advocacy, education and research with our shared Augustinian values and will utilize our vast Augustinian and Catholic network to provide education and advocacy as well as perform collaborative research on climate, justice and sustainability with local and global partners. It will have two objectives:

Local Outreach for Global Impact: Outreach to local parishes, starting with St. Thomas of Villanova, through a series of workshops, wherein participants reflect upon their environmental footprints through a "*See, Discern, Act*" framework.

Global Outreach for Local Impact: Integrated collaboration with global partners, starting with Augustinian community and University partner in Peru, with potential service learning, technical assistance research, innovation, and capacity strengthening components.

Outcomes:
1. Spread Catholic social teaching as it relates to sustainability
2. Improve the lives of those in the developing world through sustainability outreach

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Assistant Team Lead:
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Team Members:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Center for the Common Good

Center for Augustinian Education

Hone International Strategy

SCORE IMPROVEMENT

Metrics Affected	4.4, 17.1, 17.2, 17.3
Optimistic Score Improvement	0.260%
Conservative Score Improvement	0.014%
Midpoint Score Improvement	**0.137%**

Community Partnerships Initiative (ICJS)

Committee: Academics and Research

Villanova is surrounded by local governments that are making new and serious commitments to sustainability. Most notably, 21 local PA municipalities – including Radnor, Haverford, and Tredyffrin -- have signed on to the Sierra Club's Ready for 100% Renewable Energy Campaign and pledged to transition to renewable [No Title] 2035. Villanova can engage with and learn from these communities as they develop and execute their sustainability projects. By fostering communication and collaboration between community organizations and faculty, students, and staff, Villanova can offer expertise, consultation, and project support, while also serving as a regional convener of communities, municipalities, industry, and policy makers. The University might also offer, upon request, one-on-one or initiative-wide consulting, seed grants, and ways to measure sustainable project outcomes. Undergraduate and graduate students can be a source of support for community-based projects by participating in data gathering, data analysis, and program evaluation.

Outcomes:
1. Provide Villanova expertise to surrounding communities
2. Share and learn best practices. Avoid common mistakes

COST AND LABOR

Cost Classification: **NEW HIRE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total New Hires	0	New hires
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Assistant Team Lead:
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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Center for the Common Good

SCORE IMPROVEMENT

Metrics Affected	9.2, 13.1, 17.1, 17.2, 17.3
Optimistic Score Improvement	0.338%
Conservative Score Improvement	0.057%
Midpoint Score Improvement	**0.198%**

Sustainable Living Campus Laboratories (ICJS)

Committee: **Academics and Research**

Use the campus as a laboratory to perform projects related to sustainable living and operations such as stormwater, composting, gardening, biodiversity, and energy efficiency. Take existing operations and incorporate them into academics. This project will foster a sustainable community by involving students and faculty in a hands-on approach to sustainable practices on campus.
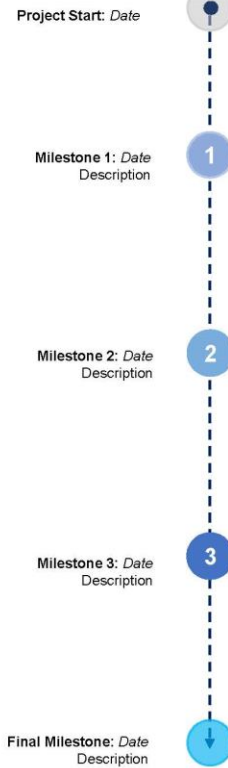
Outcomes:
1. Provide reminders of sustainability in the campus landscape

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 2/5

Strategic Initiatives:

Academic and Research Facilities

SCORE IMPROVEMENT

Metrics Affected	6.2, 11.1, 11.4, 14.1, 14.4, 15.1, 15.2, 15.3, 15.4
Optimistic Score Improvement	0.681%
Conservative Score Improvement	0.059%
Midpoint Score Improvement	0.370%

Sustainability Research Fund (ICJS)

Committee: **Academics and Research**

Create fund specifically for sustainability research. This fund contributes to visiting scholars and faculty fellows as well as research initiation grants in sustainability. Can be used for research costs for all sustainability related faculty research. Use campus as a laboratory for sustainability projects. Potential research projects include:
- Climate-related Mortality in Pennsylvania
- Climate Resiliency and Storm Impact in the Delaware Estuary
- Cross-Sector Collaboration as a Vehicle for Corporate Sustainability: Evidence from Climate Change Projects
- Campus Steam Plant Energy Assessment

The fund will ensure the growth of sustainability education and research and encourage students and faculty to develop innovative and sustainable solutions.

Outcomes:
1. Empower faculty to pursue sustainability research
2. Improve Villanova's standing as a sustainability research producer

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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name
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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 5/5

Strategic Initiatives:

Enhanced Student Engagement with Faculty on Research

Increased Faculty Research Time

Research Acceleration Fund

SCORE IMPROVEMENT

Metrics Affected	0.5, 9.4, 17.2
Optimistic Score Improvement	0.235%
Conservative Score Improvement	0.064%
Midpoint Score Improvement	**0.150%**

Villanova Food Sustainability initiative

Committee: **Academics and Research**

The Villanova Food Sustainability Initiative focuses on measures to reduce Villanova's environmental footprint associated with food systems. The initiative comprises three major areas:.
1. Villanova Food Sustainability Group
2. Eco-labeling of meals served in Villanova dining halls. A recent survey of the Villanova undergraduate student population indicated that accurate carbon eco-labeling of meals served in the dining halls could reduce annual water and carbon consumption by 100 million gallons and 700 metric tons, respectively, from Donahue Hall alone.
3. Food Recovery Challenge. The US Environmental Protection Agency (EPA) has a Food Recovery Challenge (FRC) program with the goal of minimizing and improving the use of food waste following the EPA's food recovery hierarchy.

Outcomes:
1. Reduce Villanova's environmental footprint associated with food systems

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

1

Milestone 2: *Date*
Description

2

Milestone 3: *Date*
Description

3

Final Milestone: *Date*
Description

TEAM

Team Lead:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: /5

Strategic Initiatives:

SCORE IMPROVEMENT

Metrics Affected	2.2, 2.3, 12.2, 12.4, 14.3

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

Sustainability Colloquium

Committee: Academics and Research

Establish a colloquium of professors that meet regularly to communicate their sustainability efforts on campus. This colloquium will also strive to create a centralized network where professors and students across campus can share their sustainability research efforts. The colloquium will allow the campus community to join together for sustainability and strengthen the integration of sustainability in academics.

Outcomes:
1. Create a community that fosters and reinforces sustainable innovation in academics and research
2. Exchange multidisciplinary ideas and facilitate cross-department collaboration
3. Empower faculty to incorporate more sustainability into all types of courses

COST AND LABOR

Cost Classification: VARIABLE

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
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- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Innovation in Teaching and Learning

Enhanced Student Engagement with Faculty on Research

SCORE IMPROVEMENT

Metrics Affected	0.1, 0.2, 0.4, 0.5
Optimistic Score Improvement	0.454%
Conservative Score Improvement	0.148%
Midpoint Score Improvement	**0.301%**

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Earth Day and Climate Awareness Program

Committee: **Academics and Research**

Host a series of campus-wide events and programs. Earth week will bring the campus together to educate and raise awareness about sustainability issues, encourage individual action, and embrace the value of nature.

Outcomes:
1. Raise increased awareness of the landmark Earth-Day event
2. Bring sustainability awareness to every student on campus

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
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STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Co-curricular programs align with Augustinian values

SCORE IMPROVEMENT

Metrics Affected	0.3, 6.1, 7.2, 9.2, 11.5, 12.1, 12.3, 13.1
Optimistic Score Improvement	0.321%
Conservative Score Improvement	0.012%
Midpoint Score Improvement	**0.167%**

Biodiversity Assessment and Action Plan

Committee: Academics and Research

Evaluate the biodiversity of plants on campus and draft a plan to increase existing biodiversity. Biological diversity plays a critical role in maintaining ecosystems that provide essential services, which are critical foundations for sustainable development and human well-being. Documenting and improving biodiversity on campus will foster ecosystem health and create a beautiful, safe outside space for all.

Outcomes:
1. Increase proportion of native plant species
2. Decrease the proportion of alien or invasive plant species
3. Create synergies with the biosphere to reduce pollutant concentrations

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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- *Anna Chan*
- *Jessica Vairo*
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 1/5

Strategic Initiatives:

Academics and Research
Facilities

SCORE IMPROVEMENT

Metrics Affected	14.4, 15.1, 15.2, 15.3, 15.4
Optimistic Score Improvement	1.462%
Conservative Score Improvement	0.973%
Midpoint Score Improvement	**1.218%**

Deferred Project List (Academics)

1. Sustainability Literacy Assessment

2. Conduct a Scope 3 Emissions Inventory

3. Updated Resiliency and Climate Action Plan

4. Need Blind Project

5. Use Solar Panels as Education Opportunity

6. ACS & Sustainability

7. Energy Efficiency Rebates

Operations Project Profiles

Committee Chair: Robert Morro

Renewable Power Purchase Agreement (CRP)

Committee: Operations

27.5% of the United States' greenhouse gas emissions come from producing electricity. These greenhouse gases come specifically from burning fossil fuels for power. Reducing Villanova's fossil fuel consumption will significantly reduce the greenhouse gas emissions from electricity production. Villanova will begin the process of entering a renewable power purchase agreement to draw at least 25% of electricity from green sources by 2021, and 100% by 2030. This will help reduce energy impact and Scope 2 emissions.

Outcomes:
1. Eliminate scope 2 emissions
2. Maintain competitive attractiveness to sustainably minded applicants

COST AND LABOR

Cost Classification: CAPITAL PROJECT

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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- *Name, title on project*
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

SCORE IMPROVEMENT

Metrics Affected	**7.1, 7.3, 9.2, 13.1**
Optimistic Score Improvement	**1.943%**
Conservative Score Improvement	**1.941%**
Midpoint Score Improvement	**1.942%**

Green Office and Lab Program (CRP)

Committee: Operations

Continue to grow the green lab program. Add a green office program for staff and faculty. This includes reducing office generated waste, switching to paper with higher recycled content, encouraging reusable solutions, reducing office energy consumption, and laboratory water consumption. This program will increase visibility of sustainability and foster a sustainable ethos in offices and labs across campus.

Outcomes:
1. Increase the number of labs participating in the green lab program by 10%
2. Develop a green office program based on peer institutions and tailored to Villanova's office/department structure
3. Test the green office program on 2-3 willing departments

COST AND LABOR

Cost Classification: DE MINIMUS

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

TEAM

Team Lead:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

Employee Research Groups

SCORE IMPROVEMENT

Metrics Affected	6.1, 7.2, 9.2, 9.3, 12.1, 13.1
Optimistic Score Improvement	0.516%
Conservative Score Improvement	0.128%
Midpoint Score Improvement	**0.322%**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Commuting Emissions Reductions (CRP)

Committee: Operations

In 2017, transportation accounted for 28.9% of the U.S.'s greenhouse gas emissions. Villanova hopes to reduce this by increasing the cost of parking to encourage students, faculty, and staff to not drive to campus. This reduction of people on the road will help to lessen vehicle fatalities in addition to reduce the greenhouse gas emissions produced from gasoline powered cars. Villanova will work with Septa to lower the cost of monthly train passes for students, faculty, and staff to incentivize public transportation. This provides individuals with an alternative that reduces commuting emissions and strengthens a trend in everyone. With the number of cars being driven to Villanova, it could significantly reduce Scope 3 emissions. Additional funds can be used to promote discounted SEPTA tickets, EV parking spots, carpool discounts, electric campus shuttle, covered bike storage, etc.

Outcomes:
1. Estimate costs of alternative transportation incentives
2. Base the increased parking fee on incentive cost
3. Reduce scope 3 emissions from commuting
4. Reduce traffic around campus
5. Reduce parking stress on campus

COST AND LABOR

Cost Classification: VARIABLE

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

SCORE IMPROVEMENT

Metrics Affected	9.1, 11.5, 13.2
Optimistic Score Improvement	0.256%
Conservative Score Improvement	0.132%
Midpoint Score Improvement	**0.194%**
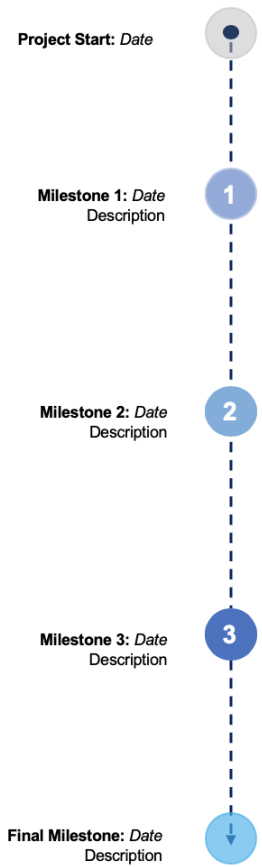
Campus-Wide Energy Efficiency (CRP)

Committee: Operations

The United States uses more energy per capita than any other country in the world. This problem cannot only be solved by switching to renewable energy but must also be addressed by reducing Villanova's energy impact. An energy audit will be conducted on campus and adjustments will be made to decrease energy intensity. All campus lighting will be updated to LEDs and occupancy sensors will be installed to further reduce lighting loads. HVAC and building envelopes will be evaluated and requisite improvements will be completed. These improvements will save the university money by reducing the energy needed and decrease energy impact and greenhouse gas emissions.

Outcomes:
1. Install campus wide meters, see "campus wide smart meter project"
2. Plan for building level LED lighting replacements based on planned upgrades to buildings.
3. Improve the energy efficiency of equipment
4. Reduce energy intensity from HVAC

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Sustainability as a Foundational Element

Academics and Research Facilities

SCORE IMPROVEMENT

Metrics Affected	7.2, 9.2, 13.1
Optimistic Score Improvement	0.350%
Conservative Score Improvement	0.121%
Midpoint Score Improvement	**0.236%**

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Campus-Wide Smart Metering Program (CRP)

Committee: **Operations**

Water scarcity affects more than 40% of the world's population. In addition, 14% of the world's population did not have access to electricity in 2017 (according to the IEA). Villanova has the ability to use electricity and run water whenever needed. Villanova's water usage will be better understood with the installation of electric and water smart meters on campus to track utility usage more granularly and use this information to improve efficiency and install greener technologies. This project will help Villanova understand and reduce its water usage impact.

Outcomes:
1. Select a standard meter and software monitoring program
2. Identify and 2-3 test buildings, and install new metering and monitory software
3. Understand which buildings are least efficient energy and water users
4. Deploy targeted upgrades to worst-offending buildings
5. Pave the way for future energy and water conservation contests

TEAM

Team Lead:
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Team Members:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

SCORE IMPROVEMENT

Metrics Affected	6.1, 7.2, 9.2, 13.1
Optimistic Score Improvement	0.288%
Conservative Score Improvement	0.010%
Midpoint Score Improvement	**0.149%**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Rewards for Taking Public Transport to Villanova Events

Committee: **Operations**

Encourage people coming to sporting and theatrical events to take Septa by giving either a discount on tickets or a free voucher for food and drinks at the game. People will be incentivized to choose sustainable transportation and support Villanova activities. Public transportation lowers carbon emissions and creates a social opportunity in which fans can travel together. This will help create a united community that supports sustainable transportation.

Outcomes:
1. Reduce commuting miles to sports games
2. Reduce scope 3 carbon emissions
3. Reduce parking load on campus during events

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
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- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project

STRATEGIC PLAN INTEGRATION

Integration Score: 2/5

Strategic Initiatives:

Sustainability as a Foundational Element

SCORE IMPROVEMENT

Metrics Affected	9.1, 11.5, 13.2
Optimistic Score Improvement	0.032%
Conservative Score Improvement	0.020%
Midpoint Score Improvement	**0.026%**

135

University Vehicle Emission Tracking

Committee: Operations

Standardize a way to track University vehicle emissions. This includes standardizing how to track gallons of fuel bought and miles traveled throughout campus operations. Tracking emissions will allow Villanova to understand the impact of University vehicles, and how it can be reduced.

Outcomes:
1. Identify all departments that purchase fuel, or whose operations required direct non-university vehicle usage.
2. Use existing documentation to identify possible fuel tracking mechanisms

COST AND LABOR

Cost Classification: DE MINIMUS

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Team Members:
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- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

SCORE IMPROVEMENT

Metrics Affected	7.4, 9.2, 13.1
Optimistic Score Improvement	0.164%
Conservative Score Improvement	0.014%
Midpoint Score Improvement	**0.089%**

Promotion of Reusable Water Bottles

Committee: Operations

Install more water bottle filling stations as well as coffee mug cleaning stations near every coffee shop on campus to promote the use of reusable mugs and bottles. The use of reusable water bottles will eliminate the need for single-use plastic water bottles. People will be able to find filling stations and cleaning stations for their reusable beverage containers throughout campus. Reusable bottles will decrease the amount of waste produced, while increasing awareness and sustainable lifestyles on campus.

Outcomes:
1. Identify high traffic areas that do not currently have a hydration station. Set up a two-year plan to install new stations.
2. Develop a capstone project for mechanical engineering students to design a mug cleaning station

COST AND LABOR

Cost Classification: VARIABLE

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

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Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

SCORE IMPROVEMENT

Metrics Affected	6.1, 6.4, 12.1, 14.2
Optimistic Score Improvement	3.543%
Conservative Score Improvement	1.573%
Midpoint Score Improvement	**2.558%**

137

Waste Disposal Uniformity

Committee: **Operations**

Restructure the bin system on campus so it is more uniform and educational. Work with the student life committee to make informative signs that best depicts and encourages proper waste separation. Set up the system to allow space to add compost bins in the future. A uniform waste disposal system will make it clear what waste goes where, increase recycling, and reduce contamination of the waste stream.

Outcomes:
1. Complete a waste audit to identify areas of inconsistency and contamination in our waste stream (see waste audit project).
2. Assess peer institution waste stream systems
3. Test out a new waste bin solution in select areas and assess its effectiveness over the current system.
4. Implement the new waste bin and signage system

TEAM

Team Lead:
Albert Motel
Manager
Recycling and Trash
Albert.motel@villanova.edu

Assistant Team Lead:
name
Title
Villanova University
Department
email@villanova.edu

Team Members:
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project
- Name, title on project

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	0.00	$

SCORE IMPROVEMENT

Metrics Affected	2.3, 12.1, 12.2, 12.3, 14.2
Optimistic Score Improvement	2.045%
Conservative Score Improvement	0.544%
Midpoint Score Improvement	1.295%

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Dining Services Sustainability

Committee: **Operations**

Collaborate with student life to change student behavior towards food. Work towards using compostable packaging and post-consumer composting. Apply a surcharge for plastic packaging and display more signage about eating sustainably. Provide nutrition and sourcing information for food served and how it compares to other foods and diets. Integrate what it means to have a truly sustainable diet nutritionally, ethically, and environmentally. Continue to provide access to dining options for members of the community with dietary restrictions. This project will encourage students to think more sustainably about food and choose options with greater nutrition and less environmental impact.

Outcomes:
1. Reduce food waste
2. Reduce packaging waste
3. Improve nutrition
4. Reduce environmental impact of Villanovans' diets
5. Ensure access to food for all diets

TEAM

Team Lead:
Tim Dietzler
Director
Dining Services
Timothy.dietzler@villanova.edu

Assistant Team Lead:
name
Title
Villanova University
Department
email@villanova.edu

Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Sustainability as a Foundational Element

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

SCORE IMPROVEMENT

Metrics Affected	2.2, 2.3, 6.4, 9.2, 13.1, 14.2
Optimistic Score Improvement	0.996%
Conservative Score Improvement	0.248%
Midpoint Score Improvement	**0.622%**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Waste Audit and Action Plan

Committee: Operations

Everyday items that could be recycled or composted are being thrown in the trash. This greatly increases the volume of waste going to landfills. When landfills fill up, additional land is used that could otherwise be utilized for different purposes. Villanova strives to lessen its contribution to the local landfills by conducting a waste audit to calculate how much recyclable material is misplaced, how much total waste is in each stream, and the amount of post-consumer organic waste is going to the landfill. Auditing waste also helps identify other problem areas and could help avoid hindering the health of marine ecosystems and promote better food management.

Outcomes:
1. Understand campus recycling rate, contamination rate, and waste habits
2. Develop an RFI for third party waste audit managers to conduct a campus wide waste audit
3. Contract for a campus wide waste audit in Fall 2020

COST AND LABOR

Cost Classification: NEW HIRE

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total New Hires	0	New hires
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
Albert Motel
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Recycling and Trash
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Assistant Team Lead:
Liesel Schwarz
Sustainability Manager
Villanova University
Facilities
Liesel.schwarz@villanova.edu

Team Members:
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*
- *Name, title on project*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a Foundational Element

SCORE IMPROVEMENT

Metrics Affected	2.3, 6.4, 12.1, 12.2, 12.3, 14.2
Optimistic Score Improvement	0.877%
Conservative Score Improvement	1.889%
Midpoint Score Improvement	**1.380%**

Deferred Projects (Operations)

1. LEED Standards Project
2. Electric Fleet Transition
3. Air Quality Monitoring
4. Reduce Legacy Stormwater Runoff
5. Steam Plant Carbon Reduction Project
6. Low Carbon Procurement
7. Organic Fertilizer and Pesticide Project
8. Measuring Carbon Sequestration on Campus
9. Commercial Composting Contract
10. Persuasive Human-Computer Interaction to Promote Water Bottle Usage

Social Justice Project Profiles

Committee Chair: Kathryn Getek Soltis

Hiring for Villanova's Future

Committee: **Social Justice**

Implement "Hiring for Villanova's Future" training to all hiring personnel across departments and colleges at Villanova. The training provides information and tools on how to ensure that the hiring process is reaching diverse audiences and managing unconscious bias across university departments. This creates more opportunities to increase diversity of faculty and staff on the Villanova campus.

Outcomes:
1. Implement "Hiring for Villanova's Future" for all hiring personnel across departments and colleges.

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 5/5

Strategic Initiatives:

Increase Diversity

Embed Inclusion in the Villanova Community

SCORE IMPROVEMENT

Metrics Affected	5.3, 8.3, 10.2

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

141

Living Wage

Committee: Social Justice

In Pennsylvania alone, there are 1.5 Million people in poverty with another 3.5 Million near poverty. The Social Justice Committee strongly recommends that a living wage is defined as at least 125% of MIT calculator living wage for 1 adult with 0 dependents. A living wage ensures that all those who dedicate their labor to Villanova can provide for themselves and their families in a reliable and dignified manner.

Outcomes:
1. The minimum wage earned by Villanova employees will meet or exceed a living wage.
2. All staff will be paid a living wage
3. All Students will be paid a living wage

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 2/5

Strategic Initiatives:

Embed Inclusion in the Villanova Community

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	TBD	$/yr
Total Labor	0.00	hrs/person
Total Savings/Revenue	0.00	$/yr
NET PRESENT VALUE	**TBD**	**$**

SCORE IMPROVEMENT

Metrics Affected	1.1, 1.2, 2.1, 8.1, 8.2, 10.1

Optimistic Score Improvement	

Conservative Score Improvement	

Midpoint Score Improvement	

PROJECT MILESTONES

Project Start: *2020*
SJ Committee reps meet with HR on an annual basis to discuss progress and possibilities.

Milestone 1:
All staff have a living wage (defined as at least 125% of MIT calculator for 1 adult and 0 dependents)

Milestone 2:
All student employees have a living wage (defined as at least 125% of MIT calculator for 1 adult and 0 dependents)

Final Milestone:
The minimum wage earned by Villanova employees will meet or exceed a living wage.

Just Employment Policy

Committee: Social Justice

A formal just employment policy will be adopted that applies to employees as well as contract workers. The hope is to form a sense of community within Villanova and promote a positive work environment for all.

Outcomes:
1. A formal policy is adopted by appropriate governing bodies.
2. The formal policy is publicized on the Villanova website.

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *2020*
SJ Committee reps meet with relevant parties to discuss progress and possibilities.

Milestone 1:
Create a draft policy and discuss changes and revisions with the relevant parties.

Milestone 2:
Develop a final Just Employment Policy that has been agreed upon by the relevant parties.

Final Milestone:
Adopt and implement the Just Employment Policy for Villanova employees and contract workers.

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 2/5

Strategic Initiatives:

Embed Inclusion in the Villanova Community

SCORE IMPROVEMENT

Metrics Affected	1.1, 1.2, 2.1, 5.3, 8.1, 8.2, 8.3, 8.4, 10.1, 10.2, 10.3
Optimistic Score Improvement	
Conservative Score Improvement	
Midpoint Score Improvement	

143

Dependent Care Support Project

Committee: **Social Justice**

Villanova has a goal to support and foster a family environment. To do this, dependent care costs of Villanova employees will be assessed and a plan to create/expand subsidies will be enacted. Resources for breastfeeding and lactation on campus will be expanded and the adequacy of family leave policy for faculty and staff will be assessed.

Outcomes:
1. Determine Villanova employee dependent care costs
2. Develop a plan that creates/expands subsidies for employees with dependents
3. Enhance resources for breastfeeding and lactation on campus
4. Assess the adequacy of family leave policy for faculty and staff

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *2020*
Collect data on current spending on dependent care.

Assess locations for use as lactation and breastfeeding areas.

Milestone 1:
Benchmark dependent car subsidies against other institutions. Determine the feasibility of using the assessed locations as lactation and breastfeeding areas.

Milestone 2:
Discuss funding of dependent care costs with relevant parties. Begin repurposing spaces to have functionality as lactation/breastfeeding rooms

Final Milestone:
Adopt and implement the Just Employment Policy for Villanova employees and contract workers.

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Employee Resource Groups

SCORE IMPROVEMENT

Metrics Affected	3.4, 5.2, 5.3, 8.5, 10.1

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

144

Project to Procure A Living Wage

Committee: **Social Justice**

Villanova not only cares about its faculty, everyone working within its campus. Living wage and fair trade policies will be evaluated for vendors that Villanova pays over $500,000 per year. Create living wage language in contracts as well as terms and conditions for vendors. Develop and implement processes to engage vendors with inadequate policies. Require all top vendors to pay a living wage by 2030.

Outcomes:
1. Evaluation of living wage and fair trade policies for vendors where Villanova spends $500,000 or more
2. Create living wage language in contracts as well as terms and conditions for vendors
3. Develop and implement processes to engage vendors with inadequate payment policies
4. Ensure all top vendors pay a living wage by 2030

COST AND LABOR

Cost Classification: **VARIABLE**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *2020*
Meet with procurement and determine the top vendors for the university

Milestone 1: *Date*
Create living wage language for contracts and in terms and conditions for vendors

Milestone 2: *Date*
Work with procurement to refine language to create a final document with living wage requirements for vendors

Milestone 3: *Date*
Update contracts with vendors to include living wage langue. Begin engaging with vendors who have not or will not accept living wage language.

Final Milestone: *2030*
Have all top vendors paying a living wage

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 1/5

Strategic Initiatives:

SCORE IMPROVEMENT

Metrics Affected   1.4, 17.2

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

145

TJEI: Donations

Committee: Social Justice

Villanova is lucky to have such a robust and diverse alumni and support group. To help foster this Villanova plans to communicate clear guidelines for donations received by the university and create an oversight structure as needed. Measures will be taken to ensure the nature and purpose of donations are aligned with the Universities mission.

Outcomes:
1. Create clear guidelines for donations received by the university
2. Create an oversight structure if needed

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 1/5

Strategic Initiatives:

SCORE IMPROVEMENT

Metrics Affected	5.4, 16.3, 16.4

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

TJEI: Information Access

Committee: Social Justice

Villanova will ensure that records and reports of key university governance structures are accessible as appropriate. Questions will be added to the climate survey to enhance understanding of satisfaction with adequate university communication and joint planning. By providing access to information, students, faculty, and staff will be able to better understand the decisions made in these governance structures and can effectively participate and contribute to decision making that effects the Villanova community.

Outcomes:
1. List key outcomes of the project here

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 4/5

Strategic Initiatives:

Data Analytics for communication foundational element

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	0.00	$/yr
Total Labor	0.00	hrs/person
Total Savings/Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

SCORE IMPROVEMENT

Metrics Affected	5.1, 5.4, 16.3, 16.4

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Deferred Project List (Social Justice)

1. CASA Program Expansion
2. Interview Wardrobe Project
3. Sexual Justice Project
4. Binge Drinking and Drug Reduction Project
5. Justice in Study Abroad Programs
6. Women's Health
7. Nova-Nook Expansion
8. Philanthropic, Strategic Plan, and Sustainability Integration
9. Expand NovaFit to students
10. Transformative Justice Coordinator

Student Life Project Profiles

Committee Chair: Liesel Schwarz

Encouraging Sustainable Behavior Changes

Committee: **STUDENT LIFE**

The students of today are our leaders of tomorrow. If a behavioral change towards sustainability can be achieved this could have tremendous impacts across all sectors of our world, leading to a more just, resilient, and sustainable world. The Student Life Committee will design and implement yearly behavior change programing targeted at faculty, staff, and students. Community habits change over time, the student life committee will respond to those changes and develop programing to encourage more sustainable behavior across campus.

Outcomes:

1. Develop a behavior change program for students, faculty and staff that include measurable milestones, campus wide communication, and reward systems.

COST AND LABOR

Cost Classification: **De Minimis**

Criteria	Value	Unit
Total Costs	500.00	$/yr
Total New Hires	0	New hires
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
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Assistant Team Lead:
Julia Baldassarre
Sustainability Intern
Sustainability Office
jbaldas2@villanova.edu

Team Members:
• *Members of the Student Sustainability Committee*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Center for the Common Good

Co-Curricular programs align with Augustinian values

SCORE IMPROVEMENT

Metrics Affected	2.3, 12.2, 6.1, 6.4, 7.2, 9.1, 9.2, 13.1, 11.5, 14.2
Optimistic Score Improvement	0.410%
Conservative Score Improvement	0.071%
Midpoint Score Improvement	**0.240%**

Villanova's Sustainable Diet

Committee: **STUDENT LIFE**

A more sustainable diet can be healthier for not only the planet, but also for the students, faculty, and staff at Villanova. We want to make sure that all students have access to healthy food while they're here. This starts with the creation of informative signs that discuss sustainable food that do not repeat dining services signs, have a documentary showing of sustainable diet or agriculture films, host a speaker-agriculture and climate changes impact on agriculture, and host cooking class demonstration and food tastings with vegetarian food and meat replacements.

Outcomes:
1. Student education of the benefits for health, animals, and environment when you change your diet.
2. Increased access to sustainable options.
3. Awareness of not just WHAT we are eating but also WHERE it comes from and packaging.

TEAM

Team Lead:
Sarah Settlecowski
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Department
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Team Members:
- Gabriella Giordano
- Charlotte Smith
- Samantha Huffman
- Matthew Peterson

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Co-Curricular programs align with Augustinian values

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	$2,600.00	$/yr
Total Labor	$72.00	hrs/ person
Total Savings/ Revenue	---	$/yr
NET PRESENT VALUE	**(2,600)**	**$**

SCORE IMPROVEMENT

Metrics Affected	2.2, 2.3, 12.2, 9.2, 13.1, 12.1, 14.2, 14.3
Optimistic Score Improvement	0.274%
Conservative Score Improvement	0.033%
Midpoint Score Improvement	**0.154%**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

149

Plastic Reduction Project

Committee: STUDENT LIFE

Plastic is everywhere. It is being found on land, in the oceans, in food, and might soon be found within the human body. Because of this, the Student Life Committee will eliminate single use plastics on campus by working with departments across the university to change their practices. This will be accomplished by reducing student demand for single use plastics such as silverware, straws, to go boxes, cups, etc. Villanova will conduct a department-wide audit on plastic use, along with a student survey about plastic use among students. Events will be organized for Plastic Free Lent throughout March.

Outcomes:
1. Significantly reduce single-use plastic in dining services through reducing demand.
2. Improve incentives for bringing reusable cups to coffee shops on campus
3. Department-wide audit on plastic use
4. Student survey sent out to the student body about plastic use

TEAM

Team Lead:
Delaina Castillo
Title
Villanova University
Department
email@villanova.edu

Team Members:
- *Emma Tucker*
- *Julia Ugras*
- *Jade Labak*
- *Alexa Schoeneborn*
- *Leah Eastmen*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Sustainability as a foundational element

Co-Curricular programs align with Augustinian values

COST AND LABOR

Cost Classification: DE MINIMUS

Criteria	Value	Unit
Total Costs	5,430.00	$/yr
Total Labor	90	hrs/ person
Total Savings/ Revenue	0.00	$/yr
NET PRESENT VALUE	**0.00**	**$**

SCORE IMPROVEMENT

Metrics Affected	2.3, 12.2, 12.1, 12.3, 13.2, 14.2
Optimistic Score Improvement	0.327%
Conservative Score Improvement	0.058%
Midpoint Score Improvement	**0.192%**

PROJECT MILESTONES

Project Start: *Jan 2020*

Milestone 1: *March 2020*
Run planned activities through plastic free lent.

Milestone 2: *Sept 2020*
Create proposal and work with Dining Services on the Holy Ground project.

Milestone 3: *Dec 2020*
Plan a proposal for eliminating one main plastic source in Dining Services.

Final Milestone: *Feb 2021*
Implement plan to eliminate one large plastic source in Dining Services

Student Input On Construction

Committee: STUDENT LIFE

Villanova's campus is a place where many students spend their four years in college and look back on fondly. They remember the classes, the buildings, but will remember in most detail the impact and the things that they were apart of. Allowing students to have input on non-maintenance related construction projects on campus will create a stronger sense of buy-in with students and will promote a stronger tie to campus. A project team will represent the input concerns and comments from the student body as well as from SSC. Input will lead to the student perspective being represented in meetings and in documents and/or provisions in construction project work plans.

Outcomes:
1. The scope of this project is currently being adjusted

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	2,310.00	$/yr
Total Labor	54	hrs/ person
Total Savings/ Revenue	---	$/yr
NET PRESENT VALUE	(2,310.00)	$

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

TEAM

Team Lead:
Simon Brooks
Title
Villanova University
Department
email@villanova.edu

Team Members:
- *John Seal*
- *Beatriz DeJesus*

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Academic Facilities

SCORE IMPROVEMENT

Metrics Affected	11.1, 16.4
Optimistic Score Improvement	0.032%
Conservative Score Improvement	0.006%
Midpoint Score Improvement	0.019%

Deferred Project List (Student Life)

1. Bike share

Health and Well-Being Project Profiles

Committee Chair: Stacy Andes

Extra Meal Donations

Committee: **STUDENT LIFE**

The goal of this project is to build upon Villanova's value of caritas in giving what we can and should to those in need. Villanova seeks to encourage community involvement in social and economic sustainability by giving students the option to donate their extra meals to those in need. The hope is to reduce the financial "loss" students encounter and instead allow them to put their tuition and meal plan money to a more productive use.

Outcomes:
1. To give students the ability to do one of two things: (1) donate extra meals at the end of the meal week to the NovaNook or a fund to be donated to a food pantry, (2) donate extra money from their meals to the same two items
2. To establish a system for auto-donation of extra meals at the end of the week that students can sign up for when selecting their meal plan

COST AND LABOR

Cost Classification: **DE MINIMUS**

Criteria	Value	Unit
Total Costs	$4,900.00	$/yr
Total Labor	97.50	hrs/ person
Total Savings/ Revenue	---	$/yr
NET PRESENT VALUE	($4,900.00)	$
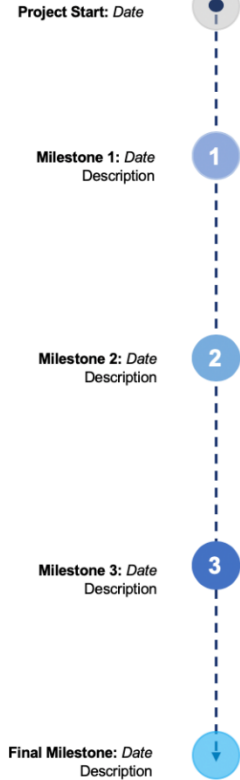
TEAM

Team Lead:
Kathryn Garner
Title
Villanova University
Department
email@villanova.edu

Team Members:
- Veronica Regina
- Victoria Adams
- Colleen Sharp

STRATEGIC PLAN INTEGRATION

Integration Score: 3/5

Strategic Initiatives:

Center for the Common Good

SCORE IMPROVEMENT

Metrics Affected	2.1, 2.2
Optimistic Score Improvement	0.043%
Conservative Score Improvement	0.005%
Midpoint Score Improvement	**0.024%**

PROJECT MILESTONES

Project Start: *Date*

Milestone 1: *Date*
Description

Milestone 2: *Date*
Description

Milestone 3: *Date*
Description

Final Milestone: *Date*
Description

Graduate Student Health Care

Committee: **Social Justice**

At Villanova, the establishment of an ethos of sustainable living requires that students do not have to sacrifice their health as a condition of pursuing an education. To achieve this the university should expand comprehensive, affordable health coverage to all Villanova graduate students.

Outcomes:
1. All Villanova graduate students are given access to enroll in comprehensive, affordable health coverage offered by Villanova.

TEAM

Team Lead:
Social Justice Committee

Team Members:
- Kathryn Getek Soltis
- Barbara Wall
- Fr. Art Purcaro
- Kate Giancatarino
- Terry Nance
- Mark Jackson
- Fr. Allan Fitzgerald
- Shawn Proctor
- George Kolb
- Jean Lutes
- Jerry Beyer
- Sunny Hallowell
- Madeline Ochabillo
- Christian Miller/Connor McKenzie
- Claryn Spies

STRATEGIC PLAN INTEGRATION

Integration Score: 5/5

Strategic Initiatives:

Increase Diversity

Enhance the Graduate Experience

COST AND LABOR

Cost Classification: **CAPITAL PROJECT**

Criteria	Value	Unit
Capital Costs	0.00	$
Total Recurring Costs	TBD	$/yr
Total Labor	0.00	hrs/person
Total Savings/Revenue	0.00	$/yr
NET PRESENT VALUE	**TBD**	**$**

SCORE IMPROVEMENT

Metrics Affected	3.3

Optimistic Score Improvement

Conservative Score Improvement

Midpoint Score Improvement

PROJECT MILESTONES

Project Start:
Beginning in 2020, SJ Committee reps meet with HR on an annual basis to discuss progress and possibilities.

Milestone 1:
All part-time graduate students have access to comprehensive, affordable health coverage.

Milestone 2:
All full-time graduate students have access to comprehensive, affordable health coverage.

Final Milestone:
All Villanova graduate students are given access to enroll in comprehensive, affordable health coverage offered by Villanova

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APPENDIX D: CARBON REDUCTION PLAN

Executive Summary

Climate change is foremost among the issues humanity is facing. While some governments, companies, and organizations have taken an aggressive approach in changing the way they operate to cultivate a healthier planet, a transition to more sustainable practices on a global scale is lacking. Participation by all individuals and organizations is necessary to maintain a natural world that can continue supporting life as we know it. Villanova University, as a higher education institution that hosts a community of persons that will be living with the decisions and policies established today, is obligated to take this movement seriously and take action to mitigate the universities' negative impacts.

The university has shown signs of initiative in moving toward a future with a lower carbon footprint. In 2007, Villanova joined the American College & University Presidents' Climate Commitment (ACUPCC), which requires the university to take certain measures to track its carbon emissions and develop a plan to reduce those emissions. In 2010, a carbon action plan was published detailing university emission levels, and what measures would be taken to reduce them. 2012 saw the onboarding of a sustainability manager to oversee environmentally conscious action throughout the campus. However, beyond these actions, Villanova has lacked a driving force in the reduction of its greenhouse gas (GHG) emissions.

This GHG emissions inventory and reduction project will reestablish the drive towards carbon neutrality. Three fundamental phases of the project make this possible: a reorientation of Villanova's GHG inventory, a formulation of projects to address the specific sources of GHG emissions at Villanova, and a suggested timeline and strategy moving forward in order to achieve the desired goal of carbon neutrality. The updated GHG inventory builds from the 2018 GHG inventory and expands certain areas of accounting. This detailed breakdown of the specific pollutant sources allows for a more informed project list development that addresses each source of GHG emissions the inventory examines. The physical, financial, and time feasibility of these projects were considered and a recommended pathway of emissions reductions moving forward was laid out. This report recommends that a pathway towards zero net GHG emissions by 2050 with a 2030 milestone of 45 percent emissions reduction be taken by Villanova. This is the most viable pathway when it comes to successfully implementing the projects laid out in the report. Furthermore, a 45 percent reduction in GHG emissions by 2030 would align with the United

Nations researched requirements to confine global average temperature rise to 1.5 degrees Celsius. Villanova needs a jumpstart to its climate action efforts, and this report provides the background data and structured plan to do so.

The student body, as well as faculty and staff, at Villanova, has already voiced its concerns regarding climate action on an organizational level. The Carbon Reduction Plan (CRP) is a blueprint that university leadership can use to respond to this call with feasible and effective action. Movement in this direction will bring Villanova University to the forefront of climate action among U.S. colleges and universities.

Introduction

In the past decade, universities across the nation have begun addressing their GHG emissions in response to the threats of climate change. With a wide range of facilities and operations, university campuses are able to implement a fully comprehensive plan to help counteract the many ways GHGs are released into the environment. The extent to which schools in the United States address their GHG emissions spans a wide spectrum. Villanova University aims to place itself among the leading schools in climate change action. To do so, a full scope GHG inventory was conducted to identify leading contributors to the university's emission profile. Based on this analysis, projects were selected for a recommended action plan based on their effectiveness in addressing these leading contributors.

GHG Inventory Background

GHG inventories gained significant international recognition in 2006 and early 2007 with the publishing of ISO 14064 by the International Organization of Standardization (ISO). ISO 14064 presents the standard for GHG management practices for organizations, including the development of an emissions inventory process (Part 1), a standard for reporting GHG emissions reduction projects (Part 2), and a verification methodology for the inventory process (Part 3) (International Standardization Organization [ISO], 2018). With these three root components, ISO 14064 supplies participating organizations with the means to initiate and maintain comprehensive GHG reduction. While ISO 14064 Parts 2 and 3 were freshly minted in this publication, Part 1 is derived from previous emissions inventory standard that serves as a blueprint for GHG emissions categorization known as the Greenhouse Gas Protocol (GHG Protocol).

The GHG Protocol, established in 1998 by the World Business Council for Sustainable Development (WBCSD) and World Research Institute (WRI), was the first globally consistent standard for GHG emissions inventory. This framework provides thorough measurement and management standards for businesses and other organizations. One of the fundamental components of the GHG Protocol structure is the organization and composition of the three scopes of GHG emissions. These scopes divide an entity's emissions by their origins. Scope 1 emissions account for all on-site production of GHGs by the organization; this includes both stationary sources such as boilers or chillers, as well as vehicles owned and used by the organization. Scope 2 emissions include all GHGs produced as a result of the production of the electricity purchased from the grid by the organization. Scope 3 emissions are a much more elusive data set to collect. The categories that make up this scope cover emissions that are produced by outside parties supplying or providing services for the primary organization (Greenhouse Gas Protocol, 2019). This includes all upstream and downstream processes linked to the organization. Figure D.1 below depicts the composition of each GHG Protocol scopes.
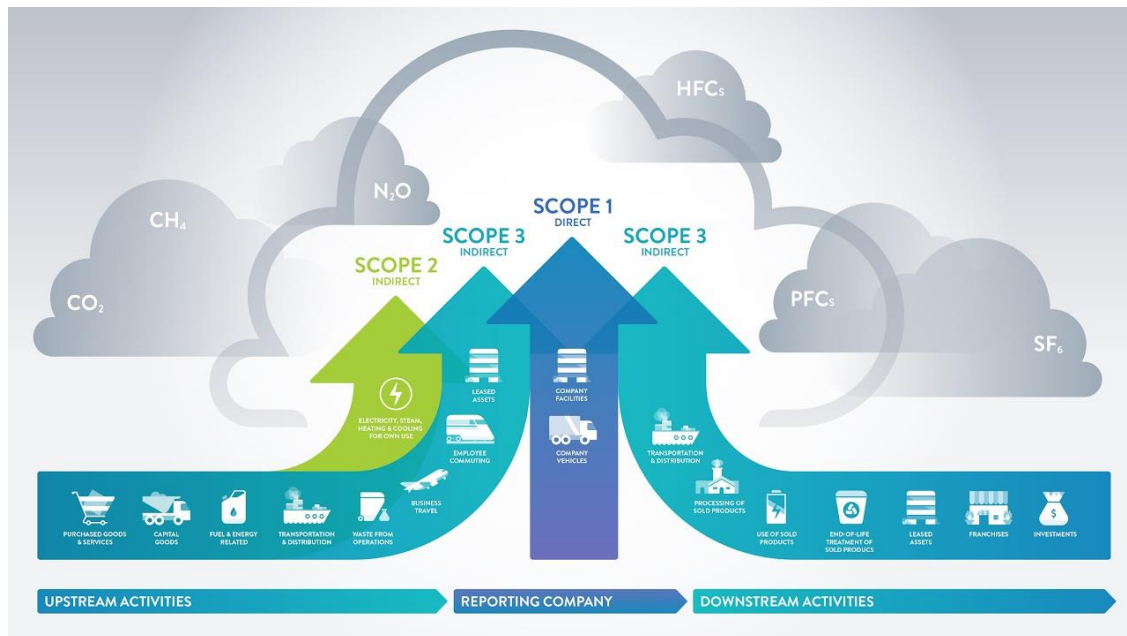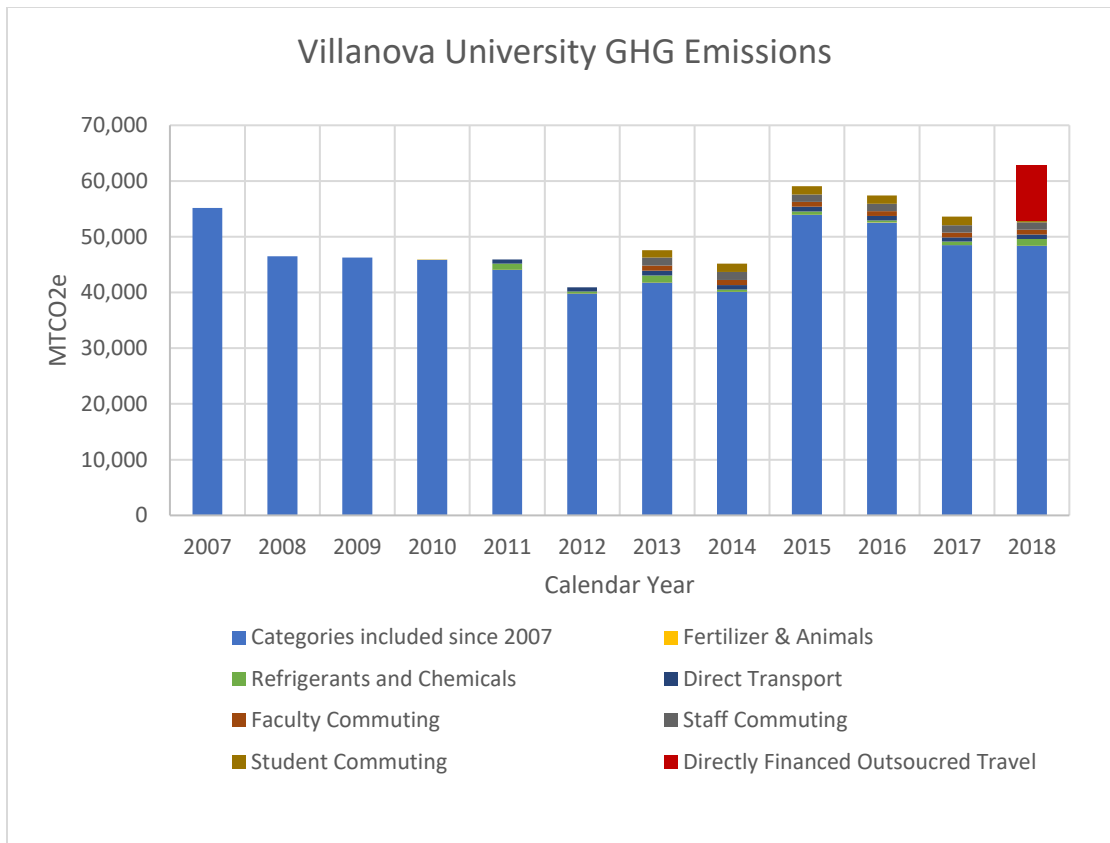

Figure D.1

This organization of GHG emissions by origin source gives structure to GHG inventories. GHG Protocol's scope categorization is the gold standard, providing an exceptionally thorough GHG inventory if followed closely. Some organizations choose to conduct a personalized GHG inventory with a customized set of scope categories, usually as a result of limited resources or field-specific applicability of the emission categories.

A vast majority of U.S. universities have implemented an abbreviated version of Scope 3 emissions categories. A common tool that has emerged in university GHG inventories is the Campus Carbon Calculator (CCC), developed by Clean Air-Cool Planet and the Sustainability Institute at the University of New Hampshire (UNH). Scopes 1 and 2 are the same as the GHG Protocol while Scope 3 includes commuting, business travel and study abroad, student travel to/from home, food, paper, solid waste, wastewater, and transmission and distribution (T&D) losses (seven categories rather the GHG Protocol's fifteen). This set of emission categories targets the common leaders of Scope 3 emissions for universities. However, without the full implementation of the GHG Protocol Scope 3 category list, there are substantial gaps in a CCC-based GHG inventory. Villanova University's implementation of the Scope 3 categories will be discussed in the following section.

Villanova GHG Inventory History

Villanova University's GHG inventory work began in 2007. Using the UNH Sustainability Institute's Excel template CCC, Villanova University recorded GHG emissions from the following sources: on-campus stationery (steam plant and generators), direct transportation, animals and fertilizers, purchased electricity, solid waste, and T&D losses. With this inventory profile, the university recorded its full Scope 2 GHG emissions, a portion of Scope 1, and a highly incomplete representation of Scope 3 (both in terms of the CCC and GHG Protocol). This inventory composition changed in 2013 with the arrival of Villanova University's current Sustainability Manager, Liesel Schwarz. Under her supervision, the university's GHG inventory expanded to include the following categories: on-campus stationary, direct transportation, refrigerants and chemicals, fertilizer and animals, purchased electricity, faculty commuting, staff commuting, student commuting, solid waste, and T&D losses. This is the most comprehensive GHG inventory composition Villanova University has implemented, covering all of Scopes 1 and 2 and just under half of Scope 3 categories according to the CCC. The results of Villanova's GHG inventories from 2007 to 2018 are shown below in Figure D.2.

Figure D.2

Categories that were added to the university's inventory report in subsequent years are projected as separate additions to the original 2007 inventory categories. This is to allow for variable-controlled observation across the years of reporting. Inventories were cataloged in the Sustainability Indicator Management and Analysis Platform (SIMAP). This website, a refined version of the CCC Excel template, provides filing and analytic tools to assist the user in data upkeep and referencing.

In 2010, Villanova University published a Climate Action Plan (CAP) prepared by a third-party consultant. This document reported a value for the university's 2009 fiscal year GHG emissions according to nine specified high-impact categories. The resulting total was reported as 83,040 MTCO2e (Villanova, 2010). However, there was no description of inventory methodology or calculation of the results. Furthermore, there are discrepancies between the 2009 GHG inventory reporting on Villanova's SIMAP account and the results in the 2010 CAP. This is likely due to the fact that the CAP report included emissions due to institutionally sponsored air travel and study abroad, two categories not included in the 2009 SIMAP report. Emissions from air travel commonly account for a significant portion of emissions for higher-level educational institutions

so the omission of these GHG sources can vastly reduce a cumulative measurement. Recognizing this inconsistency in reporting is important because the 2010 CAP established the goal of achieving a 24% reduction in GHG emissions by 2025 (Villanova, 2010). When comparing the 2010 CAP 2009 GHG measurement of 83,040 MTCO2e and the Villanova's 2018 GHG measurement of 62,857 MTCO2e, it appears that there is already a 24.3% reduction of emissions 7 years ahead of schedule. However, the SIMAP 2018 inventory does not include study abroad or athletics' air travel emissions.

Beyond the discrepancies in categories inventoried in different reports, the 2010 CAP had other shortcomings. Firstly, the mitigation areas that were suggested in the 2010 CAP are not directly linked to the categories of GHG emissions. The report fails to articulate the individual breakdown of emissions from each specific category that was examined in the study. This makes it difficult to confirm that the mitigation strategies suggested in the report are the most effective actions to reduce Villanova's emissions. Another flaw in the 2010 CAP is the lack of detail in the structure of an entity that will oversee the implementation and evolution of mitigation strategies. The President's Environmental Sustainability Committee (PESC) was named as the group that would develop and carries out the proposed carbon reduction plan. No organizational details or appointed positions to ensure completion of the allotted responsibilities and tasks were identified. These shortcomings resulted in an ineffective response on the university level to reduce campus GHG emissions.

Approach

To reorient and jumpstart the GHG emissions reduction initiative on campus, the VSLC instated a team of graduate students to develop a CRP to be released with the Villanova Sustainability Initiative Report.

Purpose

This project was developed to address the flaws in the university's 2010 CAP and catalyze an effective reduction in GHG emissions. To meet the university's 2050 goal of carbon neutrality, the CRP will redefine intermediate emissions reduction goals, compile a list of suggested projects linked to the respective emissions sources each project will address, and propose a governing body that will help guide the implementation of the CRP.
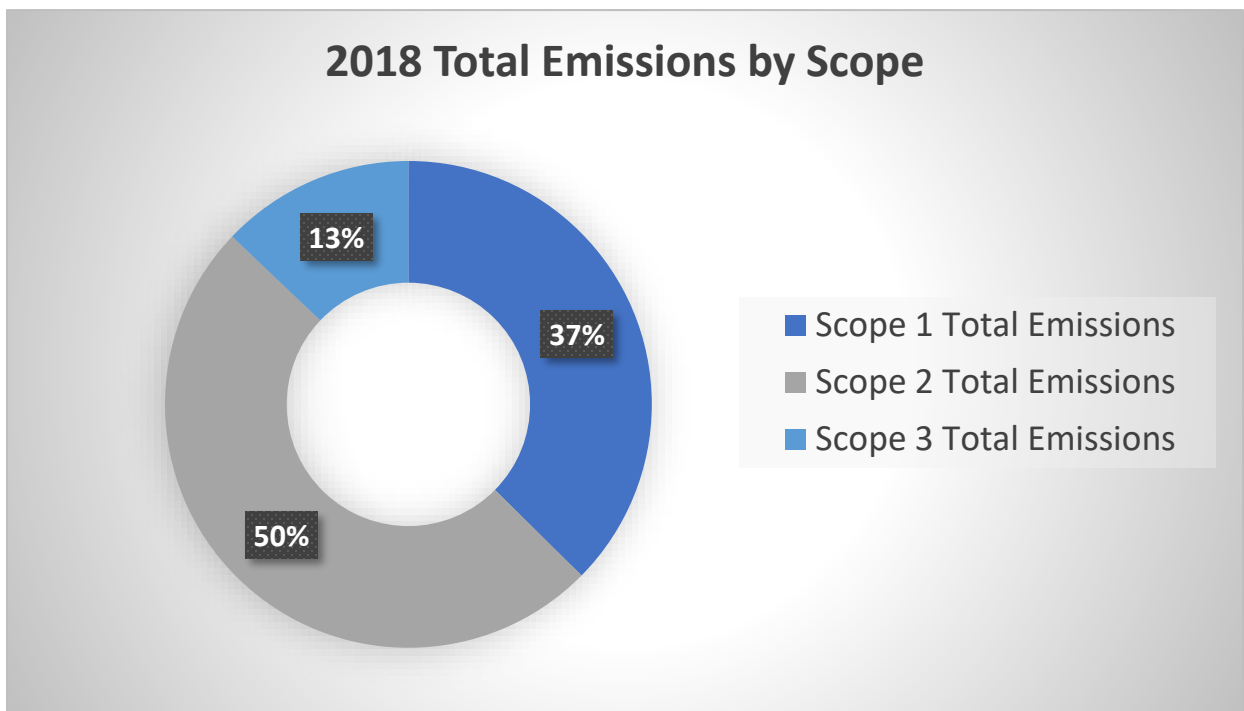
Scope

The scope of the CRP was comprised of a GHG inventory update, a composition of projects that address the specific breakdown of Villanova's GHG emissions, and a recommendation of a forward pathway towards total GHG emissions elimination. The GHG inventory update spanned all Scope 1 and Scope 2 emissions by Villanova while adopting a specified set of Scope 3 emissions accepted as a standard for GHG inventories among U.S. colleges and universities. As discussed above, the CCC's set of Scope 3 categories focuses on the common major contributors of Scope 3 emissions on university campuses. To ensure this set of categories was a standard for GHG inventories at comparable universities, a benchmarking analysis was conducted to examine the content of Scope 3 inventories at ten universities, five ranked above and five ranked below Villanova University on the U.S. News Rankings of top U.S. universities. Of the schools in this sample that were conducting regular GHG inventories, all either omitted Scope 3 from their inventories or used the CCC Scope 3 categories to account for that area of their campus emissions. This affirmed the use of the CCC Scope 3 categories for Villanova's GHG inventory update.

Deliverables and Objective

As stated previously, the CRP was constructed as a subsidiary of the Villanova Sustainability Initiative Report. Therefore, the results of the CRP project will be presented as a supporting document in the appendix of the Villanova Sustainability Initiative Report. There were three notable deliverables contained in the CRP report. The first was an updated and further developed GHG inventory that accounts for the newly constructed dormitories on campus and several new Scope 3 categories that make up significant portions of Villanova's GHG emissions. The next was a complete profile of projects hand-picked to address each of the sources of GHG emissions on Villanova's campus. The final deliverable was a recommended plan moving forward to reduce emissions at Villanova in a feasible and effective way. These end products have been developed for the specific goal of establishing a reliable GHG reduction plan that will deliver results.

Inventory Report

In measuring and tracking GHG emissions within institutions and industries, the overall standard is to divide up the total emissions into three different sectors, or scopes, based on the source of the emissions. Additionally, there are separate categories within these scopes to further break up and organize the organization's GHG emissions. The breakdown of Villanova University's emissions by scope in the calendar year of 2018 can be seen in Figure D.3 below. The majority of the university's emissions come from its Scope 2 emissions, followed by Scope 1 and then Scope 3 emissions. Further analysis of the individual components within each scope is described in the sections below. This breakdown – as well as the analysis of each of the scopes' components – will help to determine which areas of Villanova University's total emissions are the largest contributors and where a significant impact for carbon emissions projects could be felt.

2018 Total Emissions by Scope

- 13%
- 37%
- 50%

- Scope 1 Total Emissions
- Scope 2 Total Emissions
- Scope 3 Total Emissions

Figure D.3

Scope 1

The first section used to organize GHG emissions are Scope 1 emissions; this includes all the university's emissions that are generated on-campus. For Villanova University, they include the

emissions from the university's fleet vans' fuel consumption, refrigerants and chemicals used and lost, fertilizers used, and animals housed, and the steam plant that helps regulate heating and cooling within multiple buildings on campus. In the calendar year of 2018, the overall Scope 1 emissions from Villanova University totaled approximately 23,204.60 metric tons of carbon dioxide equivalents. The breakdown of percentages of each category within Scope 1 can be seen in Figure D.4.
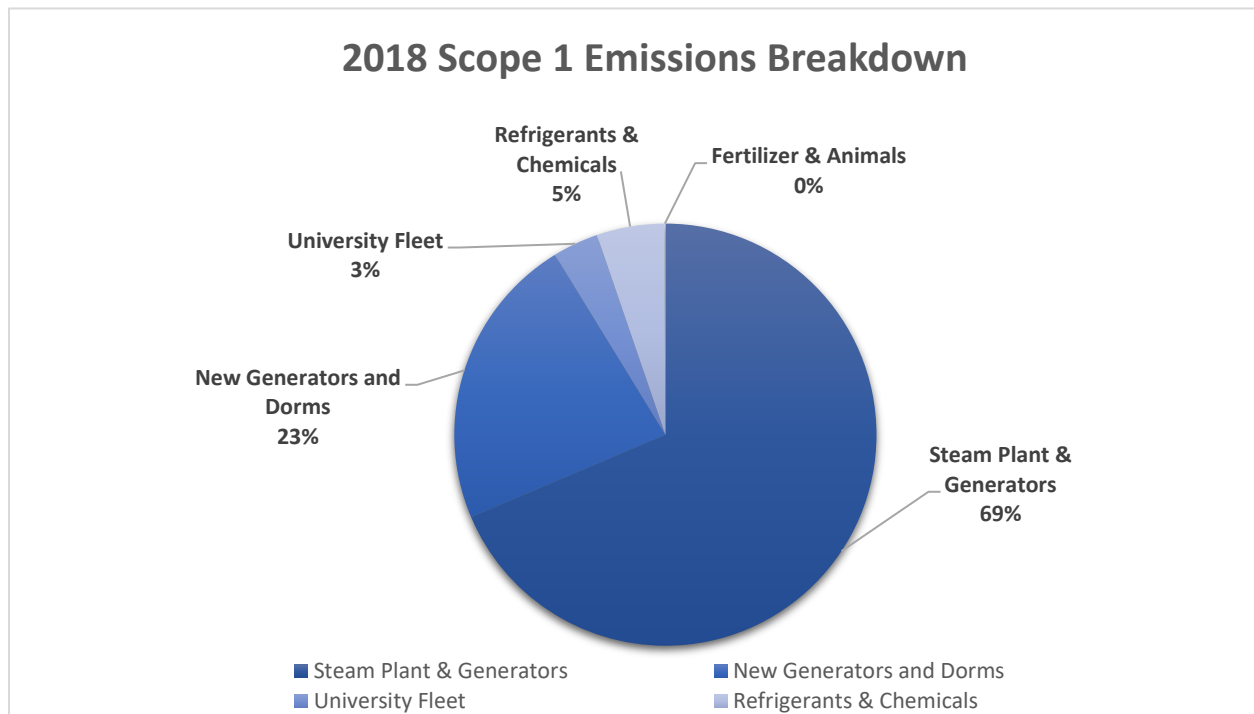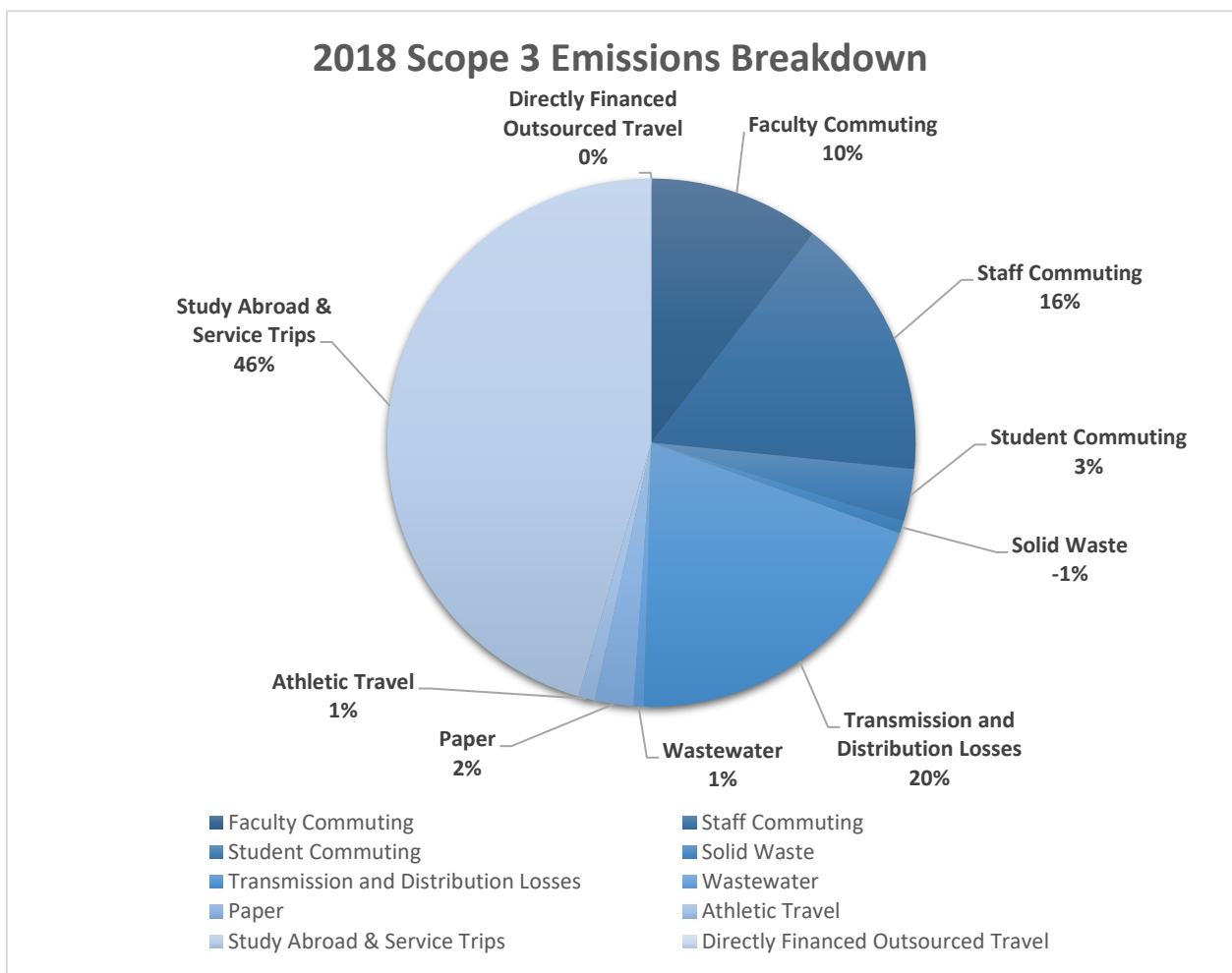

2018 Scope 1 Emissions Breakdown

Figure D.4

Scope 2

The second section for GHG emissions includes Scope 2 emissions; these emissions include all electricity generation or usage by the institute. For example, all electricity purchased from the local grid as well as the generation of any energy (i.e. from renewable sources). For Villanova University, there is no generation of energy to be included as a Scope 2 category. Therefore, the entirety of the university's Scope 2 emissions comes solely from the purchase of grid electricity. In the calendar year of 2018, the overall Scope 2 emissions from Villanova University totaled approximately 30,833.48 metric tons of carbon dioxide equivalents.

Scope 3

The third and final section for organizing the university's GHG emissions are Scope 3 emissions; these emissions include emissions from upstream and downstream emissions regarding off-campus emissions. For example, the current categories being evaluated include faculty commuting, staff commuting, student commuting, emissions from solid waste, transmission and distribution losses, emissions from wastewater treatment, emissions from the use of paper, athletic travel, study abroad and service trips, and directly financed outsourced travel. However, the university's Scope 3 emissions could be further expanded to include categories such as downstream emissions from fuel refining, emissions from meat and dairy production/consumption, as well as emissions from other procurement sources. In the calendar

2018 Scope 3 Emissions Breakdown

- Faculty Commuting — 10%
- Staff Commuting — 16%
- Student Commuting — 3%
- Solid Waste — -1%
- Transmission and Distribution Losses — 20%
- Wastewater — 1%
- Paper — 2%
- Athletic Travel — 1%
- Study Abroad & Service Trips — 46%
- Directly Financed Outsourced Travel — 0%

Legend:
- Faculty Commuting
- Staff Commuting
- Student Commuting
- Solid Waste
- Transmission and Distribution Losses
- Wastewater
- Paper
- Athletic Travel
- Study Abroad & Service Trips
- Directly Financed Outsourced Travel

year of 2018, the overall Scope 3 emissions from Villanova University totaled approximately

Figure D.5

18,203.65 metric tons of carbon dioxide equivalents as of right now in the evaluation. The breakdown of percentages of each category within Scope 3 can be seen in Figure D.5.

However, while all the categories' carbon emissions were inventoried, the uncertainty regarding Scope 3 emissions is still high due to the limited categories analyzed (not all fifteen categories given in the GHG Protocol), as well as the unreliability of the data gathered due to the lack of accurate emissions data tracking and collection at Villanova University. Therefore, due to this level of uncertainty to the accuracy of the current Scope 3 emissions reported, a sensitivity analysis was conducted. In this analysis, the percentage of contribution from each scope was calculated in the scenarios of a doubling and a tripling of Scope 3 emissions, seen in Figure D.6 and Figure D.7 below. As seen in these graphs below, potentially increasing the emissions from Scope 3 has significant impacts; doubling Scope 3 carbon emissions increases the scope's contribution from 27% to 43% while tripling Scope 3 emissions increases the scope's contribution to 53%.
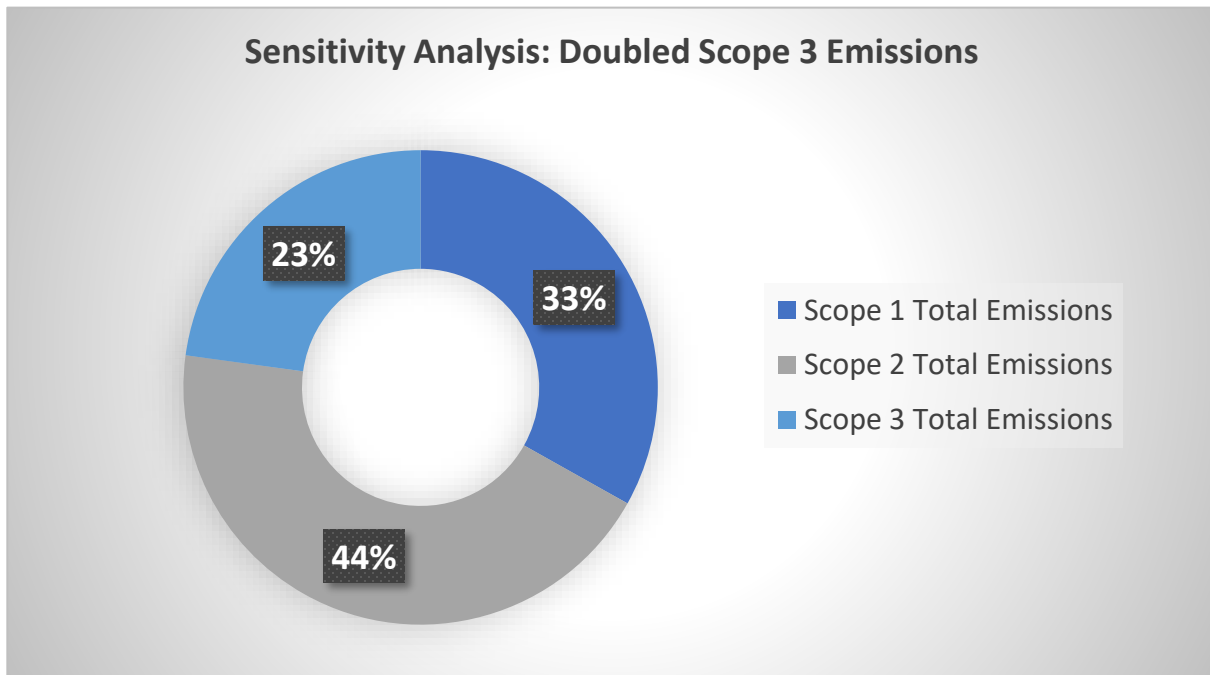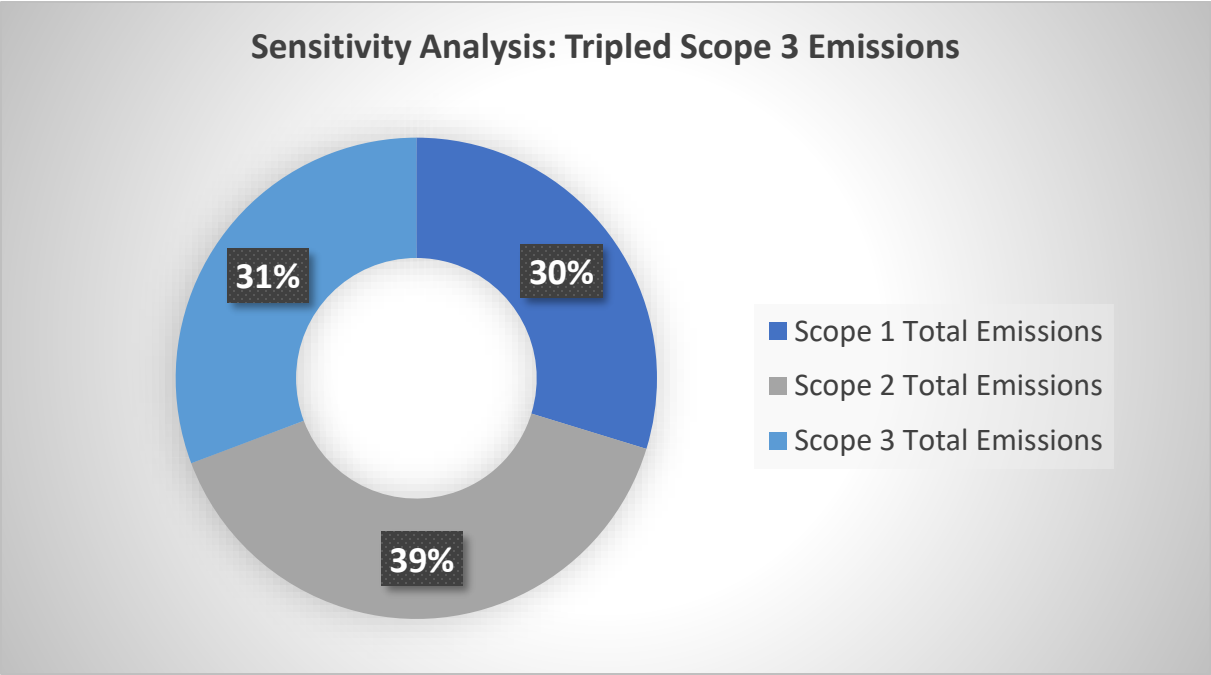

Figure D.6

Sensitivity Analysis: Tripled Scope 3 Emissions

- Scope 1 Total Emissions
- Scope 2 Total Emissions
- Scope 3 Total Emissions

30%
39%
31%

Figure D.7

Carbon Reduction Projects

With an updated GHG inventory completed, the project laid out a custom project profile that would work to eliminate Villanova's GHG emissions. The projects were chosen based on their ability to eliminate, reduce, or offset the emissions recorded in the updated GHG emissions inventory. Table D.1 provides a quick reference to the projects that were selected. Detailed descriptions and explanations for selection are provided in Sections 4.1, 4.2, and 4.3.

Table D.1

Project	Description
PPA and Renewable Energy Contracts	**Implement renewable energy contracts and PPA to consistently cover 100% of university electricity demand annually**
Steam Plant Decarbonization	**Decarbonize the central steam plant using methods most feasible for Villanova**
Energy Efficiency Retrofit	**Install LED lighting and VFDs in all buildings**
Decarbonized Fleet	**Replace all university vehicles with electric or non-fossil-fuel-burning equivalent**
Commuting Diversification	**Increase the cost of on-campus parking and use proceeds to fund cleaner transportation (SEPTA, bike-share, charging stations)**
Distance Travel Emissions Offsetting	**Establish an internal fund that is fed by fees charged for air-travel emissions that can be used for future emissions reduction projects**
Lifestyle Change Initiative	**Research and develop a program that effectively helps the Villanova community reduce GHG intensive daily activities**
Low Carbon Procurement	**Set up sustainability standards for contractors and suppliers to the university**
Carbon Offset Purchasing	**Purchase carbon offsets to address no more than 15% of the university's total emissions**

Scope 1 Projects

Scope 1 emissions made up 32% of the university's GHG emissions. Nearly 70% of those emissions came from the campus steam plant and generators (the generators contributed a minimal amount towards this percentage). As a result, the highest priority project for reducing Scope 1 emissions is the decarbonization of the steam plant. However, such a large task is burdened with caveats. The upfront capital costs of this kind of project dwarfs any other cost associated with the reduction and elimination of the university's GHG emissions. Furthermore, decarbonization strategies were suggested in the 2010 CAP, including the integration of biomass fuel and cogeneration infrastructure (Villanova, 2010). The use of biomass fuel sources has since been ruled unfeasible by the Villanova Department of Operations and Management and while the

installation of cogeneration turbines saw a marked drop in the campus' Scope 2 emissions, those reductions have been overcome by increased electricity usage due to campus expansion. In short, a new approach will be needed to address the steam plant GHG emissions if Villanova is to achieve net-zero GHG emissions in 2050. Without sufficient data on the current steam plant and distribution system on campus, it will be impossible to determine a single alternative to the current infrastructure. Therefore, the steam plant decarbonization project must begin as a data collection initiative to gather all the information needed to make an educated decision on an alternative to Villanova's fossil-fuel-fired steam plant. Both information on the current system performance levels as well as information on an array of viable industry alternatives to fossil-fuel-fired steam must be included in the project's, or group of projects', results. Once this is completed, further decisions can be made on how to decarbonize the steam plant and distribution system effectively.

The next project included in the Scope 1 project list is the decarbonization of the university fleet. Villanova owns a fleet of mostly gasoline-powered vehicles, with the remainder running on diesel fuel. Although this source of emissions only accounts for 3% of Villanova's Scope 1 emissions and just under 1% of the school's total GHG emissions, a decarbonized university fleet is a highly symbolic move towards a more sustainable future. Shifts in Villanova's operations such as these can have a high impact on enrollment and endowment. As with the steam plant, there are some feasibility issues with this project. For instance, new decarbonized vehicles must meet the same standards as gas and diesel-powered vehicles. Factors such as this make this project's completion highly dependent on what the auto industry has to offer in the near future.

Because decarbonization is nearly impossible if the efforts of new technology and operations overhauls are not met by the efforts of individuals on the use-end of GHG-emitting products and services, a lifestyle change initiative was placed on the Scope 1 emissions reduction project list. This project will work through organizations involved in student life and facility occupancy to educate and help individuals implement less energy-intensive practices in their daily lives.

The final project for Scope 1 emissions reductions is a Scope 1 GHG emissions offset program. Emissions from refrigerants and chemicals are either unavoidable or have only highly unfeasible alternatives available. Additionally, Villanova may acquire difficult Scope 1 emissions in the future that are relatively minimal but need to be addressed, nonetheless. By purchasing carbon offsets for this small amount of emissions, the university can still achieve net carbon neutrality in the future. It should be noted that included in this program will be a maximum GHG emissions

percentage abatement or restrictions of other kinds such that the program is not used as a shortcut to emissions reduction in the future.

Scope 2 Projects

Scope 2 emissions currently make up the largest percentage of Villanova's GHG emissions at 43%. Fortunately, there are relatively economical solutions to addressing GHG emissions resulting from purchased electricity. Power Purchase Agreements (PPAs) and renewable energy contracts are methods of offsetting an entity's GHG emissions due to electricity generation, without having to oversee the installation or maintenance of the renewable energy system that provides the offsets. These programs can vary in structure, utilizing different renewable energy systems, financing plans, and geographic locations. All these factors will need to be considered when implementing this offset program for Villanova. It will be important to ensure that the new renewable power made available by the program is used to its full potential and that the energy systems are constructed sustainably. The benefit of a successful roll-out of a PPA or renewable energy contract would offset Villanova's scope 2 emissions for a relatively low cost.

The next project included in the Scope 2 project list is a straightforward lighting retrofit. LED lighting of campus facilities could lead to a significant reduction in electricity consumption as most buildings are not currently fitted with these bulb types.

The last project included on the Scope 2 emissions reductions project profile is an extension of the lifestyle change initiative on the Scope 1 list. This program can address Scope 1 and 2 emissions alike through the use of smart, conservational habits when using HVAC and lighting systems.

Scope 3 Projects

Scope 3 emissions make up a quarter of the university's total GHG emissions. While this is the lowest percentage of the three scopes, it has high expansion potential as detailed in the Scope 3 sensitivity analysis. The project list is tailored to the emissions reported in this report's inventory, but it should be noted that further projects may be needed in the future should Villanova's Scope 3 inventory include new categories in the coming years.

The foremost project for addressing Scope 3 emissions is an internal university revolving fund that is fed by a travel fee placed on all university-associated air travel. There is currently no physical alternative to air travel, which is one of the most intensive GHG-emitting operations in

society. Air travel makes up the vast majority of the directly financed outsourced travel, study abroad and service trips, and athletic travel categories in the Scope 3 emissions inventory. These categories equal 77% of Scope 3 emissions. The only current solution to GHG emissions from air travel is purchasing carbon offsets. However, due to the dissociative nature of purchasing carbon offsets to make up for GHG emissions, some universities have designed more tangible programs that charge a fee for air travel on a per-mile basis but maintains the proceeds within the university to fund GHG emissions-reduction initiatives. This is a trend Villanova should follow in order to responsibly address its air travel emissions.

Commuting emissions (faculty, staff, and student) make up 13% of Villanova's Scope 3 GHG emissions. One possible reason for these emissions contributing to a substantial portion of the inventory is the university's relatively low cost for parking permits. This encourages faculty, staff, and students to purchase passes drive to campus daily. A simple solution to this is to raise the prices of parking permits. The revenue from these price increases would then be used to fund the cultivation of other sources of transportation: bike share program, electric vehicle charging stations, and SEPTA pass subsidies. Making these modes of transportation more accessible could be further funded by revenue from the air-travel carbon fee revolving fund.

One project that is included in this section but does not directly correlate with a category in the Scope 3 inventory is a sustainable procurement program. Villanova's Department of Procurement does not track GHG emissions associated with transactions with vendors, contractors, and other third parties. If Villanova is to be truly carbon-neutral, it will have to account for emissions that result from these types of transactions. A sustainable procurement program would establish a set of standards for Villanova University contractors, vendors, and third-party business partners to ensure the school is linked to entities that maintain sustainable supply-chain practices and work hard to keep a low carbon footprint.

The lifestyle change initiative and carbon offset purchasing also extend to the Scope 3 emissions reduction project list.

Overall Costing

Costing of these projects was abbreviated and requires deeper analysis. Most were deemed a net even cost-to-payback project with significant energy and cost savings integrated into the desired results. However, two projects required closer inspection on cost projections in order to

predict the feasibility of implementation due to high capital costs or high carbon abatement potential: steam plant decarbonization and PPA and/or renewable energy contract.

Steam plant costing was done using a benchmarking analysis among other universities that have implemented decarbonized steam plant and distribution systems to varying extents. Table D.2 shows the school case studies that were considered for this analysis and their respective metrics.

Table D.2

School	Project Description	Facilities' sq. ft.	Projected Cost	Cost per sq. ft.
Miami University - Ohio	Migration from steam/condensate distribution to hot water distribution and addition of heating hot water infrastructure at chiller plant	8,000,000	$17.9 million	$2.24/ft^2
University of British Columbia	45 MW natural gas fired plant, 115 building conversions, distribution system piping conversion to hot water	17,197,000	$88 million	$5.12/ft^2
American University	Steam plant and distribution system conversion to low temp hot water (LTHW)	1,664,000	$28 million	$16.83/ft^2
Ball State University	Replacement of coal-fired boilers and chilled water equipment with ground-sourced geothermal district energy system	7,203,801	$82.9 million	$11.51/ft^2
Carleton College	Steam distribution system transition to LTHW along with three geothermal bore fields and a heat pump	2,066,433	$38 million	$18.39/ft^2
UC Davis	Hot water heating system with pipe distribution system, heat recovery chillers	7,300,000	$137.5 million	$18.84/ft^2
Stanford University	Reconstruction of power plant from natural gas fired steam to electrified LTHW, new electrical power station, complete retrofitting of distribution system from steam to water piping	15,400,000	$485 million	$31.49/ft^2
Swarthmore College	Hydronic conversion (HTHW), new heating plants, geo-exchange field, LTHW and CHW piping network, building energy transfer stations, existing building conversion from steam to hydronic	2,072,621	$87.1 million	$42.02/ft^2

The schools are color-categorized by extent of decarbonization. Yellow represents a partial reduction of carbon emissions, green represents elimination of the majority of carbon emissions,

and red represents projects that eliminate all carbon emissions in the future. To attain more concise answers the Table D.3 shows averaged projected costs for each tier of case study.

Table D.3

Benchmarking scope	Cost range projection ($ in millions)	Cost projection ($ in millions)
Baseline	8.9 – 166.7	72.7
High-cost Range	45.7 – 166.7	92
Middle-cost Range	45.7 – 74.8	65
Low-cost Range	8.9 – 74.8	48
Interim Project	n/a	14.6

The middle-cost range of around $65 million was taken as the closest representation of a steam plant decarbonization project.

PPA or renewable energy contract costing was conducted using assumed cost increases or decreases from the current university electric bill given by the operations department. With an average annual cost of electricity at around $5 million and an assumed range of a 10 percent cost to a 5 percent savings, the projected cost of a full coverage PPA or renewable energy contract would range anywhere from $5.5 million to $4.75 million. Compared to the projected $65 million for the steam plant decarbonization and considering purchased electricity accounts for 11 percent more of Villanova's GHG emissions, this is a low cost per MTCO2e eliminated.

Future Emissions Reduction Scenarios

Reduction Pathway Options

In every scenario pathway discussed below, the goal of carbon neutrality is ultimately realized; however, the year in which carbon neutrality is reached differs for each scenario. Additionally, for all emissions reduction goals, the percentage reduction is based on a reduction from the baseline year which was chosen as the year 2010. These emission reductions also include the emissions from Scope 1, Scope 2, as well as Scope 3.

The description of each carbon reduction pathway scenarios can be seen in the proceeding subsections. The pathways can also be seen and visually compared in Figure D.8 below. In this graph, a large increase in the university's emissions can be seen before the planned reductions. However, this spike in Villanova University's total emissions in the year 2020 considers the expected increase in emissions is from the new construction and buildings on campus. However,

it must be noted that this increase in 2020 is solely based upon estimates and not actual measurements.
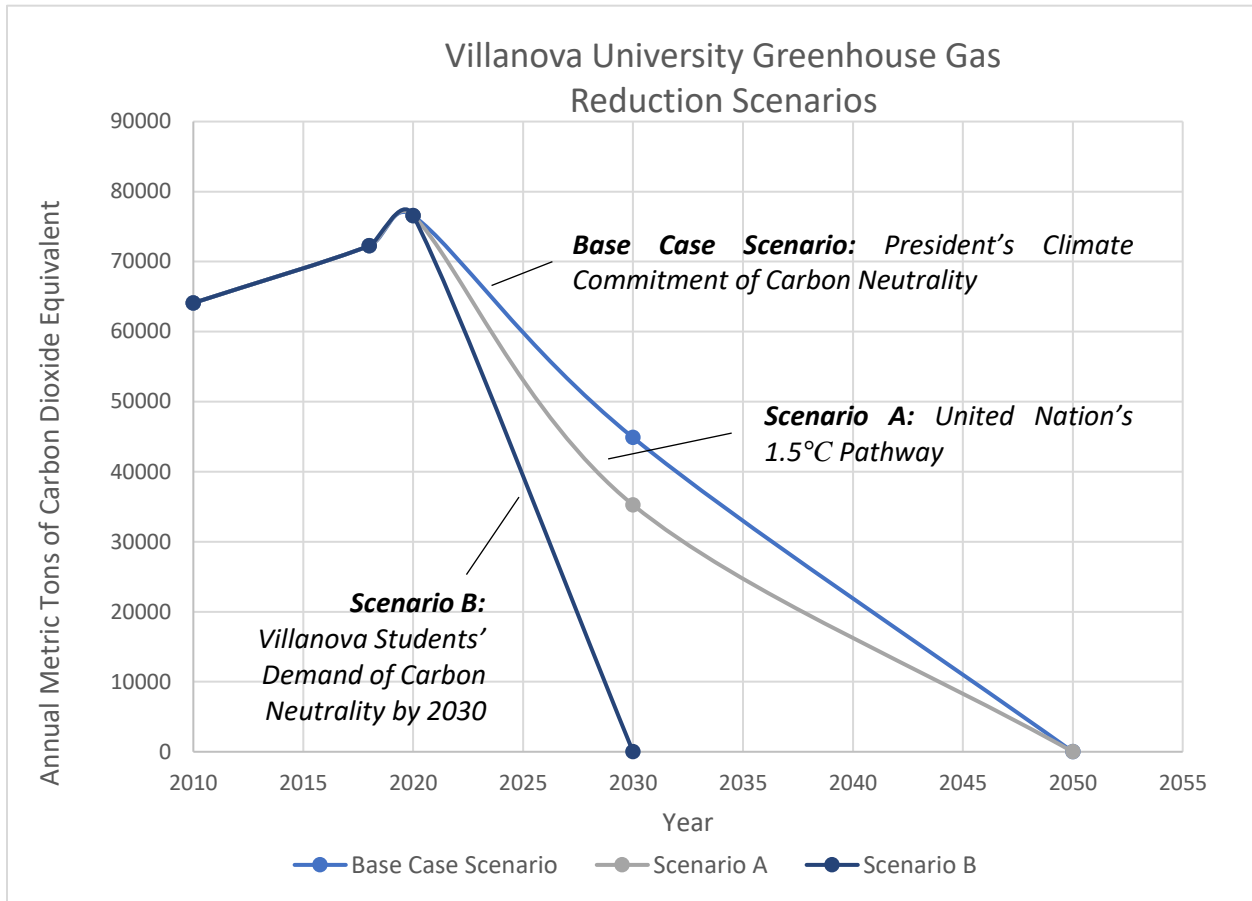

Figure D.8

Business as Usual

In terms of a "business as usual" base case for the university's carbon reduction plan, Villanova University has already pledged itself to the President's Change Commitment of Carbon Neutrality. This plan includes achieving carbon neutrality by the year 2050 and includes interim goals of a 24% emissions reduction from the baseline year (chosen to be 2010) by 2025 as well as a 30% emissions reduction from the baseline year by 2030.

Scenario A

The next scenario for the university's carbon reduction pathway follows the guidelines laid out by the United Nation's IPCC SR (Intergovernmental Panel on Climate Change Special Report) published in 2018 which outlines emissions reduction goals in order to limit the increase in the global temperature to only 1.5°C. In order for Villanova University to be aligned with this 1.5°C world, this scenario includes reaching carbon neutrality by the year 2050 as well as an interim goal of a 45% emissions reduction from the baseline year by 2030 (Rogeli et al., 2018). The baseline year for Scenario A is defined as 2010, the same as for the business as usual case. As it can be seen, the ultimate goal of carbon neutrality by 2050 is the same in this scenario as with the Business as Usual scenario; the 2030 interim goal for this Scenario A has a slightly more aggressive pathway with a 45% reduction from the baseline year rather than a 30% reduction.

Scenario B

The final scenario being analyzed is one inspired by the student activists' demands for carbon reduction by the university. This scenario is the most aggressive of all the previously discussed carbon pathways. In this scenario, there is no interim goal; there is only the goal of carbon neutrality by the year 2030.

Pathway Cost Comparisons

In terms of a financial comparison between the various pathway scenarios, the cost difference between the base case scenario (the President's Climate Commitment) and Scenario A (accordance with the United Nation's IPCC SR) is almost negligible. This is due to the fact that both scenarios have the same ultimate goal of carbon neutrality by 2050 and only a small difference in the scenarios' interim goals for 2030 (a 30% reduction from the baseline year for the President's Climate Commitment versus a 45% reduction from the baseline year for Scenario A). Additionally, for the interim 2030 goals for both scenarios, either the entirety or the majority of the reduction goal could be achieved through power purchase agreements (PPAs) in order to offset Scope 2 emissions for the university.

In terms of comparing these two scenarios, more carbon reduction projects would be front-ended for Scenario A versus the base case scenario to meet the 2030 interim goal. While there may be a slight cost difference, reducing more of the campus's carbon emissions by 2030 as in Scenario A would also reduce the financial risk if a carbon tax was to be implemented on either the state

or federal level in the future. In Scenario A, as more carbon emissions reduction projects would have been completed by 2030 in comparison to the base case scenario, the university would not feel the risk or the impacts of a carbon tax as keenly.

However, in terms of a financial comparison between Scenario A and Scenario B, there would be a significant cost difference. This is due to the fact that for Scenario A, the decarbonization of the university's on-campus steam plant would be able to be deferred until after 2030, allowing the university enough time to research the potential decarbonization options, as well as complete the project over an extended period of time, spreading the total cost out, as well as causing minimal disruption on-campus during the necessary infrastructure construction. Scenario B calls for carbon neutrality by 2030, only allowing the university a ten-year time period to decarbonize the steam plant, incurring a significant capital cost for the project as well as potential disruption of life on campus from the construction required in such a short timeframe.

Villanova Carbon Reduction Plan

Based on the data gathered and the research done, it is recommended that Villanova University surpass the interim goals set out in the President's Climate Commitment and follow the reduction pathway set out by the United Nation's 1.5°C global climate change scenario. Within Villanova University's Sustainability Plan, the metrics and goals set out to follow the United Nation's Sustainable Development Goals (SDGs); therefore, it is reasonable to also follow the guidelines set out by the United Nations in regard to climate change and carbon reduction pathways.

While following the Scenario A pathway frontloads a larger portion of the carbon emissions reduction by 2030 than the President's Climate Commitment, it is not as large of an emissions reduction as in Scenario B which achieved carbon neutrality by 2030. This scenario was deemed technologically and financially infeasible, mainly due to the logistics of decarbonizing the university's current steam plant. Completely eliminating all emissions from the steam plant – either through innovative technologies and the corresponding new infrastructure or accredited carbon offsets – within a ten-year timespan is not only a massive undertaking, but it is also a significant cost to the university. Following the reduction pathway set out in Scenario A instead allows for a more gradual change for the steam plant, even allowing the university to defer any new changes to the plant until after 2030. This gives the university time to follow industry and technology changes, benchmark other universities transitioning to a decarbonized steam plant, as well as research the best option for Villanova University.

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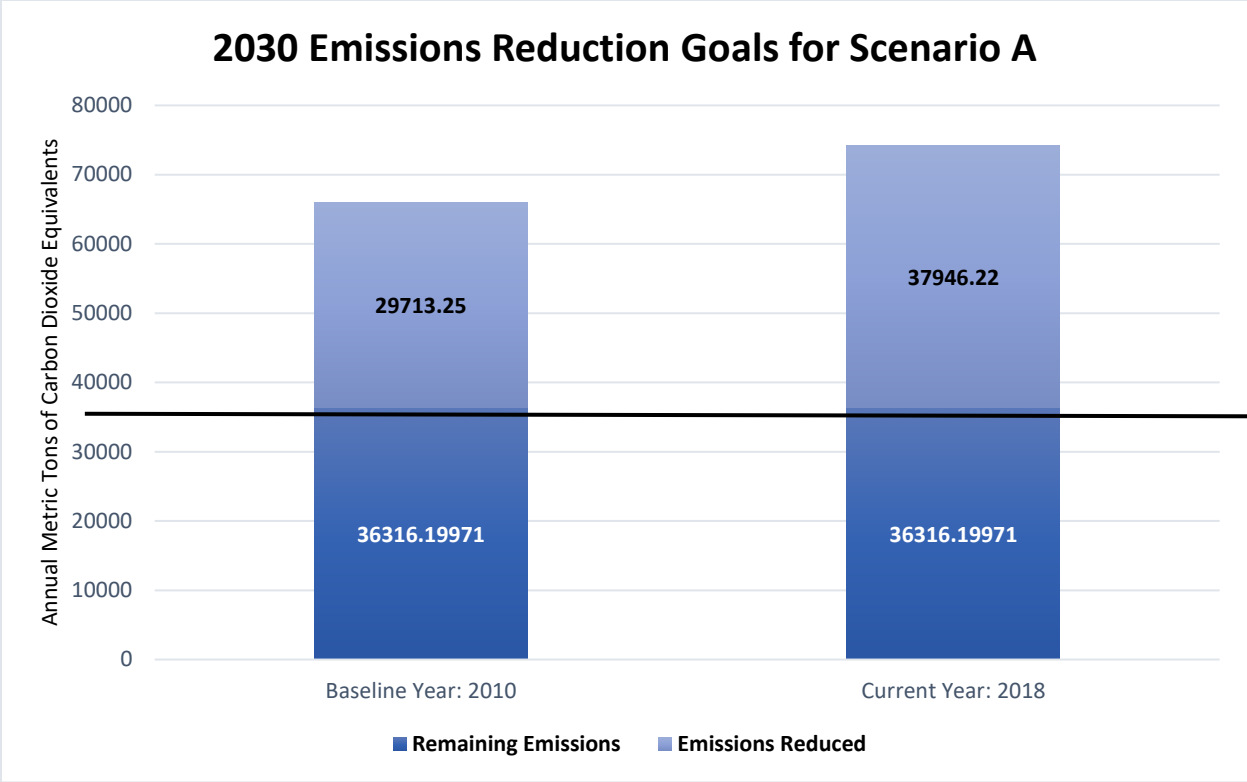
Figure D.9

To achieve the emissions reduction goals for Scenario A, several projects must be chosen and finished prior to 2030 in conjunction with the completion of multiple projects after the 2030 interim goal. As it can be seen in Figure D.9 above, a 45% emissions reduction from the baseline year of 2010 correlates to a different percentage of the current emissions inventory for Villanova University; this is due to the increase in emissions from 2010, mainly attributed to new construction and increased electricity usage. Therefore, a 51% reduction of current 2018 emissions is needed in order to meet the 2030 interim goal of a 45% reduction of the university's 2010 emissions.

As seen in Figure D.3 in the previous section, current calculations place Scope 2 emissions from electricity usage to 43% of the total carbon emissions from 2018. Therefore, in order to follow Scenario A, and the 1.5°C pathway set out by the United Nation's IPCC special report, Villanova University should offset the entirety of their Scope 2 emissions through several power purchase agreements (PPAs). Power purchase agreements allow the university to invest in current or upcoming renewable energy projects in order to offset their own Scope 2 emissions from purchasing electricity from the local grid. In addition to these PPAs, it is also recommended that Villanova University complete several smaller emissions reduction projects that are easily done

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without too much financial cost, such as lighting and insulation retrofits to on-campus buildings. It is also recommended that the university complete several high visibility emissions reduction projects. It has already been seen that current Villanova University students are concerned about the university's carbon emissions and how these emissions should be reduced. Therefore, several high visibility projects such as electrifying the university fleet, while limited in their emission reduction, would be able to show the students and community that Villanova is committed to preserving the global environment.

Next Steps and Conclusions

Moving forward, the implementation structure is necessary to ensure the recommended plan comes to fruition. Each of the projects included in the CRP can also be found in the Operations Committee project list in the Villanova Sustainability Initiative. Projects in the Villanova Sustainability Initiative will be addressed by the specific committee to which an individual project is assigned. Therefore, there is no need to separately establish new teams for the projects included in the CRP. However, there is currently no active entity that would assume responsibility for tracking and catalyzing the progress of the full CRP. Beyond guiding the implementation of the CRP project profile, this entity will be responsible for assisting in the expansion and improvement of Villanova's GHG inventory. While Sustainability Manager Liesel Schwarz oversees the annual update of the university's GHG inventory using the SIMAP software, she will need this team to grow the inventory into a more comprehensive form that includes a Scope 3 inventory in accordance with the GHG Protocol. This will take Villanova University to the leading edge of higher education organizations working towards carbon neutrality. Suggested locations within the university that could house this team include the RISE program within the Sustainable Engineering Master's program and the Sustainability Manager's office in the Department of Operations and Maintenance. Regardless of the organizational location of this team, it is crucial to the future success of the CRP and Villanova University effectively and economically achieving carbon neutrality by 2050.

The CRP was developed in direct response to the momentum of a movement demanding the development of an environmentally conscious future, a movement coursing through the student community and younger generations. These are the same individuals that will populate the Nova Nation of the future. If Villanova University is to successfully evolve, it must be open to listening to its community stakeholders. Furthermore, action and change need to follow. It is the university's responsibility to create an environment where students can feel safe, proud and encouraged. If

young generations are calling for environmentally conscious decision-making, the recommended actions detailed in this CRP will make Villanova a beacon for the best of these ambitious and bright minds.

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