

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

2022 Addendum

**Prepared by the DiLoreto Research
Team**

Villanova Sustainability Leadership Council
Office of the President

CONTENTS

- Contents 1
- Figures..... 3
- Tables..... 4
- Acronyms..... 5
- Acknowledgment..... 6
 - Villanova Sustainability Leadership Council..... 6
 - DiLoreto Research Team (2021-2023) 6
 - Ethos Sustainability Solutions..... 7
- Executive Summary 8
- 1 Plan Update 9
- 2 Project Implementation and Completion.....10
- 3 Materiality Update and Score Recalculation.....11
 - 3.1 Stakeholder Involvement and the Analytical Hierarchy Process.....13
 - 3.1.1 Updating the Hierarchy13
 - 3.1.2 Conducting the Survey15
 - 3.1.3 Materiality Study Update Results16
 - 3.2 Metrics Update19
 - 3.2.1 Weighting Metrics19
 - 3.2.2 Scaling Metrics19
 - 3.3 Score Update.....20
 - 3.3.1 Scoring Metrics Without Data Available25

4	Updating Key Results	26
4.1	Villanova Sustainability Leadership Council and Committees	26
4.2	Key Results and Projects.....	28
4.3	Project Evaluation and Selection	33
4.3.1	Project Score Improvement	33
4.3.2	Strategic Plan Integration	33
5	Software	35
	Appendix A: Objective, Metric, and Key Result Details.....	37
	A.1 Objective Details; Metrics, Bounds, Baseline Score, and Key Results.....	48
	Appendix B: Goal Snapshots	50
	Appendix C: Project Details.....	51
	Appendix D: Carbon Reduction Plan.....	52
6	2022 Addendum References.....	53

FIGURES

Figure 1.1. Villanova Sustainability Plan Timeline 9

Figure 3.1. Hierarchy Used in the 2018 Villanova AHP Materiality Study. 14

Figure 3.2: Updated Villanova Materiality Study Hierarchy with Balanced Categories. 15

Figure 3.3. Weight of Each SDG by Category Based on Stakeholder Input..... 17

Figure 3.4: Score improvements from 2018 to 2021 by SDG. 21

Figure 3.5. Score in 2021 Compared to the Maximum Score by People, Planet and Prosperity Categories. Slight discrepancies in percentages are due to rounding. 22

Figure 3.6. Score in 2021 Compared to the Maximum Score by Objective/SDG. 23

Figure 3.7. 2021 Score Available by Metric. 24

Figure 3.8. Data Availability of Metrics. 25

Figure 4.1. Strategic Plan Integration for Projects in the 2021 Key Result Period..... 34

Figure 5.1. Three-Tier Approach to Sustainable Action. 35

TABLES

Table 3.1: New Materiality Weights for 2021, sorted by weight. Cyan SDGs are in the Planet Category, blue in People, and green in Prosperity.18

Table 4.1. 2021 VSLC Membership.27

Table 4.2: Operations Committee 2024 Key Results.29

Table 4.3: Social Justice Committee 2024 Key Results.....30

Table 4.4: Health and Well-Being Committee 2024 Key Results.31

Table 4.5: Academics and Research Committee 2024 Key Results.32

Table A.1. Wording of Adjusted Villanova Objectives from UN SDGs38

Table A.2. Details of Each Metric, Including Description, Unit, Bounds, Baseline Value, Maximum Score, and Intermittent Score.....40

ACRONYMS

Acronyms	Full Name
AASHE	Association for the Advancement of Sustainability in Higher Education
AHP	Analytical Hierarchy Process
AQI	Air Quality Index
CDP	Carbon Disclosure 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
PESC	President's Environmental Sustainability Committee
UN SDGs	United Nations Sustainable Development Goals
VSLC or SLC	Villanova Sustainability Leadership Council

ACKNOWLEDGMENT

The Villanova Sustainability Leadership Council (VSLC or SLC), the committees, and the entire Villanova community would like to express their heartfelt gratitude to the DiLoreto family for their leadership in Villanova's sustainability journey. Andy and Susan DiLoreto have been steadfast supporters of the sustainability initiative, and we all continue to benefit from their involvement. None of the efforts captured in this 2022 Addendum would have been possible without their insights and generous financial support.

VILLANOVA SUSTAINABILITY LEADERSHIP COUNCIL

Leadership of the SLC would like to also express our deepest appreciation to the staff and faculty members of the SLC that have helped to make Villanova University a sustainable place to live and work. They have been supporting the development of Villanova University's Sustainability Plan through workshops, revisions, and projects for students, research team members, and the Villanova community at large. Listed below are key members who served in leadership positions for the SLC in the 2021-2022 academic year:

- **William Lorenz**, Director, Sustainable Engineering; Co-Chair, VSLC
- **Art Purcaro, OSA**, Adjunct Professor, Theology and Religious Studies; Co-Chair, VSLC
- **Robert Morro**, Vice President for Facilities Management
- **Joseph Lennon**, Associate Dean, International and Interdisciplinary Initiatives
- **Alfonso Ortega**, James R. Birlle Professor of Energy Technology in the Department of Mechanical Engineering
- **Kathryn Getek Soltis**, Director, Center for Peace and Justice Education
- **Liesel Schwarz**, Sustainability Manager
- **Stacy Andes**, Director of Health Promotions

DiLORETO RESEARCH TEAM (2021-2023)

The DiLoreto Research Team 2021-2023 (Research Team) are a group of students from Villanova University's Sustainable Engineering program. They deserve recognition as they strive to create an ethos of sustainable living at and beyond campus through developing and executing

a wide range of projects at Villanova University and contributing to the development of Villanova University Sustainability Plan. Their efforts and support have made the Villanova community more inclusive and sustainable. Listed below are the Research Team members who contributed to the success of the University's sustainability efforts outlined in this 2022 Addendum:

- **Matthew Ashcroft**
- **Priya Arya**
- **Simon Brooks**
- **Yen Leng Chong**
- **Megan Copsey**
- **Dana Goodyear**
- **Kiersten Gourlay**
- **Mark Lacobino**
- **Aldo Pierini**
- **Claudia Pineda**
- **Renee Turner**

ETHOS SUSTAINABILITY SOLUTIONS

Thank you to Joseph Camilleri, Villanova University '17, '19 and CEO of Ethos Sustainability Solutions, for his company's generous time and dedication in partnership with Villanova University. Many of the strides realized by the SLC outlined in this 2022 Addendum would not have been successful without the efforts of Mr. Camilleri's support.

EXECUTIVE SUMMARY

Villanova University recently completed the first phase of its Sustainability Plan. This 2022 Sustainability Plan Addendum (2022 Addendum) highlights the progress, updates, and changes that occurred during the first three years of the Plan's implementation (Phase I). Thanks to the significant efforts made by the DiLoreto Research Team and the Villanova Sustainable Leadership Council (VSLC), the University is officially 42% complete in achieving an ethos of sustainability on campus according to the Sustainability Plan's methodology. This sustainability score jumps to 45% complete relative to the 2018 baseline, representing a 13% increase over the past three years. Many factors contributed to this increase in overall sustainability score, including but not limited to data infrastructure improvements, new measurements for metrics, and more accurate greenhouse gas accounting. New weightings also played a factor in this score calculation. These new weights came from the second round of the campus community Analytical Hierarchy Process (AHP) materiality study. During the 2021 AHP, the VSLC received feedback from over 400 community members, an improvement from the last round in 2018. A random sample and open link version of the survey were distributed, widening the study's reach to a larger population of the campus. To continue these great strides, Student Life in partnership with the VSLC is launching the *UNITAS Commitment: Promoting Sustainable Lifestyles* to establish an ethos of sustainable living at and beyond campus.

The Plan methodology remained largely the same throughout this phase. The most notable change included reorganizing the United Nations Sustainable Development Goals (SDGs) categories within the materiality study to equalize the SDGs within each category (People, Planet, and Prosperity), ensuring that the materiality weights were no longer skewed. Smaller changes included rewording certain metrics, and units for said metrics, to represent the campus' operations more accurately. These necessary changes to the evolving Sustainability Plan show that Villanova is still learning and adapting to sustainability. Furthermore, the five VSLC Committees became more autonomous during this phase and will continue to operate with agency for the remainder of the Plan. The Committees signed off on new ambitious 2024 Key Results for Phase 2 of the Plan; they will look to solidify projects to accomplish these key results in the later months of 2022. With these new key results and projects, the VSLC's goal for Phase 2 of the Plan is reaching a score of 55%, keeping Villanova on pace to reach a 100% score by 2030. Overall, score progress helps the campus achieve its goals; notably, a 50% carbon reduction by 2030 (relative to a 2018 baseline), keeping Villanova in accordance with The Paris Climate Agreement.

1 PLAN UPDATE

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 United Nations Sustainable Development Goals (UN SDGs) and guided by the principles of Catholic social teachings, the methodology provides clear goals tailored to Villanova, and quantifiable targets with set action plans. 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.

In October 2020, Villanova University published the first iteration of the University Sustainability Plan, the October 2020 Sustainability Plan (Sustainability Plan). The original plan was based on data representing university operations in 2018 and outlined a plan for updates every three years. This 2022 Addendum serves as the first 3-year update to the original Sustainability Plan. This document is designed to be used in tandem with the Sustainability Plan, providing relevant information on plan updates, changes, and other comments.

Since the publication of the Sustainability Plan, efforts have been primarily focused on four key areas: existing project implementation and completion, data collection and score recalculation, determination of the 2024 Key Results, and software construction and implementation. This 2022 Addendum serves as an update to the Sustainability Plan and gives a brief update on these four areas, including any other relevant information on the Sustainability Plan.

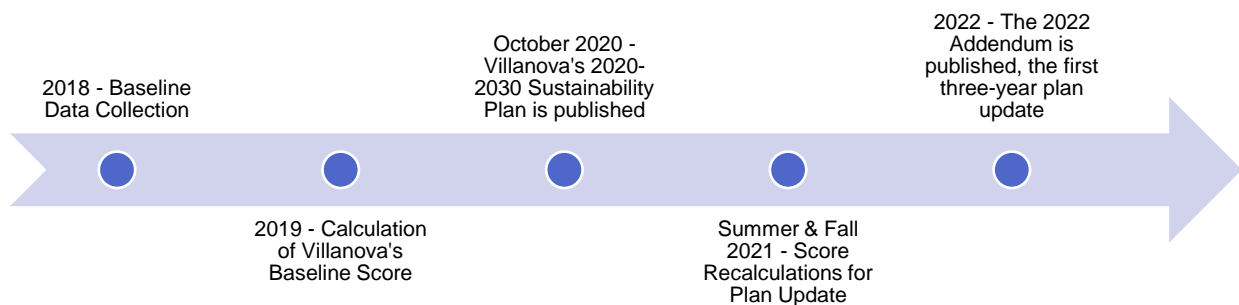


Figure 1.1. Villanova Sustainability Plan Timeline.

2 PROJECT IMPLEMENTATION AND COMPLETION

Certain projects have made significant strides within the Sustainability Plan. The Operations Committee's Renewable Power Purchase Agreement Project recently agreed to a contract that will increase the amount of purchased hydropower energy used to meet on-campus energy demand. Additionally, a waste audit has been completed, uncovering opportunities for better waste reduction and management on campus, which progresses the Operations Committee's Waste Audit and Action Plan Project. An expansion of graduate student health insurance stipends has advanced the Health and Well-Being Committee's Graduate Student Health Care Project. The Academics and Research Committee began collecting data allowing them to launch the Villanova Institute for Climate, Justice, and Sustainability, therefore advancing their respective projects.

Projects for Phase II of the Sustainability Plan (through 2024) will be finalized in 2022 and published in 2023. An online form originally created to organize suggestions surrounding projects is planned to re-launch in 2023 to ensure all grassroots sustainability efforts on campus are captured and reported through the unity of the SLC and the University's Sustainability Plan. The form will provide a space to submit efforts to be affiliated with the University's Sustainability Plan, alongside a section for recommendations and feedback regarding existing projects as well as recommendations for new projects on campus.

3 MATERIALITY UPDATE AND SCORE RECALCULATION

As detailed in the Sustainability Plan, the DiLoreto Research Team (Research Team) developed a system to determine a sustainability score that represents the performance of the University with respect to the Sustainability Plan. The purpose of Villanova's sustainability 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. During Summer and Fall 2021, the Research Team collected metric data to recalculate the score based on university operations in 2021.

The purpose of Villanova's sustainability scoring system is to identify which UN SDGs are being addressed effectively and which need additional work.

This score update was conducted following the Scoring System Mathematics used in 2019, detailed in Section 2.3.5 of the Sustainability Plan. For information on how the score is calculated, please reference Section 2.3 of the Sustainability Plan.

According to the Sustainability Plan methodology, new data will be collected for all metrics in each goal to calculate a new score and to track improvement in sustainability every three years from 2018 to 2030. The data collected in 2018 contributes to Villanova's baseline score to track sustainability improvement. The 2018 baseline score for Villanova as published in the Sustainability Plan was 31.9%. Fortunately, access to additional 2018 data has allowed for a more accurate baseline score recalculation, updating the official 2018 baseline score to 33%, meaning that Villanova was truly 67% away from achieving an ethos of sustainability on campus in 2018.

The score was recalculated with new data to capture progress in 2021 and will be recalculated again in 2024 and 2027. The scores generated by these recalculations are called intermittent scores for the Sustainability Plan. Note that these intermittent scores will report progress relative to the 2018 baseline score, but also progress relative to the updated scoring potential and updated community prioritization as captured by the Analytical Hierarchy Process (AHP) (see Section 3.1). For example, Villanova will continue to strive to meet a current living wage and will report intermittent score updates relative to the 2018 baseline score and the 2018 AHP weights, and

relative to any updates (to the AHP and to the target, such as if the target living wage increases within an update period).

Thanks to significant efforts made by the DiLoreto Research Team and the Villanova Sustainable

Thanks to the significant efforts made by the DiLoreto Research Team and the Villanova Sustainable Leadership Council (VSLC), the 2021 intermittent score reflects that the Sustainability Plan is 42% complete in achieving an ethos of sustainability on campus.

Leadership Council (VSLC), relative to the 2018 baseline score potential and 2018 AHP, the Sustainability Plan is 45% complete in achieving an ethos of sustainability on campus; this is a 13% increase over the past three years. The official 2021 intermittent score reflects that the Sustainability Plan is 42% complete in achieving an ethos of sustainability on campus (relative to the 2021 updated score potential and 2021 AHP). The score achieved in 2030 will be Villanova's final score for this Sustainability Plan, as 2030 is the designated year by which Villanova aims to achieve all 18 objectives adapted from the UN SDGs. Additionally, 2030 is the year that the UN SDGs expire.

3.1 STAKEHOLDER INVOLVEMENT AND THE ANALYTICAL HIERARCHY PROCESS

As part of the 3-year Sustainability Plan update, the Research Team conducted a second, university-wide materiality assessment. For the materiality assessment of the UN SDGs at Villanova University, the council used the AHP because of its compatibility with decision-making in a large group of stakeholders. From this assessment, the Research Team produced an updated weighted list of SDGs that was used to determine the direction of the Sustainability Plan for 2021-2024. To conduct the materiality assessment, the Research Team surveyed community members using a campus-wide survey to determine how stakeholders prioritize the sustainability issues affecting the world and the Villanova campus. Each campus stakeholder's contributions were ascribed an equal weight, allowing for each member of the Villanova community to have equal say in the AHP.

3.1.1 UPDATING THE HIERARCHY

The 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. At the top of the hierarchy is the vision to establish an ethos of sustainable living on campus and within the community. There are two criteria layers and an alternatives layer. The first criteria layer consists of Villanova's three spheres of influence: campus, region (defined as the Delaware Valley), and the globe, which remain unchanged in the 2022 Addendum. 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, a business framework that focuses equally on the benefits of company decisions and actions for people, planet and profit, the VSLC renamed the categories People, Planet and Prosperity. The SDGs included in each category were updated for the 2022 Addendum to distribute the weighting more equally across the categories.

The baseline hierarchy, shown in Figure 3.1, contained a mathematical bias because of the unbalanced number of SDGs in each category. The People category contained nine SDGs while the Planet category contained four and the Prosperity category contained five. The unbalanced hierarchy meant that despite the People category receiving more stakeholder weight than the other categories did, each SDG within the People category received less relative weight than the SDGs of the other categories because the People category weight was being divided among more

SDGs. The result was that all four of the Planet-category SDGs were elevated to the highest importance. The stakeholder-survey participants were not accounting for this mathematical bias in their voting, which led to skewed weights. Stakeholders' true sentiments would have reflected certain People-category SDGs elevated at the expense of the Planet category SDGs 14 and 15.

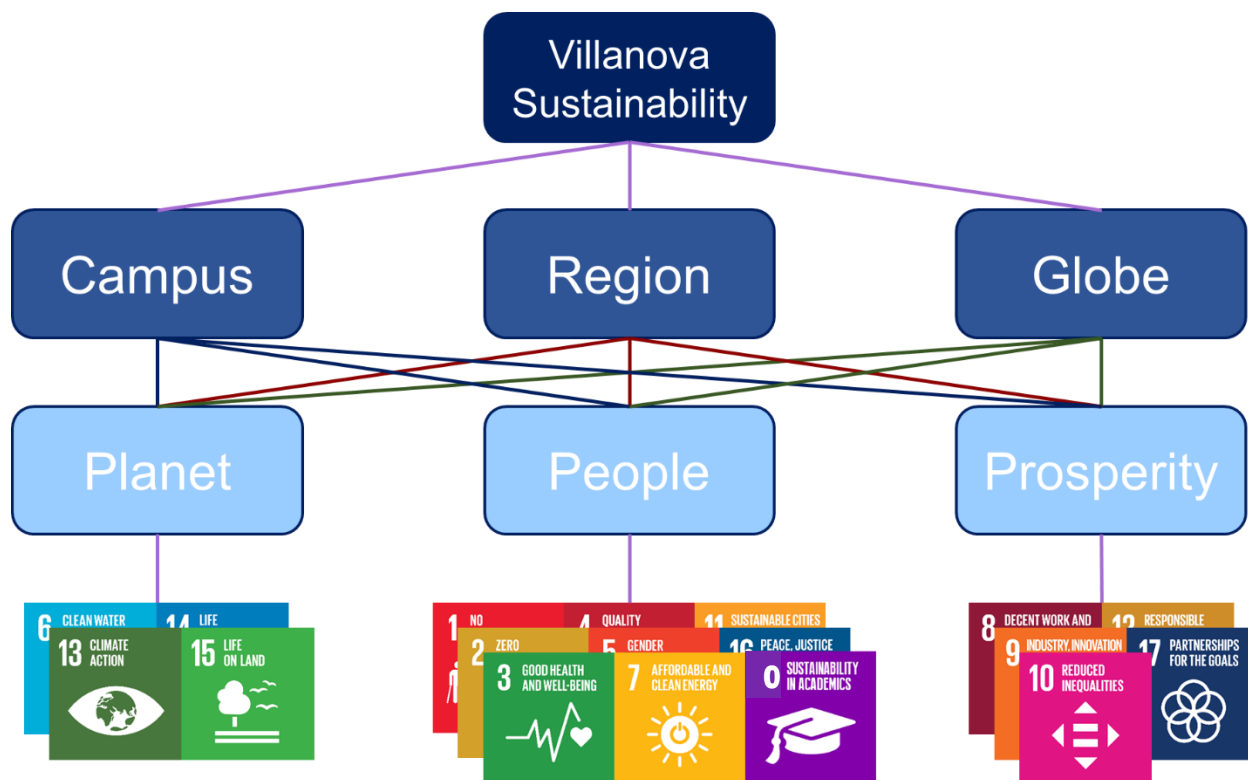


Figure 3.1. Hierarchy Used in the 2018 Villanova AHP Materiality Study.

The unintentional bias in the hierarchy was addressed by reorganizing and balancing the categories to each have an equal number of SDGs. To balance the categories, SDG 7: Clean and Affordable Energy and SDG 11: Sustainable Cities and Communities were moved from the People category to the Planet category; and SDG 16: Peace, Justice, and Strong Institutions was moved from the People category to the Prosperity category. SDG 7 was likely originally placed in the People category by Rockstrom and Sukhdev due to the affordability and availability aspects of energy consumption. However, in the United States, it is more relevant in the context of how clean/renewable the

The unintentional bias in the hierarchy was addressed by reorganizing and balancing the categories to each have an equal number of SDGs.

energy is, which justifies its recategorization into the Planet category. In the case of SDG 11, the metrics chosen for the Villanova Sustainability Plan were more environmentally oriented than socially oriented, justifying a recategorization into the Planet category. With the recategorization of SDG 16 into the Prosperity category, the redistribution was complete. With the new categorization, the Planet category contains Goals 6, 7, 11, 13, 14, and 15. The Prosperity category contains Goals 8, 9, 10, 12, 16, and 17. Finally, the People category contains Goals 1, 2, 3, 4, and 5, as well as Villanova’s custom Goal 0. The new hierarchy is displayed in Figure 3.2: Updated Villanova Materiality Study Hierarchy with Balanced Categories. This new even distribution of SDGs eliminated the mathematical bias that existed in the hierarchy previously.

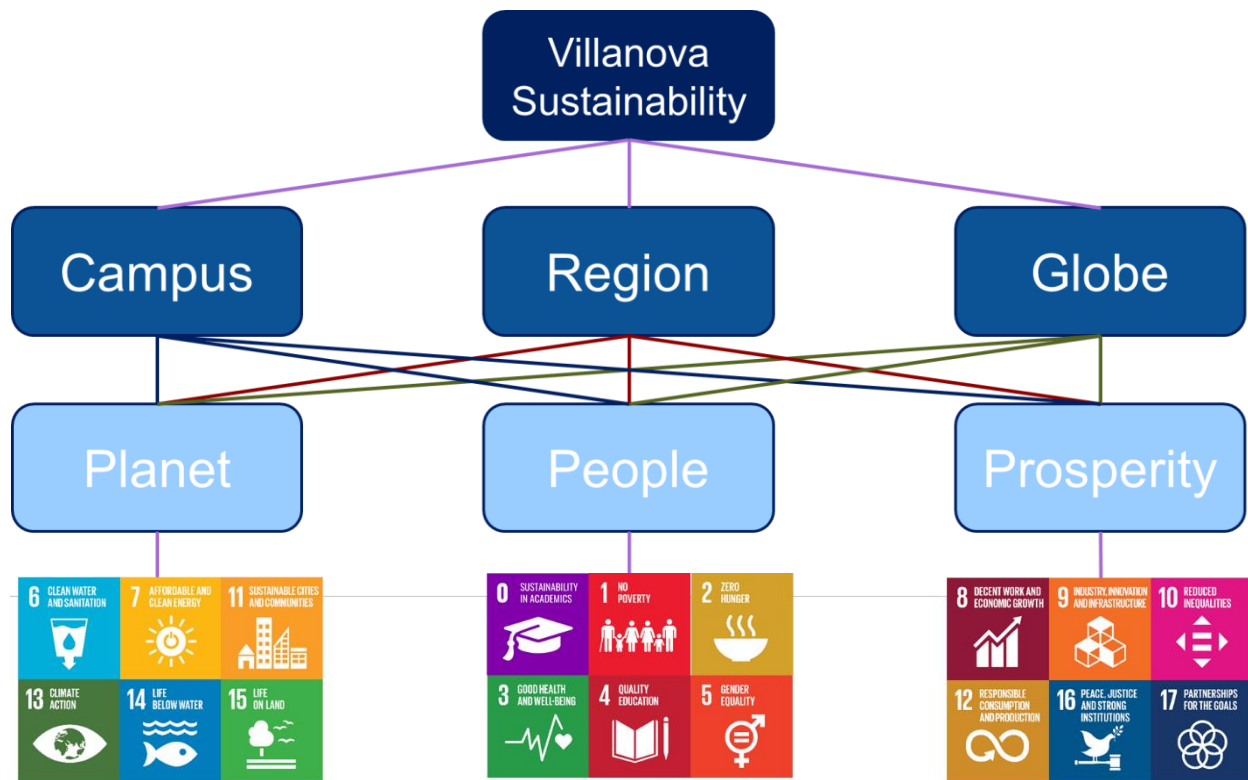


Figure 3.2: Updated Villanova Materiality Study Hierarchy with Balanced Categories.

3.1.2 CONDUCTING THE SURVEY

For this 2022 Addendum, the AHP was conducted differently than originally detailed in Section 2.1 of the original Sustainability Plan. In 2018 and 2019, live stakeholder sessions were held with the Villanova Sustainability Leadership Council (VSLC), dining staff, former members of the

President's Environmental Sustainability Committee (PESC), members of the VSLC committees, grounds staff, custodial staff, and elective sessions for faculty, staff, and students. In 2021, the AHP was updated without conducting in-person sessions with stakeholders due to COVID-19 concerns. Instead, the survey was built using the survey platform Qualtrics with the assistance of the Villanova Office of Strategic Planning and Institutional Effectiveness (OSPIE). The question format remained unchanged from that of the baseline Materiality Assessment in 2018/2019. The removal of live sessions eliminated the participants' ability to ask clarifying questions of the research team. However, this issue was proactively alleviated by providing detailed instructions to participants before conducting the survey, including informational material about the process, how to answer the questions, and the SDGs themselves.

The survey was distributed to the VSLC and committee members on a mandatory basis as well as to a random sample of undergraduate and graduate students. Additionally, the survey was made available to take on a voluntary basis, advertised in university communications channels, and promoted by the VSLC members. Three classes were asked to complete the survey as part of their coursework: undergraduate theology courses *Social Justice in Sustainability* and *Stewardship of Creation: Sustainability and Environmental Justice*, and the graduate engineering course *Fundamentals of Sustainable Engineering*. Each course was taught by one or both of the VSLC co-chairs, William Lorenz, and Fr. Art Purcaro, OSA. In total, more than 400 participants took the survey, an improvement in participation from the baseline AHP in 2018. Going forward, the enterprise software produced by Ethos Sustainability Solutions will be used to conduct the AHP Materiality Study at the Sustainability Plan's halfway point, and participation can be increased further, potentially to include stakeholders beyond Villanova's campus. Implementing more inclusive and equitable best practices in the representation of stakeholders participating in future AHPs is also under consideration. The enterprise software is further discussed in Section 5.

3.1.3 MATERIALITY STUDY UPDATE RESULTS

The results from these stakeholder groups seen in Figure 3.3 are organized by the categories of People, Planet, and Prosperity. The People category was weighted the highest at 38.0%, down from 41.4%. The next highest priority was the Planet category at 34.9%, down from 37.3%, followed by Prosperity with a weight of 27.2%, up from 21.3%. This is a more balanced weighting

of each category. In conjunction with the reconfiguring of the SDGs in each category, the weights of Goals are more evenly distributed as well.



Figure 3.3. Weight of Each SDG by Category Based on Stakeholder Input.

Table 3.1: New Materiality Weights for 2021, sorted by weight. Cyan SDGs are in the Planet Category, blue in People, and green in Prosperity.

All Participants 2021		
Goal	Description	Weight
Goal 13	Climate Action	8.8%
Goal 6	Clean Water and Sanitation	8.4%
Goal 2	Zero Hunger	8.3%
Goal 1	No Poverty	7.6%
Goal 7	Clean and Affordable Energy	7.1%
Goal 3	Good Health and Wellbeing	6.6%
Goal 10	Reduced Inequalities	6.2%
Goal 11	Sustainable Cities and Communities	5.9%
Goal 12	Responsible Consumption and Production	5.5%
Goal 16	Peace, Justice, and Strong Institutions	4.8%
Goal 4	Quality Education	4.7%
Goal 5	Gender Equality	4.4%
Goal 8	Decent Work and Economic Growth	4.3%
Goal 15	Life on Land	4.2%
Goal 9	Industry, Infrastructure, and Innovation	3.7%
Goal 14	Life Below Water	3.6%
Goal 0	Sustainability in Academics	3.3%
Goal 17	Partnerships	2.8%

3.2 METRICS UPDATE

3.2.1 WEIGHTING METRICS

The weights of each metric remain unchanged from the weights set by the VSLC in 2018 to maintain consistency and continuity in the scoring system. The weights of the SDGs are allowed to change with updating priorities via the AHP, but the metric weights remain constant. At the halfway point of the Sustainability Plan (2024-2025), a larger metric change may take place. The metrics should be reassessed to determine if they are still relevant, worth measuring, and able to be measured. Metrics can then be eliminated or replaced if they are not contributing effectively to the Sustainability Plan.

3.2.2 SCALING METRICS

After metrics were selected and weighted, they were scaled for Villanova to determine how well it is performing on each metric and in each objective. To determine the scale for each metric, the Research Team gave each an upper and lower bound. The upper bound indicates the best performance, and the lower bound represents the worst performance. The Research Team 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:

- Ideal target set by UN SDGs
- The principle “No person left behind”
- Science-based target
- Bottom or top 2.5th percentile of universities
- Bottom or top 2.5th percentile of non-university performers

Following this structure, the upper and lower bounds for each metric were reviewed and updated by the Research Team during Spring and Summer 2021. This updated information is presented in *Appendix A*.

3.3 SCORE UPDATE

The 2021 updated intermittent score for Villanova is 42.4% using the new 2021 materiality weights, or 44.6% using the baseline 2018 weights. Both of these intermittent scores reflect an increase from the baseline score of 33% in 2018. The score is computed with the old weights to show the marked improvement during Phase I, and with the new weights to set effective key results for the upcoming Phase II of the Sustainability Plan. These intermittent scores convey progress on two different standards: the Sustainability Plan is 44.6% complete in achieving its original vision for an ethos of sustainability on campus, and Villanova is currently 57.6% away from achieving its updated, current vision for an ethos of sustainability on campus. The current vision as represented by the 2021 AHP results is the driver for Phase II key results and projects.

These intermittent scores convey progress on two different standards: the Sustainability Plan is 44.6% complete in achieving its original vision for an ethos of sustainability on campus, and Villanova is 57.6% away from achieving its updated, current vision for an ethos of sustainability on campus.

Gains have been made in 14 of the 18 SDGs, as displayed in Figure 3.4, using the weights from the original baseline materiality study. Slight regressions were captured with new data for SDG 9: Industry, Innovation and Infrastructure, SDG 16: Peace, Justice, and Strong Institutions, and SDG 17: Partnerships. A larger decrease in score was observed for

SDG 13: Climate Action, marked in yellow. This was due to an improvement in the accounting for Scope 3 carbon emissions. Villanova has a better understanding of its size of Scope 3 emissions, which are higher than was accounted for in 2018. Despite the appearance of a decrease in the University's performance, the renewable energy contract signed in 2019 drastically improved the University's Scope 2 emissions. SDG 13's decrease in score is due in part to better accounting of Scope 3 emissions yielding a higher maximum score, not solely an increase in emissions. Future Sustainability Plan updates and addendums will likely present similar narratives as the global

Despite the appearance of a decrease in the University's performance, the renewable energy contract signed in 2019 drastically improved the University's Scope 2 emissions.

knowledge around Scope 3 reporting is expected to increase, and reporting standards are expected to change.

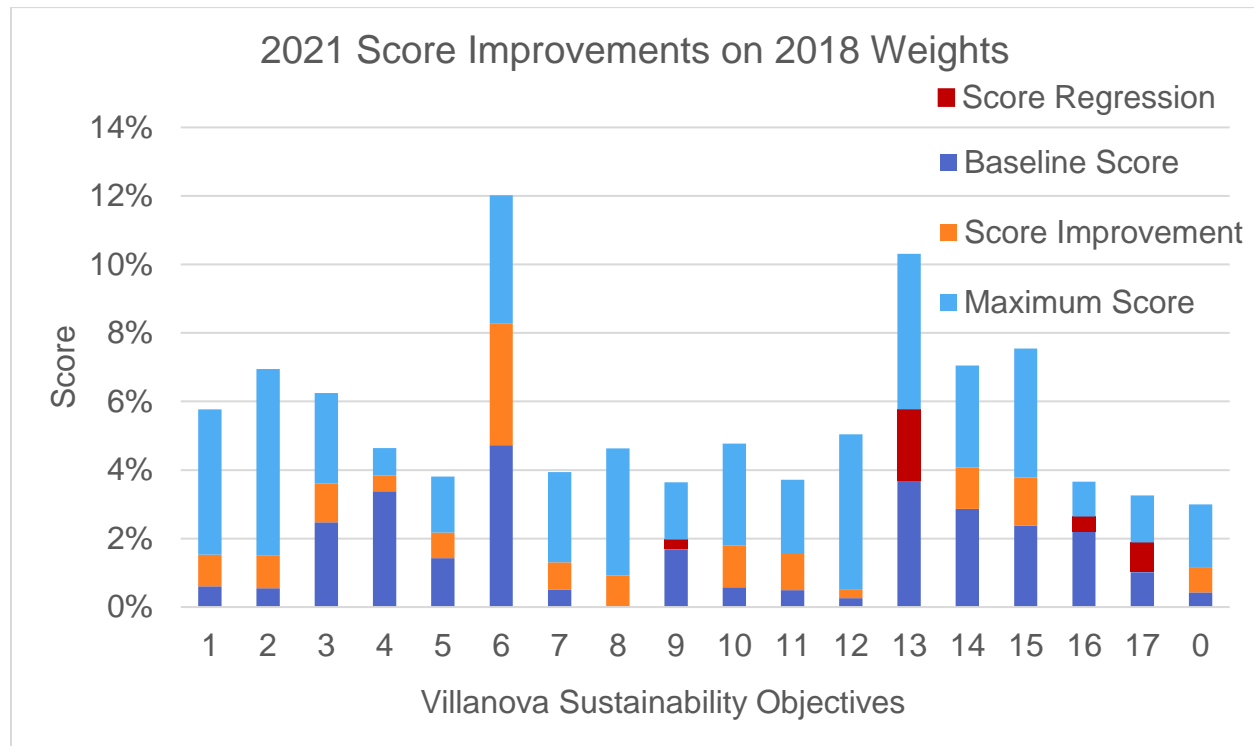


Figure 3.4: Score improvements from 2018 to 2021 by SDG.

Villanova’s overall score can be broken down by the score of each objective (adopted from the UN SDGs), each category (Planet, People and Prosperity), or each metric (measuring progress of Key Results), and compared to the maximum score obtainable for each objective, category, or metric (see Figure 3.5. Score in 2021 Compared to the Maximum Score by People,

The difference between the maximum score and its baseline or intermittent score is the score available.

Planet and Prosperity Categories. Slight discrepancies in percentages are due to rounding., Figure 3.6. Score in 2021 Compared to the Maximum Score by Objective/SDG. and Figure 3.7). The maximum score is determined by the target Villanova strives to achieve per objective or metric, such as the upper-bound target living wage. These targets are provided in *Appendix A*. The difference between the maximum score and its baseline or intermittent score is the score

available. Alongside the AHP weightings, score available can be used to evaluate which areas of sustainability Villanova needs to focus on the most.

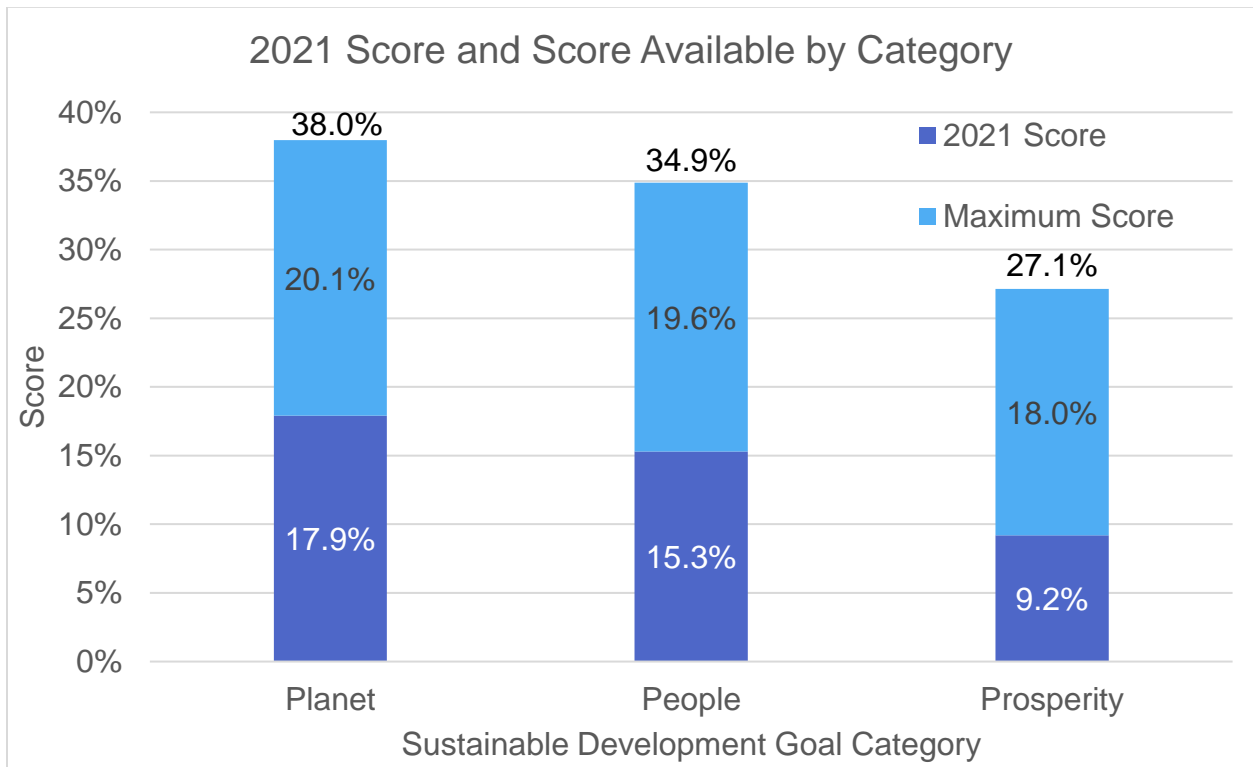


Figure 3.5. Score in 2021 Compared to the Maximum Score by People, Planet and Prosperity Categories. Slight discrepancies in percentages are due to rounding.

Despite certain categories and objectives having higher weights than others, the difference in weight does not necessarily reflect the score available. For example, the Planet category is weighted about 11% higher than that of Prosperity. However, the Planet's available score is 20.1%, whereas Prosperity's score is 18.0%. These scores indicate that, although stakeholders think the Planet category is more important than the Prosperity one, Villanova needs to improve in the latter nearly as much as they do in the former as they work toward their ethos of sustainable living at and beyond campus (see Figure 3.3. Weight of Each SDG by Category Based on Stakeholder Input).

Figure 3.6. Score in 2021 Compared to the Maximum Score by Objective/SDG. shows the 2021 updated score and score available for each metric, ordered by Goal. Goals 1, 2, and 13 have

Waste, particularly food waste, is a large area of concern...Ambitious key results and projects were created for these goals because Villanova is underperforming against them.

some of the highest-priority metrics. Many of these metrics have a large score available due to lack of data or generally low-scoring performance. Waste, particularly food waste, is a large area of concern for the Villanova community and one in which it desires to make progress. The large score available for these goals is reflected in the Key Results and

Projects created for 2020–2021. Ambitious key results and projects were created for these goals because Villanova is underperforming against them, and they are of higher importance to stakeholders (see *Appendix A* and *Appendix B*).



Figure 3.6. Score in 2021 Compared to the Maximum Score by Objective/SDG.

Prioritizing metrics and objectives by “Score Available” highlights where immediate action is needed to achieve an ethos of sustainability by 2030.

Although metrics and goals with a larger score available are prioritized for sustainable actions, metrics and goals with a smaller score available are still important. Villanova is striving for an ethos of sustainable living on campus and for an overall

score of 100%. Achieving an ethos of sustainable living on campus will require significant progress on all goals across all categories. Therefore, the score available simply indicates areas where Villanova can make greater improvements. As Villanova works toward closing the score gap on these metrics, other metrics may become those with the highest score available and the priority list will adjust accordingly. 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 an ethos of sustainability by 2030. Note that the wording of metrics 5.1, 7.4, and 14.1 have been updated by the SLC as part of the 2022 Addendum efforts.

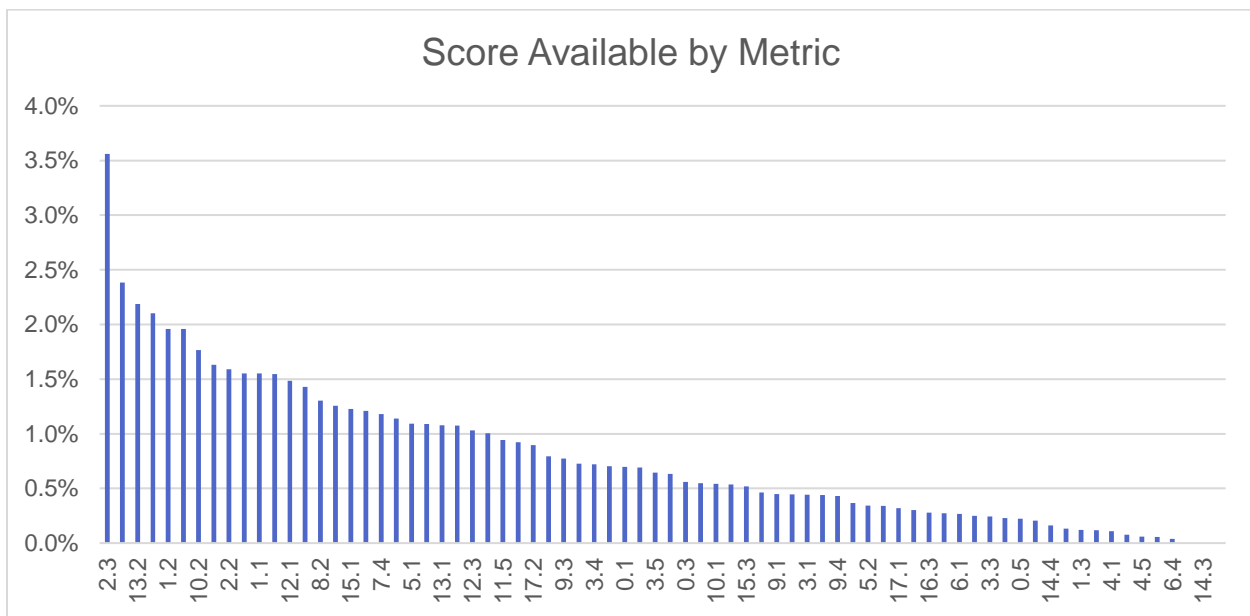


Figure 3.7. 2021 Score Available by Metric.

3.3.1 SCORING METRICS WITHOUT DATA AVAILABLE

The increase in data availability was largely due to the completion of a campus waste audit, better data acquisition, and lessons learned from Phase 1 (2018-2021).

Data was collected for all possible metrics. Although some of the metrics chosen do not have data, the VSLC recognized that they are essential to determining if Villanova is meeting its sustainability goals. Therefore, systems were created to measure these metrics in the first two

years of the Sustainability Plan. Of the selected metrics, 81% present data. This is an increase from 2018’s baseline of 65% noted in the Sustainability Plan. The increase in data availability was largely due to the completion of a campus waste audit, better data acquisition, and lessons learned from Phase 1 (2018-2021). Figure 3.8. Data Availability of Metrics. 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.

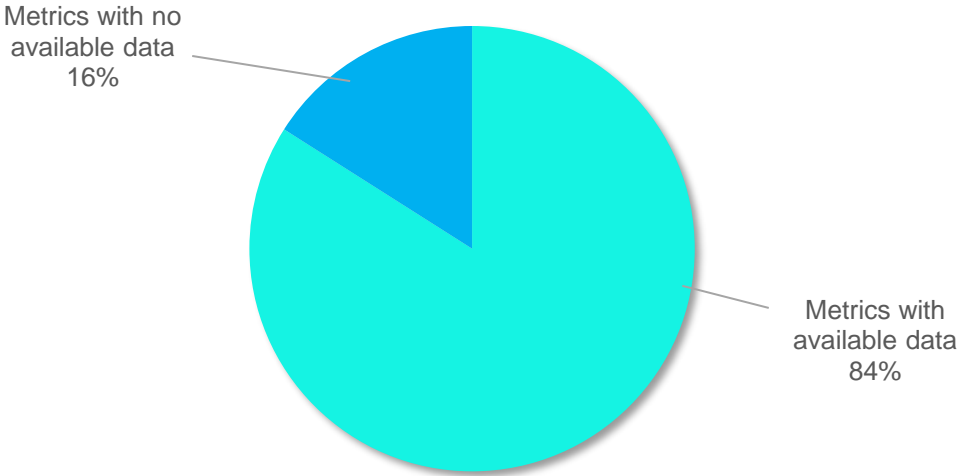


Figure 3.8. Data Availability of Metrics.

4 UPDATING KEY RESULTS

A key piece of the Sustainability Plan methodology is to create key results by specifically setting quantifiable, three-year goals that the University wants to achieve to increase the overall score. Key results are checkpoint goals considering *how* the University wants to achieve its objectives in a certain time span. Key results are action oriented and are worded in such a way that its achievement can be determined. More information on the process of setting key results is in Section 2.4 of the Sustainability Plan. As part of this 2022 Addendum, the VSLC created new key results for the 2021-2024 timeframe, or Phase 2 of the Sustainability Plan.

To determine the new 2024 key results, the VSLC evaluated progress on the 2021 key results and considered both the updated weights of the objectives and metrics and the availability of data for the metrics. Key results were primarily created for the 2022–2024 timeframe, with some consideration given to the existing key results for 2025–2027 and 2028–2030. The key results for 2022–2024 were based on three main criteria: (1) aligning with the community priorities resulting from the AHP, (2) obtaining all data needed to measure metrics, and (3) focusing on metrics with the largest available score. Considering these criteria, the VSLC created ~50 key results for 2022–2024 (Table 4.2). These key results are short-term steps to reach the University’s goal of creating an ethos of sustainable living at and beyond campus. Projects will denote *how* key results will be achieved and thereby increase the overall score.

4.1 VILLANOVA SUSTAINABILITY LEADERSHIP COUNCIL AND COMMITTEES

To achieve an ethos of sustainability as measured by the scoring system in the Sustainability Plan, Villanova created the VSLC, a governmental structure that develops key results and implements projects. The VSLC, which is supported by five committees, comprises of 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.

The chairs and co-chairs of the VSLC are listed in Table 4.1. 2021 VSLC Membership.

Table 4.1. 2021 VSLC Membership.

Name	University Position	VSLC Position
William Lorenz	Faculty	Co-chair
Art Purcaro, OSA	Staff	Co-chair
Robert Morro	Staff	Operations Committee Chair
Joseph Lennon	Faculty	Academics and Research Co-chair
Alfonso Ortega	Faculty	Academics and Research Co-chair
Kathryn Getek Soltis	Staff	Social Justice Committee Chair
Liesel Schwarz	Staff	Student Life Committee Chair
Stacy Andes	Staff	Health and Well-Being Committee Chair

In Spring 2019, the 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. The VSLC also drafted key results for the years 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, the 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 the VSLC 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.

Committees are to consider the key results crafted by the VSLC and brainstorm projects that achieve these key results, thereby effectively improving the metric scores and creating a more sustainable campus. The 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 the 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 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.

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 the VSLC members, key results are achieved through projects created and implemented by the committees. Below is the list of key results that were approved for each committee by the Council for the 2022-2024 timeframe, Phase 2 of the Sustainability Plan. These key results will be critical for setting projects to achieve them. Phase 2 project will be finalized in the later months of 2022.

The Student Life Committee has decided to forego key results for this phase of the Sustainability Plan and instead plans to provide support to other committees to accomplish their goals. The decision was made based on student turnover rate and the volunteer nature of the committee. Student Life in partnership with the VSLC is launching the UNITAS Commitment: promoting sustainable lifestyles to establish an ethos of sustainable living at and beyond campus.

Some key results and projects that have longer-term outcomes or were affected by the COVID-19 pandemic will be continued in the next phase of the Sustainability Plan. A list of all projects will be updated as projects are completed, and more are formed. Updates to the success of the projects will also be stated. These updates will be in *Appendix C*; however, no update to *Appendix C* was made for this 2022 Addendum as project updates were not finalized at the time of this publication. *Appendix C* of the Sustainability Plan contains each Phase I Project's details, team members, cost estimates, estimated score improvement, milestones, and integration into Villanova's Strategic Plan.

Table 4.2: Operations Committee 2024 Key Results.

Operations Committee	
Metric	2024 Key Result
6.3	Develop a comprehensive stormwater assessment and plan.
7.1	Buy 100% of electricity from renewable sources with Green-e certified recs and additionality.
7.3	Understand the sustainability of the investments and work to divest from negative influencing companies.
7.4	Reduce fleet emissions by 25%
9.3	All new buildings and whole building renovations to be built to at least LEED silver standard.
12.1	Overall reduction in waste generation by 33% excluding construction waste (based on waste audit)
12.2	Divert 90% of pre-consumer and 25% of post-consumer food waste from landfill.
12.4	Develop framework for calculating comprehensive scope 3 emissions reductions Conduct a baseline sustainability assessment of our procurement. Implement sustainable language in written procurement strategy.
13.1	Reduce scope 1 emissions to achieve 50% overall carbon reduction by 2030. Develop a steam plant transition plan and feasibility study. Buy 100% of electricity from renewable sources.
13.2	Conduct a comprehensive scope 3 emissions inventory. Evaluate reductions to achieve 50% overall GHG emissions by 2030.
13.3	Comprehensive resilience strategy with 50% implementation.
15.1	Implement the Villanova Biodiversity plan to increase native species while sequestering additional carbon.

Table 4.3: Social Justice Committee 2024 Key Results.

Social Justice Committee	
Metric	2024 Key Result
1.1	Raise faculty and staff wages to MEET the MIT living wage (including benefits?) Raise student wages to \$10/hr. minimum
1.2	N/A
1.4	Implement a contractual agreement for a living wage for all tier 1 suppliers.
10.2	Align with targets of Aequitas committee
10.3	Align with targets of Aequitas committee
12.4	Develop framework for calculating comprehensive scope 3 emissions reductions Conduct a baseline sustainability assessment of our procurement. Implement sustainable language in written procurement strategy. Asset recovery from vendors (pallets). Use sustainable brands for sponsored clothing

Table 4.4: Health and Well-Being Committee 2024 Key Results.

Health & Well-Being Committee	
Metric	2024 Key Result
2.1	Awaiting survey results to establish KR 2024
2.2	Analyze existing survey data (students and employees) and NovaFit data (employees) to establish interventions, in partnership with the Center for Obesity Prevention and Education (COPE).
3.1	Analyze existing survey data to establish KR for 2024
3.2	Analyze inventory/audit of existing initiatives and interventions to identify gaps and opportunities
3.3	All graduate students, financially dependent on the University (stipend students), have access to comprehensive affordable health care through the University. Expand awareness and/or access to university health and well-being resources
3.4	N/A
3.5	Analyze existing data to establish KR 2024
3.6	Analyze existing data to establish KR 2024
5.1	Establish a baseline, normative range per capita to reduce incidence
16.1	Maintain high level of safety Identify disparities in feelings of safety among underrepresented, marginalized students and employees
16.3	Add questions to the climate survey to better represent satisfaction with Villanova's administrative justice. Implement gaps identified in the survey

Table 4.5: Academics and Research Committee 2024 Key Results.

Academics and Research Committee	
Metric	2024 Key Result
0.1	<p>Integrate sustainability into the common core.</p> <p>Integrate sustainability learning outcomes into core course requirements for all students</p> <p>More sustainable development/engineering courses for undergraduates</p>
0.2	<p>Launch Institute</p> <p>Director of Institute + One Staff member</p> <p>Fund four Faculty Fellows</p> <p>Fund four summer research projects</p> <p>Make funds available for integrating sustainability into courses in Engineering (EOP), Business, Law, Nursing</p>
0.3	Implement a sustainability literacy assessment for use at the 2022 orientation program
0.4	25% of students graduating from programs with sustainability learning outcomes
0.5	25% of research-producing departments that are engaged in sustainability research
1.3	N/A
4.3	Make continuing progress towards 2030 goal of meeting 100% of demonstrated financial aid while remaining need blind in admissions
4.4	Expand applicant pool to reflect demographics of top 4-year national college applicants.
16.4	N/A
17.3	Increase 10% above current baseline

4.3 PROJECT EVALUATION AND SELECTION

A necessary component 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 the sustainability projects. The diversity of the committee members and their expertise allowed for the development of a wide range of projects that moved Villanova towards achieving the 50 key results. Certain key results are more ambitious in terms of the resources needed to achieve them. Due to obstacles posed by required financial investments as well as upholding continuity during graduate student turnover, efforts surrounding the completion of projects will need to be strategically planned.

After the 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 2022–2024, others have a longer time span 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 results to the project shows the vast interconnectivity of the methodology and allows for the committees to creatively achieve the key result set by the VSLC in whichever way the committees deem most efficient. Please reference *Appendix C* of the Sustainability Plan for a full project list.

4.3.1 PROJECT SCORE IMPROVEMENT

To aid in project selection, council members used the Pahl and Beitz method to evaluate the degree to which each project could improve Villanova's score. In this method, the alternatives—the sustainability projects—are assessed against a set of weighted criteria, or metrics. The metrics were already weighted from the materiality study discussed above. More detailed information on the Project Score Improvement process can be found in Section 2.5.1 of the Sustainability Plan.

4.3.2 STRATEGIC PLAN INTEGRATION

Villanova's Strategic Plan, *Rooted. Restless*, lists sustainability as one of its foundational elements for the next decade. Many key results and projects proposed in the Sustainability Plan align with the efforts of the Strategic Plan. To capture this alignment, the VSLC matched each

sustainability project with 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 scored 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 4.1. 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.

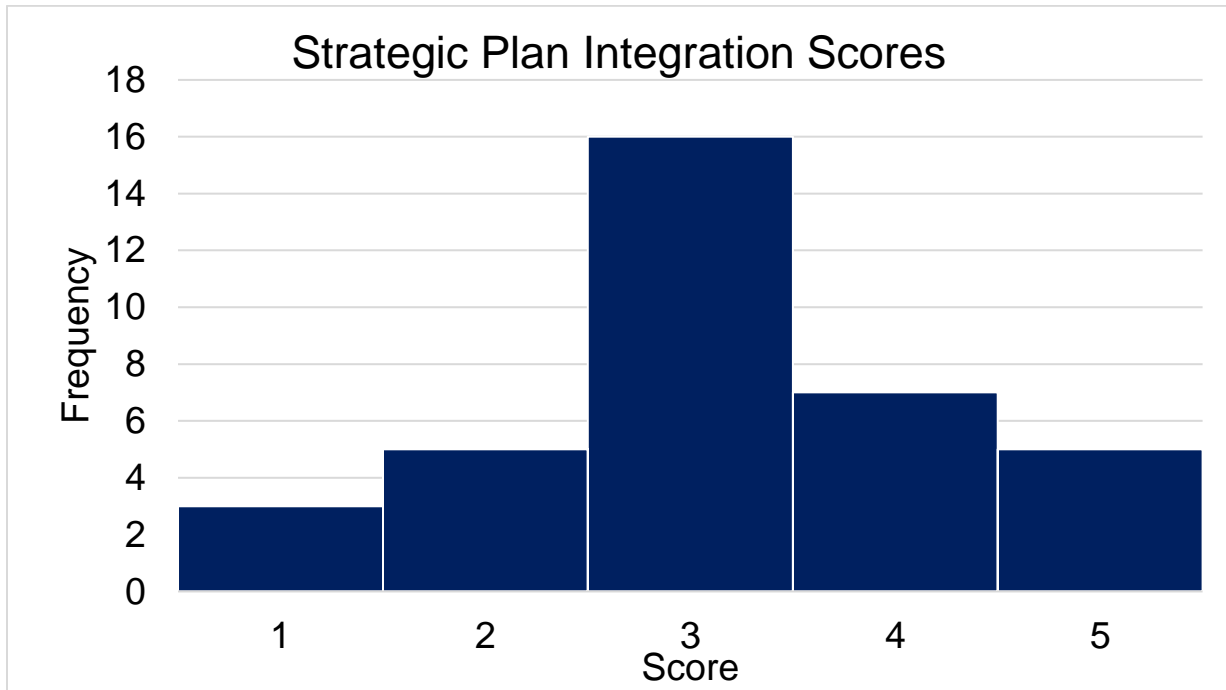


Figure 4.1. Strategic Plan Integration for Projects in the 2021 Key Result Period.

5 SOFTWARE

An integrated three-tier approach was created to achieve an ethos of sustainable living on campus. The three tiers are personal, community and institutional. A visual representation can be seen in Figure 5.1. 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. The personal tier is focused on individual actions that bring about positive environmental change or reduce environmental impact. The community tier is dedicated to educating groups of people about ways they can work together to reduce their collective negative impact. Lastly, the institutional tier uses advanced analytical tools and stakeholder engagement to measure and address the impact of the University as a whole.

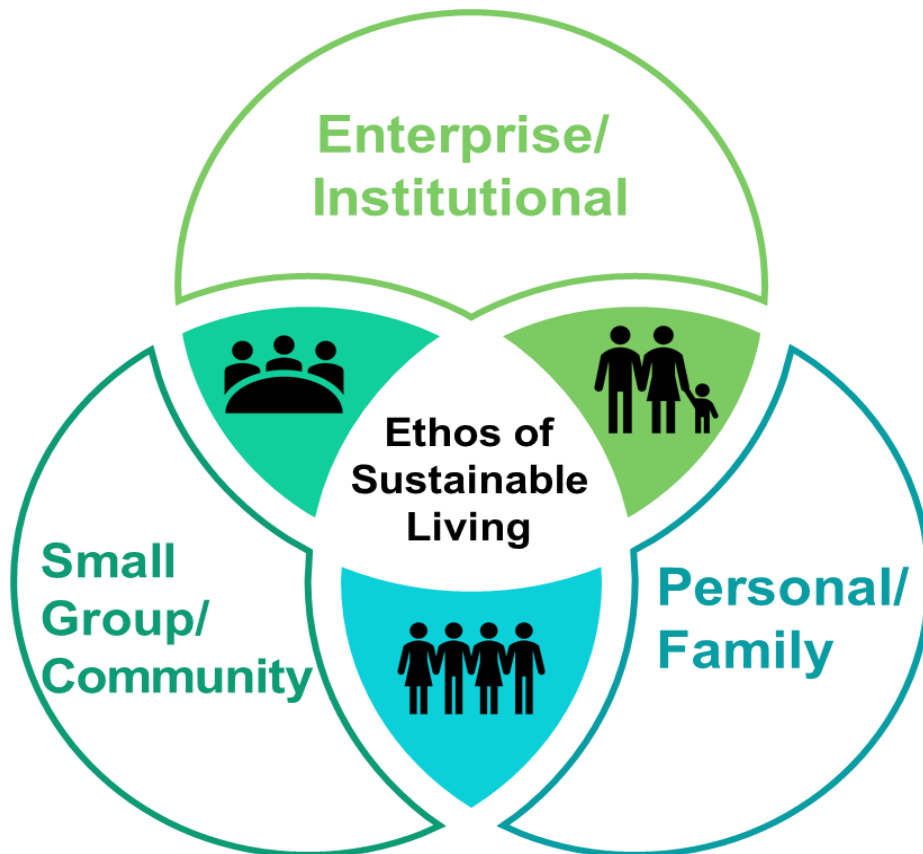


Figure 5.1. Three-Tier Approach to Sustainable Action.

During the process of developing the Villanova Sustainability Plan, and as a direct result of the generous financial support of the DiLoreto family, two software platforms were created to help

foster an ethos of sustainable living on Villanova's campus. The two software platforms are already being utilized at Villanova and are being offered externally to allow for Villanova's three-tiered sustainability planning and management methodology to be used by others.

The enterprise-oriented platform by Ethos Sustainability Solutions was designed to automate much of the measurement and management process involved in creating the Villanova Sustainability Plan. This includes the AHP Materiality Assessment, metric and data analysis, key result creation, and project management. This software platform will increase the ease with which the committees can track and report on their progress, allowing Villanova's sustainability score to be updated with a greater frequency than during the first key result phase.

The second software outcome of the DiLoreto research initiative and the Villanova sustainability planning process is a mobile phone application, *Pathways by Ethos*, designed to help users measure and manage their personal carbon footprints. For Villanova to meet its sustainability goals, it is vital that every member of the community works to ensure that they are lowering their footprint in concordance with Villanova's larger sustainability projects. The mobile application utilizes a state-of-the-art footprinting assessment, tools for users to track their carbon emissions over time, actions and challenges designed to instruct users to lower their footprints, and the ability to compete with others.

Released to the public in March 2022, the mobile application was piloted by students in the THL 4100 class taught by William Lorenz and Fr. Arthur Purcaro. The mobile application will be introduced to incoming students in the freshman orientation for the class of 2026.

APPENDIX A: OBJECTIVE, METRIC, AND KEY RESULT DETAILS

This appendix includes the following:

Table A.1: A table of Villanova objectives adjusted from UN SDGs.

Table A.2: A table of metrics with their unit, bounds, baseline value in 2018, maximum score, and intermittent score.

Table 0.1. 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 its 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	Improve the value of a Villanova education and increase its accessibility to all groups of people.
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 0.2. Details of Metrics, Including Description, Unit, Bounds, Intermittent Value, Maximum Score, and Intermittent Score

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
0.1	Percentage of courses that include sustainability learning outcomes encompassed by the SDGs.	%	31%	0%	5.24%	0.84%	0.14%
0.2	Incentives for faculty across all disciplines to incorporate sustainability into existing courses or develop new sustainability courses.	\$ per course	\$2,000	\$0	\$2,500	0.47%	0.47%
0.3	Existence of, and performance on, a sustainability literacy assessment for students.	%	100%	0%	0%	0.56%	0.00%
0.4	Percentage of students who graduate from programs that have adopted at least one sustainability learning outcome	% of Programs	100%	0%	15.82%	0.65%	0.10%
0.5	Percentage of research-producing departments that are engaged in sustainability research	%	100%	0%	71.9%	0.79%	0.57%
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%	25%	2.46%	0.91%
1.2	Minimum hourly earnings (lowest pay band) of employees disaggregated by students, part time, and full time.	\$/hr.	\$15	\$7.25	\$7.25	1.96%	0.00%
1.3	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	\$	\$66,400.00	\$32,000.00	\$63,061.00	1.23%	1.11%
1.4	Proportion of procurement expenses from tier 1 suppliers that have living wages or equivalent for its employees.	%	100%	0%	0%	1.96%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
2.1	Prevalence of moderate or severe food insecurity in the university population, based on the Food Insecurity Index.	%	0	48.0%	22.0%	3.12%	1.69%
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	59	59	1.59%	0.00%
2.3	Percentage of food disposed of in a non-circular manner.	%	0%	100%	97%	3.56%	0.11%
3.1	Harmful drug misuse 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%	28.85%	1.53%	1.09%
3.2	Percentage of sexually active students practicing safer sex and prevention of STDs (condoms, or abstinence).	%	100.00%	0.00%	49.0%	1.05%	0.52%
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%	1.21%	0.97%
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	24	0	11.5	1.38%	0.66%
3.5	Proportion of students, faculty, and staff receiving age-appropriate sleep per night during the semester.	%	100%	0%	0%	0.64%	0.00%
3.6	Brief Inventory of Thriving.	Brief Inventory of Thriving Scale	6	1	4.61	0.82%	0.59%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
4.1	Graduation rate of Villanova undergraduate students in 6 years.	%	100%	20%	87%	0.67%	0.56%
4.2	Average starting salary of undergraduates going into the workforce and full-time graduate students in their field of study.	\$	\$66,400	\$32,200	\$63,061	0.56%	0.50%
4.3	Net annual aid for first-time, first-generation students whose family earnings are in the lowest income bracket of reported to IPEDs.	\$	\$58,290	\$4,206	\$51,739	1.08%	0.95%
4.4	Proportion of student population made up of underrepresented groups: Black, Hispanic, Asian, Native American.	%	42.2%	0%	27.4%	1.32%	0.86%
4.5	Percent difference of graduation rate in 4 years of the underrepresented groups.	%	0%	100%	5.49%	1.05%	1.00%
5.1	Experiences of sexual violence, discrimination or harassment against students, staff and faculty.	%	100%	0%	3.88%	1.14%	0.04%
5.2	Average cost incurred by students, faculty, and staff to pay for dependent care while working at Villanova.	\$/year	-	\$48,000.00	\$20,000.00	0.82%	0.48%
5.3	Proportion of seats held by women in leadership positions on the President's cabinet, council of deans, and provost council.	%	50%	0%	32.73%	1.27%	0.83%
5.4	Satisfaction of female and male employees in their work environment, work policies, and with family friendly services and facilities at Villanova.	Score	6	1	4.6175	1.14%	1.14%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
6.1	Total potable water used per year.	gal/ weighted campus user	35.06	76,201.1	10183.35	2.00%	1.74%
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%	1.84%	1.64%
6.3	Percentage of rainfall captured from impervious surfaces on campus.	%	100%	0%	0	2.10%	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	81.34	1.25	2.46%	2.42%
7.1	Renewable energy share in the total campus energy consumption (Scope 1 and 2).	%	100%	0%	50%	2.42%	1.21%
7.2	Campus's energy intensity (site energy).	mmBtu/ GSF	0.021086	0.29865	0.13	1.79%	1.09%
7.3	Percentage of the institution's investment pool in positive sustainability investments.	%	45.18%	0%	0%	1.63%	0.00%
7.4	Percentage of vehicles in the Villanova fleet that are 100% electric.	%	100	0	3.54%	1.22%	0.04%
8.1	Annual growth rate of Villanova total revenue per employed person (\$/full time employee equivalent).	\$	7.80%	0	-1%	0.73%	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	1.30%	0.00%
8.3	Largest percent difference in attrition rates between genders and races.	%	0%	100%	100%	0.79%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
8.4	Recordable injury rate. (OSHA)	Cases/ 100 full time employees	0	2.8	1.29	0.59%	0.32%
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	11.50	0.87%	0.53%
9.1	Net carbon emissions emitted by student, faculty, and staff commuters.	MT CO2e/weighted campus user/ yr.	0	3.61	1.63	0.9964%	0.5476%
9.2	Scope 1 and 2 net greenhouse gas emissions.	MT CO2e/ weighted campus user/ yr.	0	13.32	4.13	0.97%	0.67%
9.3	Percentage of campus building built and certified to current sustainable standards. (AASHE and LEED as of 2019)	%	100.00%	0.00%	18.9%	0.95%	0.18%
9.4	Percentage of students and faculty actively engaged in research.	%	100.00%	0	41%	0.73%	0.30%
10.1	Proportion of students and employees that earn below a living wage.	%	0%	100%	25%	2.17%	1.63%
10.2	The average diversity level of new hires for each "band" of jobs hired on a five-year rolling basis.	%	100%	0%	0.00%	1.76%	0.00%
10.3	Proportion of minority members in leadership positions on the President's cabinet, council of deans, and council of provosts.	%	41.50%	0%	12.73%	2.23%	0.68%
11.1	Proportion of non-utility and non-maintenance projects that have stakeholder input from students, faculty, and staff.	%	100%	0%	100.00%	0.94%	0.94%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
11.2	Indoor and outdoor air quality based on EPA and OSHA regulations	AQI	0%	500	500	1.07%	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%	0.00%	1.01%	0.00%
11.4	Percentage of campus managed under sustainable landscape management practices.	%	100%	0%	65%	1.28%	0.84%
11.5	Proportion of commuter miles traveled using low carbon transportation (public transit, carpooling, walking, biking, and electric vehicles).	%	100%	0%	43%	1.64%	0.70%
12.1	Proportion of total waste disposed of in a non-circular manner.	%	0%	100%	80.00%	1.48%	0.30%
12.2	Percentage of food disposed of in a non-circular manner.	%	0%	100%	97.00%	1.26%	0.04%
12.3	Campus recycling rate.	%	100%	0%	20.00%	1.19%	0.24%
12.4	Proportion of campus products sourced sustainably as verified by third party certifications.	%	100%	0%	0.00%	1.55%	0.00%
13.1	Scope 1 and 2 net greenhouse gas emissions.	MT CO2e per weighted campus user	0	13.32368	4.13	3.47%	2.39%
13.2	Scope 3 net greenhouse gas emissions.	MT CO2e per weighted campus user	0	3.61	2.70	2.93%	0.74%
13.3	Degree of implementation of an up-to-date integrated climate change and disaster resilience strategy.	% Implementation	100%	0%	0.00%	2.38%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
14.1	Annual mass of nitrogen used in fertilizer on campus.	N lb./acre	0	55.98	18.2	0.76%	0.52%
14.2	Percent of unrecycled plastic waste produced on campus.	%	0%	100%	100.00%	1.09%	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%	0.85%	0.85%
14.4	Load of pollutants in runoff.	%	100%	0%	81.00%	0.85%	0.68%
15.1	Carbon sequestered per year by Villanova's campus ecosystem.	MTCO2e	15755.13	0	351	1.25%	0.03%
15.2	Portion of campus considered Green space and/or covered by trees. Includes green roofs.	%	28%	0%	52.00%	1.03%	1.03%
15.3	Proportion of campus biosphere considered to be an alien or invasive species.	%	0%	100%	58.00%	0.90%	0.38%
15.4	Percentage of campus managed under sustainable landscape management practices or an equivalent third-party certification.	%	100%	0%	65.28%	1.06%	0.69%
16.1	Proportion of population that feel safe walking alone around the campus.	%	100%	0%	94.00%	1.25%	1.18%
16.2	Annual crime rate per capita on Villanova's campus.	crimes/ 1,000 students	0.05	117.82	54.75	1.36%	0.73%
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%	77.75%	1.25%	0.97%
16.4	Proportion of campus departments that adopt and implement policies that guarantee public access to information.	%	100%	0%	0.00%	0.92%	0.00%

Metric I.D.	Metric Description	Unit	Upper Bound	Lower Bound	Intermittent Value (2021)	Metric Weight	Intermittent Score (2021)
17.1	University philanthropic contributions (hours) associated with advancing the UN SDGs.	hrs./student/year	51.07	0	29.00	0.74%	0.42%
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		0.90%	0.00%
17.3	Annual student, faculty, and staff hours spent on off-campus service-learning projects.	hours/student / year	51.07	0	20.18	1.14%	0.45%

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.

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 0.3. 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 0.3. 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 Association for the Advancement of Sustainability in Higher Education (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 0.4., is an example of one such metric.

Table 0.4. 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 0.5. and Table 0.6..

Table 0.5. 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 0.6. 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

APPENDIX B: GOAL SNAPSHOTS

No update to *Appendix B: Goal Snapshots* was included in the 2022 Addendum.

APPENDIX C: PROJECT DETAILS

At the time of the 2022 Addendum, the 2022-2024 projects had not been determined. Therefore, no update to *Appendix C: Project Details* was included in the 2022 Addendum. To ensure thorough project completion, a new format for project one-pagers has been outlined and will be released in 2023.

APPENDIX D: CARBON REDUCTION PLAN

The Sustainability Plan included a Carbon Reduction Plan for Villanova University Operations. The Carbon Reduction Plan has not been updated since the initial publication and was therefore not included in the 2022 Addendum. Please reference *Appendix D* of the Sustainability Plan for information on the Carbon Reduction Plan.

6 2022 ADDENDUM REFERENCES

Jessica Espey, Hayden Dahmm, & Laurie Manderino. (2018). Leaving No U.S. City Behind (p. 60). Sustainable Development Solutions Network. <http://unsdsn.org/wp-content/uploads/2018/06/US-Cities-Index-Report.pdf>

Rockstrom, J. (2016, June 14). How food connects all the SDGs—Stockholm Resilience Centre [Text]. <http://www.stockholmresilience.org/research/research-news/2016-06-14-how-food-connects-all-the-sdgs.html>