

SUST 6000 Class Project: Spring Term 2017

**Sustainability and New Building Construction
at the
University of Utah:**

A Progress Report

Submitted By:
Debolina Banerjee, Ruan de Lange, Brenden Femal,
Frode Jensen, Qwynne Lackey, Cody Lutz,
Sally Meehan, and Emily Post

May 1, 2017

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I. Introduction

The subject matter of this paper arose as a result of our class's investigation of the inversion and pollution problem in the Salt Lake Valley. Because of the importance of the University to the economic, environmental and social well-being of the metropolitan area, it was natural to consider how and to what extent the University is contributing to the overall environmental well-being and sustainability of the Valley. As our inquiry deepened we began to look into the University's efforts to reduce greenhouse gas emissions and promote energy efficiency on campus and this naturally led us to look at the sustainability of the University's built environment.

As part of this inquiry we learned that a new building currently under construction on campus, the Robert H. and Katharine B. Garff Executive Education Building (the Exec Ed Building) at the David Eccles School of Business (the Business School), was proposed to be built without obtaining LEED Silver certification, in seeming contradiction of the University's design requirements and sustainability policy. This interesting discovery led to this project, wherein the authors have attempted a comprehensive analysis of the history, background and extent of the University's commitment to sustainability, a deeper dive into the facts and circumstances surrounding the decision by the Business School to proceed with the Exec Ed Building without LEED certification, as well as the decision by the leadership of the S. J. Quinney College of Law (the Law School) to design and build its new building (the Law Building) to LEED Platinum standards.

These investigations have led to an analysis of the current process for designing and building sustainable buildings on campus and otherwise creating a more energy efficient and sustainable built environment, as well as an investigation into the opinions of students regarding whether the University is doing enough to live up to its commitment to sustainability, and thence, to this Report.¹²

II. Executive Summary and Conclusions

A. Background and Sustainability Commitment. The University and its presidents have a long history of concern about, and of addressing, environmental and conservation issues. The exploration and examination of the sustainable building process on campus which we have undertaken reveals that much progress has been made over the last ten years in particular in planning for, and building and maintaining, a more sustainable campus.

¹ The authors are grateful to the many members of the University family who assisted us in our learning process, including Matt Abbot, Robert Adler, Mikel Brownie, Robin Burr, Reyn Gallacher, Shireen Ghorbani, Bob Simonton, Amy Wildermuth, and Myron Willson. We are also grateful to our Professor, Brenda Bowen, for her encouragement and assistance, but this work product is all ours.

² A Power Point presentation summarizing our project is also attached to this Report as Appendix B.

In 2007, the University addressed the idea of “sustainability” directly, establishing the Sustainability Office of the University to be “a resource for the students, faculty, staff and our community...to support the University’s commitments for climate action and drive strategies toward carbon neutrality through sustainable education, research, engagement, and campus progress.”

The Sustainability Office itself states that “The University of Utah strives to provide sustainable built environments for its students, employees, and visitors.” The office acknowledges that “[m]ost of the energy used by the University comes from fossil fuel sources, such as coal and natural gas; building electricity and heating and cooling account for three-quarters of the University’s tracked greenhouse gas emissions” and that to improve the University’s energy consumption, it will focus on savings opportunities from occupant behavioral changes, energy efficiency upgrades, installation of renewable technologies, and more, which will also reduce overall operating costs.

Finally, and most importantly with respect to Sustainable Building Design and Construction, it states that the University “is committed to building a campus that will serve as an innovative model for current and future generations”. To do so, the “University seeks third party verification for green buildings through the...LEED... certified buildings program of the U.S. Green Building Council” LEED buildings, it states “exemplify advancements in planning, construction, maintenance, and operations that result in less energy, less water usage, and reduction in greenhouse emissions” and address “many facets of sustainability, including increasing energy and water efficiency, landscaping using water-wise techniques, reducing the impact of storm water, and more.” Accordingly, it commits that “all new buildings costing over \$2.5 million are required to achieve LEED Silver Certification.³

Following the establishment of the Sustainability Office, in 2008 the University adopted the American College & University Presidents’ Climate Commitment (ACUPCC), thereby setting a goal of reaching carbon neutrality by 2050 and committing to developing an institutional plan to achieve net zero greenhouse gas (GHG) emissions and expand the University’s research and educational efforts related to sustainability. In 2010, to accomplish the carbon neutrality goal under the ACUPCC, the University adopted its “Energy and Environmental Stewardship Initiative: 2010 Climate Action Plan” to build “on the University of Utah’s 2008 Campus Master Plan and [extend] the University’s leadership by integrating the principles of social, economic, and environmental sustainability into campus planning, design, operations, administration, curriculum, and community engagement.

³ Apparently, the minimum dollar threshold has been changed and is now \$5 million.

In January 2012 David Pershing became President of the University. Early in his presidency, the University adopted its “Strategic Vision: Seven Core Commitments of the

New U” in which it described the future of the University (the New U). A key element of this vision is stated to be “the pursuit and practice of sustainability”, wherein the “New U” will integrate the “values of a sustainable and just society into all facets of the University, including academics, operations, and administrative practices”. In order to implement this vision, the University has embarked on the creation of a strategic plan to build on its core commitments and “[map] a course to strengthen the University, transform the lives of individuals, and leverage the resources of the University to impact our local and global communities”.

As part of its commitment to sustainability, and, in particular, energy efficient building practices, both the State of Utah, through its Division of Facilities Construction and Management (DFCM), and the University, through its Facilities Management Department, have adopted policies and procedures intended to promote sustainable building. The DCFM requires that each state project meet a sustainable design standard as set forth in its “Design Requirements” manual and implements an “Integrated Design Process” intended to ensure that compliance with the required standards is achieved. The University’s Facilities Management Department has adopted sustainability requirements even more stringent than the DCFM’s in Section 5.0 of its “Design Requirements” manual, which states that not only must DCFM High Performance Building Standards be met, but certain additional standards, including, under certain circumstances, LEED Silver Accreditation must be met. The standards also provide, however, that the Associate Vice President Facilities may approve an exception to this requirement.

B. *Case Studies.* In Section IV of this Report we examine two recent examples of new building construction on campus to see how the University’s sustainability requirements have been implemented in practice. The two buildings we chose are the recently completed Law Building and the new Exec Ed Building at the Business School. To learn more about these two buildings we interviewed representatives of both schools, as well as a number of other University officials.

We discovered two very different building processes in respect of their approach to sustainability.

Case Study #1. The Law Building was developed with a \$60.5 million construction budget and thus was clearly subject to the LEED Silver and other sustainability requirements of the Design Requirements manual. However, from inception, the Law Building was championed by a dean and school officials committed to environmentalism, in large measure, perhaps by reason of the Law School’s long standing teaching commitment to environmental issues, best exemplified by its nationally recognized

environmental law programs and the Wallace Stegner Center, within the Law School. The Law School officials we spoke to said that once it was determined that a new building was desirable, there was no question that it would be built to high standards of sustainability. As an important part of this process, the building's champions began early in the process to look for additional contributions to fund the extra upfront costs associated with a high degree of sustainability. They were successful in attracting the support of a charitable donor, the Alternative Visions Fund (the AVF) of the Chicago Community Trust. The AVF provided \$4.5 million, to which the Law School added \$500,000 in matching funds, specifically designated to install "green features" in the Law Building. This fund allowed the Law Building to achieve LEED Platinum certification, a substantially higher standard than the LEED Silver standard required by the DCFM and Facilities Management combined requirements. A second important factor in the Law School's approach was to seek out architectural firms and builders with both proven experience, expertise and strong interests in sustainable building. Building in the 21st Century is a highly complex undertaking and building to high standards of sustainability is especially complex and demanding, making experience and expertise an essential ingredient in the process.

This focus on building sustainability from the outset, together with the experience, expertise and interest of the architects and builder, all working together, allowed the building's champions to integrate numerous sustainability features, including several passive energy strategies into the building's structure and design. A detailed list of sustainability features incorporated into the design and construction of the Law Building is included in Section IV a. of this Report. Officials of the Law School and the University believe these features will result in significant operating savings over the useful life of the building

Notwithstanding the Law Building's champions success in achieving LEED Platinum certification, difficult tradeoffs and challenges were encountered. Obtaining the data to support anticipated operating savings has proven time-consuming and difficult and, in fact, two years after completion of the building, such data is not yet available for review. Even with available data, measuring the benefits of green building can be extremely difficult and subject to varying interpretations. Sustainability does not easily boil down to quantifiable costs and benefits.

Case Study #2. The Exec Ed Building is a \$40-45 million project and thus also clearly subject to the LEED Silver and other sustainability requirements of the Design Requirements manual. However, it appears that from inception the proponents of the Exec Ed Building were more highly motivated to save as much construction cost as possible, an understandable desire in light of the overall difficulty in attracting state and donor support for new construction on campus. While representatives of the Business School claim an appreciation for the virtues of sustainability, especially where it can be demonstrated to save costs, especially construction costs, they appeared less invested in

the virtues of sustainability than their Law School counterparts. In particular, there was no apparent attempt at the Business School to raise funds especially for “green measures”, nor does there appear to have been a special interest in engaging architects or builders with especially “green” credentials. Notwithstanding these differences in approach the Business School representatives claim that the Exec Ed Building will be built to a high standard of sustainability, in fact meeting the requirements of the DCFM’s High Performance Building Standards and the Integrated Building Process, as well as the substantive requirements for LEED Silver Certification. The initial budget for the Exec Ed Building, however, did not provide funds for LEED Silver certification. Representatives of the Business School were comfortable with this approach, taking the position that the resulting costs of obtaining certification from the [US Green Building] exceed the benefits and that the cost savings would be better used for other costs of construction and to lower the overall cost of the project. In order to get University sign off for this approach, the Business School asked for an exception to the Silver LEED certification requirement which the Associate Vice President Facilities has authority to grant and, in fact, initially did grant. When this approach was criticized by other stakeholders who wondered why an exception had been granted and what the applicable standards were, the Business School reviewed its position and has apparently determined to undertake the cost and process of achieving LEED Silver certification. Nevertheless, the differing approaches of the proponents for the two buildings raises many questions regarding the commitment of the University to sustainability and the various processes currently existing to meet its sustainability goals.

We concluded our case studies with the reminder that while it is important to articulate goals, success is difficult to achieve if the goals are not backed up by definable and consistent standards, and that even with standards, goals can be missed if the process to obtain them is flawed.

C. The Sustainable Building Process: Areas of Concern and Possible Solutions.

In Section V of our Report we identify a number of areas of concern regarding the sustainability of our campus built environment and the process by which the University is tackling its commitments to sustainability and suggests potential improvements and solutions.

The primary issues identified can be summarized as follows:

1. The University has not clearly defined what “sustainability” means in respect of its built environment and no system currently exists to accurately measure and track the University’s overall progress toward achieving sustainability. We believe that the University should undertake to define better what it means by “sustainability”, perhaps in connection with the development of its strategic plan, which is now underway. The University should also consider better defining its

commitment to building sustainability (and overall sustainability) by adopting the Second Nature Climate Commitment and/or subscribing to the STARS (rating system) of the Association for the Advancement of Sustainability in Higher Education (AASHE).

While the University has set some interim goals for reductions in GHG emissions from baseline levels, the Climate Action Plan does not have a defined set of incremental benchmarks outlining the periodic achievements the University must make to reach its 2050 carbon neutrality goal on time. Also, many existing buildings on campus are not equipped with energy meters, creating a data deficit that makes it difficult to accurately measure and reduce energy consumption on campus. Nor are there specific energy usage reduction benchmarks in place, separate and apart from the long-term carbon neutrality goals. In addition, there is no plan in place to retrofit existing buildings for energy efficiency, which buildings comprise most of the square footage on campus.

In the absence of a clearer definition of sustainability, a strategic plan, incremental benchmarks, sufficient data, and more comprehensive plans and standards, achievement of sustainability goals and accountability for making consistent progress toward sustainability goals is problematic.

2. Currently, the Associate Vice President of Facilities Management can grant decision makers in the sustainable building process an exemption from the LEED Silver certification requirement for individual new construction projects. However, there are no standards for granting exceptions, and exceptions do not require input and review from other stakeholders (such as faculty and students). Such exceptions, unless standards-based and transparently justified, are contrary to the University's sustainability goals, preventing the University from making progress toward these goals. The University should amend and improve this exception procedure⁴.
3. Facilities Management is working on an effort to finalize a metering project. Once fully complete, this project will eliminate the data deficit problem. Likewise, The Sustainability Office has also been working on standards for smaller projects and for retro-fitting existing buildings which should also be considered and adopted. These initiatives should be completed.

⁴ We understand that Facilities Management is revising the LEED requirement exception clause so that exceptions may only be granted with the consent of the president of the University. This change, if adopted, will improve the visibility and transparency of any future exceptions and increase support for upholding sustainability policies.

4. We believe that the primary drivers and decision makers in the new building process are not sufficiently accountable for achieving high levels of sustainability (or for the consequences of failing to implement or failing to sufficiently implement sustainable building design elements). Deans of the colleges are the primary drivers of new building design, construction and funding. In addition, lead financial donors appear to strongly influence the design of the buildings they fund but may have little or no awareness of the University's commitment to sustainability. Other stakeholders, such as interested students and faculty, may have little or no input into sustainability decisions. With apparently few exceptions (one, however, being the Law Building Case Study; see Section IV below), the deans and lead donors may not be as sensitive to sustainability concerns and commitments as other aspects of building projects (such as up-front construction cost, siting and aesthetic design and speed of completion) and may be relatively uninvolved in the sustainability aspects of building design and construction. This disconnect between sustainability concerns and decision-making power can prevent individual colleges from achieving optimal levels of sustainability in new buildings. Decision makers should measure and consider institutional standards, values and priorities as well as dollars and cents costs in determining appropriate levels of building sustainability. We recommend that the University take steps to assure that deans and donors better understand and more fully participate in the design processes and sustainability requirements mandated by the DCFM and the Facilities Management Department.

5. To achieve high levels of sustainability on campus, we believe that decision makers should be held appropriately accountable for the consequences of their decisions. Currently, when a college fails to achieve high levels of sustainability through the new building design and construction process, the decision makers in that process may not be accountable for the consequences. For example, one consequence of low levels of sustainability achievement may be inefficiency in the resulting building, including, for example, a high level of non-renewable energy consumption, which may increase building operation and maintenance (O&M) costs. However, in many cases, the deans, colleges, and other administrative units often have limited or no financial responsibility for O&M. Even when they do have some financial responsibility for O&M, the individuals and departments responsible may not be the same and accountability may therefore suffer. In addition, donors are not aware of and are generally not asked to consider or fund O&M costs.

To the extent that decision makers are not accountable for the performance outcomes associated with different levels of sustainability achievement, sustainability achievement may often come down to primarily construction cost-weighted decision-making made by each dean and donor involved in specific new

building projects. We would suggest that if sustainability is made a high priority (with accountability) for these individuals, high levels of sustainability will result. The two case studies included in this report highlight each of these scenarios (See Section IV of this Report). Another way to accomplish accountability for sustainability is to make sustainability a formal part of the fund-raising process to encourage or require donors to assume responsibility for O&M costs. Similarly, Colleges and administrative units should be financially accountable for part or all of their energy use costs and for the consequences of their sustainability decisions. This would encourage them to choose more sustainable options.

6. There is a school of thought among some involved in the new building process at the University that the extra costs of LEED certification (such as consulting costs, verification costs, and certification costs) are not worth the benefit or could be better spent on the building construction itself. Proponents of LEED certification argue that the certification process entails a rigor and discipline that may be absent if certification is not sought and obtained. To the extent this disagreement persists among stakeholders in the new building planning and design process, we suggest that more analysis be done by stakeholders to determine the approach most appropriate at the University to meet its stated goals.

7. During the design phase for every new building on campus, sustainability measures are evaluated and, in particular, energy modeling is completed to estimate the energy efficiency of each new building. Ideally, the results of these models should be used by decision makers and building project steering committees to adapt their building designs in order to achieve higher energy efficiency and overall levels of sustainability. Unfortunately, in practice, energy modeling is not always fully incorporated in final designs. There is an expectation at the University for buildings to be built quickly and cost effectively. It is our understanding that building project steering committees often move onto the next phase of development before energy models and cost estimates are completed and fully integrated into the project outcome. There appears to be no strong incentive for the steering committee to spend the time and money returning to the design phase after modeling has been completed to achieve a higher level of sustainability if minimum levels have been achieved. Thus, the time required to create a highly sustainable building design is incompatible with the current expectations and pressures surrounding the building design process on campus. To address this issue, we believe that it is important for decision makers at the University to better understand the time requirements needed for sustainable building design and align their expectations accordingly. This requires education as well as a cultural shift on campus if the University is to maintain its commitment to achieving its sustainability goals.

8. We believe that the sustainable building process on campus is currently framed around a perhaps too narrow view of sustainability. The current sustainable building policies on campus focus on large building projects costing \$5 million dollars or more. Smaller projects, such as building repairs and renovations, do not currently have to follow any sustainability guidelines. While the focus on large projects has, and will continue to have, a substantial impact on overall sustainable building on campus, we believe this is not enough to maximize sustainability on campus or fully meet the University's current sustainability goals. New policies requiring sustainability standards and guidelines for smaller projects will support the University's commitment to sustainability. Additionally, standards should be developed for smaller, non-LEED projects as well as retro-fit projects. Each of these projects should be completed to expand the breadth of scope of sustainability on campus.
9. The University Development Office apparently does not currently pursue donor support for smaller renovation projects for existing buildings. It is recommended that this policy be reviewed, as renovation projects aimed at improving sustainability may in fact be attractive to certain donors. Any additional financial resources which would help the University increase the number of small building renovation and energy retrofitting projects on campus should be pursued.
10. Additionally, and notwithstanding the University's announced long-term carbon neutrality goal, in its modeling the University currently takes a relatively short-term view of sustainability measures. The current life cycle and energy modeling assessment tool used in the building design phase does not fully calculate the long-term costs of their building design decisions. Additionally, the LEED standards adopted by the University are *design* standards, which only measure design performance and not *operational performance*. Once a building receives LEED design certification, there is no mandate to monitor or maintain a high level of on-going sustainability performance. Each of these issues prevents the University from achieving optimal long-term, on-going performance during the sustainable building design process. Potential solutions include adopting a broader measure of building cost, including the financial and carbon costs of material acquisition, construction, operation and maintenance and demolition and disposal. Additionally, the University should consider adopting the LEED for Existing Buildings: Operations and Maintenance guidelines, which would increase the scope of sustainability measurement on campus and increase accountability for on-going sustainability performance, enhancing the University's ability to maintain high levels of sustainability for longer periods.

For a more detailed consideration of the foregoing issues and possible solutions, see Section V below.

D. The Student Perspective: Determining Student Attitudes Towards Implementing Environmentally Sustainable Features in Buildings. Section VI of our Report describes our survey of student attitudes towards sustainable building on campus. As noted above, our interest initially developed after it was discovered that the newly planned Exec Ed Building was to be built without acquiring LEED certification, despite the University's public commitment to sustainability. It appeared that a gap between the priorities of the University of Utah's administration on paper and what is undertaken in practice might exist. Interested observers suggested that if evidence of student support for environmentally and economically conscious building projects could be demonstrated, it would be useful for administrators to know when making such decisions.

Our goal for this survey was to gauge student attitudes towards implementing sustainable features into buildings on campus, as well as determine if students receive enough information in course curricula that would contribute to forming opinions about sustainable building projects. Special attention was paid to the attitudes and responses from students in the Business School with the hope that responses would underscore support for incorporating LEED certification into the new Exec Ed Building under consideration.

Of the 472 respondents, 92 were business students, constituting a 19.5% of respondents, the largest demographic represented. The second largest demographic was represented by students in the College of Education at 12.3%, followed by students in the College of Health represented by 10.4% of respondents. 61.4% of respondents said that environmental sustainability was "very important" to them. Overall, 90.4% of students responded positively that environmental sustainability was important to them to some degree and 76.7% responded that they were likely to some degree to participate in future sustainable initiatives led by their specific college. For students in the Business School, 46.7% rated sustainability as "very important" and 90% responded positively that environmental sustainability was important to them to some degree. A large [?] majority of all survey respondents identified sustainability as important in some aspect to the University and to their college.

When asked how often do you discuss issues of environmental sustainability in classes, 55% answered negatively that issues were either mentioned "not very often" or "not at all". This trend held with students in the Business School, with 54.4% saying that issues of sustainability were not mentioned very often or at all in classes.

When asked how aware students were about measures taken by their specific college to address issues of environmental sustainability, 47.7% answered that they were either "not very aware" or "not at all aware". Of students in the Business School, 41.3% were unaware to some degree of what measure their college had taken to address issues of

sustainability. 67.2% of respondents believed that their specific college should be doing more to address issues of environmental sustainability. This trend held to the same percentage for Business School student responses.

In summary, the survey responses show that issues of environmental sustainability are of value to students and that they are interested in participating in sustainable initiatives. Yet despite believing that the University has interest in the subject, a majority of students do not discuss issues of sustainability in their course curriculum and are unaware of specific measures their school has taken to implement the University's commitment to sustainability. There also is an overwhelming majority that believes their specific college could be doing more to address issues of sustainability. To us this suggests a disconnect between what the University communicates to students and others about sustainability and what it implements in practice. We believe these results demonstrate that students would react favorably to incorporation of environmentally and economically sustainable features in buildings, such as implementation of LEED certification into the new Exec Ed building.

E. Conclusions. The University has a long history of concern for the environment and has made a strong commitment to "sustainability" over the past 10 years. It has made a great deal of progress in establishing the Sustainability Office, adopting the ACUPCC Climate Commitment and drawing up the Climate Action Plan, as well as many other measures. Existing building design standards established by the University through the Facilities Management Department require the incorporation of energy efficient and other sustainability measures in all major new construction on campus. In many regards the University has shown an admirable response to the challenges of building a sustainable campus in a sustainable world.

However, as one of the premier public universities in the Mountain West, a PAC 12 institution, and one of Utah's top three employers, the University has a unique opportunity to be a leader and a pace setter in all areas of sustainability. On a campus of approximately 300 buildings on over 1,500 acres, serving almost 50,000 students, faculty and staff, with ambitious plans to build and grow, the University has a great responsibility to explore, design, and undertake new practices and processes in sustainable building and operations. While University leaders have taken this responsibility seriously as it relates to policy and staffing infrastructure and have achieved notable successes, sustainability commitments appear uneven across departments and administrative units, reflecting differing priorities and uncertainties in the definitions of sustainability and the processes for achieving sustainability. In many cases, these disconnects are reflected in a conflict between greater upfront construction costs and budget limitations, on the one hand, and reduced operating costs and longer term pay-offs, on the other hand. We believe that increased attention to a strategic plan which incorporates sustainability benchmarks, sufficient data, and more comprehensive

plans and standards, achievement of sustainability goals and accountability for making consistent progress toward sustainability goals will lead to greater success and achievement.

In particular, new rules requiring University administrative units to undertake responsibility for the cost of operating and maintaining their buildings may provide needed additional incentive for greater sustainability investments. Additionally, as noted in the student survey which we conducted, awareness across the campus of the importance of sustainability measures is growing, perhaps faster than University curricula currently reflects. We found relatively high student interest but relatively low awareness of University sustainability measures and little in-class discussion of environmental sustainability and its importance.

We conclude that the University is well positioned to lead the state and region in demonstrating environmental responsibility and sustainability. Its progress and actions are notable but there is more that can be done to bridge the gap between University goals and actions. A willingness to continue to improve is evidenced by the administration's immediate positive response to student questions about the sustainability of the new Exec Ed building and its decision to seek LEED Silver certification. This is also a demonstration of its commitment to and accountability for optimal sustainability of the campus built environment. The assistance and positive response we have received from all of the representatives of the University with whom we have worked on this project makes us optimistic that improvements will be accomplished and the University will be successful in meeting its goals.

III. The History and Background of the U's 'Commitment to Sustainability.'

a. The Role of the President.

The University and its presidents have a long history of concern about, and of addressing, environmental and conservation issues. In 2007, the University addressed "sustainability" directly, establishing the Office of Sustainability as part of the Facilities Management Department and naming a member of the research faculty in the School of Architecture and Planning, Dr. Craig B. Forster, as its first director. Unfortunately, Dr. Forster died in a climbing accident in November 2008, but the groundwork for a sustainability initiative at the University had been laid. Then President Michael Young said at the time of Dr. Forster's death, "[Craig] was the first director of our Office of Sustainability and his remarkable leadership and extraordinary abilities laid the framework for the U's efforts to become climate neutral. Craig's contributions to our sustainability efforts were being felt in positive ways across campus, and the initiatives he was proposing would have benefited all Utahns."

According to Dr. Young's statement, during Dr. Forster's tenure, numerous sustainability initiatives at the U were fostered by "encouraging an understanding of sustainability based on education, especially as it regards students on campus; economics, where investment into future generations is smart business; and, environmental benefit. [Dr. Foster's] efforts helped usher in the installation of advanced watering systems, the efficient Cogeneration energy plant, recycling programs, the Campus Farmer's Market, encouraged students to form the ASUU Board of Sustainability, and he helped create many other programs to benefit the environment".

Following the establishment of the Sustainability Office, in 2008 the University signed the American College & University Presidents' Climate Commitment (ACUPCC). By signing the ACUPCC the University set a goal of reaching carbon neutrality by 2050 and committed to developing an institutional plan to achieve net zero greenhouse gas (GHG) emissions and expand the University's research and educational efforts related to sustainability. The ACUPCC is described as a "high-visibility effort" of more than 650 other academic institutions to address global warming (global climate disruption) by creating a network of institutions that have committed to neutralize their greenhouse gas emissions and accelerate the research and educational efforts of higher education to equip society to re-stabilize the earth's climate.

In 2010, to accomplish the carbon neutrality goal under the ACUPCC, the University adopted its "Energy and Environmental Stewardship Initiative: 2010 Climate Action Plan" (Climate Action Plan). The Climate Action Plan states that it "builds on the University of Utah's 2008 Campus Master Plan and extends the University's leadership by integrating the principles of social, economic, and environmental sustainability into

campus planning, design, operations, administration, curriculum, and community engagement. This plan represents the desire, ability, and commitment of students, staff, faculty, and administration to dramatically reduce our greenhouse gas (GHG) emissions and achieve carbon neutrality as rapidly as practicable. The University of Utah's efforts to become carbon neutral will address the potential risks associated with carbon emissions in a proactive way. First and foremost, the plan seeks to reduce and mitigate future threats to the University and by extension to the greater community and the state of Utah. At its core, the plan examines how we obtain and use energy resources that power our campus and our modern amenities and mission-critical facilities”.

The Climate Action Plan asked why the University should become actively engaged in meeting the challenges of energy efficiency and conservation and answered the question as follows:

“Universities are the centers from which new knowledge, cutting-edge research, and creative, thoughtful leaders emerge. The true leaders in this transformational time will have the skills to navigate complex systems and foster collaborative innovation. The University of Utah, consistent with its mission and position as the state's flagship university, has stepped forward in its commitment to lead, with technology solutions, policy solutions, and human solutions.

To this end, the University of Utah will contribute to develop workable new strategies, systems, practices, and technologies that can be scaled up to the community and state levels. The goals of the ACUPCC are well aligned with the mission of the University to foster active and responsible citizenship in the arenas of human health, environmental stewardship, social responsibility, and economic progress. Taking action on this issue is expected to hold further advantages in the quest to recruit top students, faculty, and staff; to attract new sources of funding and to maximize the support of alumni and local communities.”

In adopting the Climate Action Plan, then President Young said:

“It has never been an easy task to meet the practical needs of the present without the risk of compromising our delicate relationship with the environment. The dramatic effects of climate on the world have forced us to reassess our way of living and come up with viable, sustainable solutions that will impact our collective future in sensible, positive ways. The University of Utah is dedicated to setting the standard for responsible and sensible actions with a plan that promotes thoughtful environmental stewardship and reduces our own carbon footprint on campus. Through the U's Office of Sustainability, we are reaching that delicate balance between environmental care, economic development, and social responsibility by introducing and expanding programs such as increased energy efficiency, sustainability-focused curricula, renewable energy production, and decreased dependence on single-occupant vehicles. In addition, students have

created the Sustainable Campus Initiative Fund, which allocates resources for meaningful campus sustainability projects and new awareness campaigns. [The Climate Action Plan] will outline the University's efforts in laying out the scope of the challenge; defining goals, strategies and tactics; and creating a blueprint for that action. By bringing bright minds together and through thoughtful, decisive action, the University of Utah is leading the way in its commitment and response to key climate issues and working to create a more responsible, sustainable world in which to live and learn.”⁵

In January 2012 David Pershing became President of the University. Early in his presidency, the University adopted its “Strategic Vision: Seven Core Commitments of the New U” in which it described the future of the University (the New U). A key part of the Strategic Vision statement in respect of sustainability is the following:

“In moving to the next level, to a New U, we are extending the rich visionary heritage of this place, from the original town platting laid by Mormon settlers to the renowned ongoing work of Envision Utah and the commitment of the current municipal leadership to promote walkable communities, public transit, earth-wise development guidelines, and practices that contribute to energy independence”.

The Strategic Vision outlines seven core commitments, the fourth of which states:

“4. The pursuit and practice of sustainability: The New U integrates the values of a sustainable and just society into all facets of the University, including academics, operations, and administrative practices.

- Promote and coordinate interdisciplinary and cross-campus sustainability research, learning, and programs
- Practice sustainability on campus by making sustainability an integral part of our operational framework and our decisional framework
- Value the uniqueness of our natural surroundings
- Fulfill the Climate Action Plan”

The core commitments contemplate the development of a new strategic plan, the “University of Utah Strategic Plan: Phase II”, which will build on the seven core commitments and “[map] a course to strengthen the University, transform the lives of

⁵ While an extensive analysis of the Climate Action Plan is beyond the scope of this Report, it is noted that the plan itself did not adopt specific policies regarding sustainable building design and/or construction.

individuals, and leverage the resources of the University to impact our local and global communities”. The Strategic Plan Phase II includes:

- The Strategic Vision
- Action items for fulfilling the seven core commitments, [and]
- Metrics for benchmarking and measuring success”

On February 10, 2015 President Pershing wrote, reaffirming the University’s commitment to sustainability:

“The U has a history of success with sustainability. It is actively engaged in the U.S. Department of Energy Better Buildings Challenge, which means we are implementing high efficiency and other sustainability requirements in new construction, but it doesn’t stop there. Existing facilities are also being evaluated with the goal of lessening environmental impact, the U’s College of Science is piloting a behavioral energy change program to better educate the university community about sustainable behavior and the U Community Solar program, which allowed students, faculty, staff and friends of the university access to reliable, affordable solar power, has exceeded all expectations. I am grateful to the many individuals and organizations at the University of Utah who are committed to leading with way in sustainability and making a lasting and positive impact on this campus, the community and the world”.

More recently, President Pershing and the Board of Trustees have stated that:

"Climate change is one of the most pressing and difficult issues of our time, and we are committed to doing our part to respond to it through our research, teaching, and operations at the University of Utah."

The University is also now in the process of updating the Climate Action Plan (in particular, to include aspects of social justice, food systems, investment practices, and wellness). The new plan will be in line both with other institutions and with the U’s involvement in the STARS program of the Association or the Advancement of Sustainability in Higher Education.

b. The Role of the Facilities Management Department in supporting the ‘Sustainability Commitment’ of the University.

The University has adopted a Campus Master Plan, one of the elements of which is to be a leader in environmental stewardship, by “integrat[ing] the principles of environmental sustainability into campus planning, design and operations.” In leading the construction of new buildings under the Campus Master Plan, the Facilities Management Department has incorporated principles of efficiency and sustainability into its policies and procedures relating to new building design and construction. Because the University is a

state organization, Facilities Management must follow the design processes (the “Design Processes”) mandated by Section 5.0 “High Performance Building System” of the Division of Facilities Construction and Management of the State of Utah Design Requirements (March 31, 2015), which requires that all state building projects meet the sustainability design standards of the Integrated Design Process in Section 5.1 thereof⁶, as well as the process mandated by Section 5.1 of the Design Requirements University of Utah Supplement (November 1, 2016) which requires that, unless exempt (i) all University of Utah projects exceeding \$5 million of design and construction costs shall meet the additional minimum standards set forth in Section 5.0; (ii) all projects shall achieve a minimum of LEED v4 Silver Certification; and (iii) all projects shall specifically achieve the LEED credits as further outlined in Table 5.1.^{7 8}

c. The Role of the Sustainability Office in supporting the ‘Sustainability Commitment’ of the University.

The Sustainability Office of the University was established in 2007 as part of the Facilities Management Department. It has subsequently been moved to the Office of Academic Affairs in recognition of the broader role of sustainability on campus. The U’s sustainability webpage states that the Sustainability Office is “a resource or the students, faculty, staff and our community. We support the University’s commitments for climate action and drive strategies toward carbon neutrality through sustainable education, research, engagement, and campus progress.” [add as footnote: See: <https://sustainability.utah.edu/>]

The mission, vision and core values of the Sustainability Office are stated to be:

- Mission: Our mission is to integrate sustainability as a core principle throughout operations, research, and education at the University of Utah and to support initiatives that cultivate the campus a living laboratory.
- Vision: Our vision is to create a culture of responsibility by integrating the values of sustainability in all facets of the University of Utah and to serve as a model for what is possible.
- Our Core Values: Collecting data and best practices to track progress and

⁶ See: https://dfcm.utah.gov/wp-content/uploads/design_requirements.pdf#page=45

⁷ See: <https://facilities.utah.edu/project-resources/documents-standards/UofU%20Design%20Requirements%20Supplement.pdf.pdf>

⁸ The “Design Process”, DFCM Design Manual University of Utah Supplement (January 15, 2016) provides additional design process requirements. See: <http://facilities.utah.edu/project-resources/documents-standards/UofU%20Design%20Process%20Supplement%2001-15-2016.pdf>

implement change [by]

- Connecting campus sustainability practices, programs, and people;
- Creating a living, learning laboratory on campus;
- Catalyzing and leading the campus community toward action;
- Communicating campus sustainability initiatives and successes.

The focus areas of the University's sustainability commitment are to achieve sustainable solutions across campus that promote efficiency, conservation, equity, and wellness programs and demonstrate the University's commitment to environmental stewardship, fiscal responsibility, and justice and health. Identified focus areas are: Air Quality, Climate, Energy and Buildings, Food and Dining, Grounds, Investment, Justice and Equity and Purchasing.

With respect to Energy and Buildings, the U's sustainability webpage states "The University of Utah strives to provide sustainable built environments for its students, employees, and visitors".

With respect to Energy the University's sustainability webpage states that "[m]ost of the energy used by the University comes from fossil fuel sources, such as coal and natural gas; building electricity and heating and cooling account for three-quarters of the University's tracked greenhouse gas emissions. To improve the University's energy consumption, the Energy Management Office focuses on savings opportunities from occupant behavioral changes, energy efficiency upgrades, installation of renewable technologies, and more, which will also reduce overall operating costs."

With respect to Sustainable Building Design and Construction, the University's sustainability webpage states that:

- The University of Utah is committed to building a campus that will serve as an innovative model for current and future generations.
- Achieving LEED Certification: The University seeks third party verification for green buildings through the Leadership in Energy and Environmental Design (LEED) certified buildings program of the U.S. Green Building Council. LEED buildings exemplify advancements in planning, construction, maintenance, and operations that result in less energy, less water usage, and reduction in greenhouse emissions. Additionally, these advancements save money. LEED certified buildings are ranked as Silver, Gold and Platinum.

- All new buildings costing over \$2.5 million are required to achieve LEED Silver Certification.⁹
- LEED addresses many facets of sustainability, including increasing energy and water efficiency, landscaping using water-wise techniques, reducing the impact of storm water, and more.

With respect to Sustainable Building Design and Construction, the U’s sustainability webpage states that “[the] University has an on-going program to strategically install solar energy whenever possible. There are several solar arrays on campus buildings and several solar projects planned or under construction”.

With respect to Sustainable Building Design and Construction, the U’s sustainability webpage states “[the] University of Utah Facilities Management includes the Energy Management Office. This office promotes and supports energy efficiency and conservation efforts on campus like LED lighting, pursuing utility rebates, and supporting new construction and renovations”.

With respect to the Climate Action Plan, the Sustainability Office has acknowledged that the plan needs updating to include intermediate targets, better metrics, aspects of: social justice, food systems, investment practices, and wellness. In particular, and in respect of sustainability, the Sustainability Office has stated that the plan needs to be updated to:

1. Provide an improved framework for sustainability
2. To establish meaningful comparisons
3. Create incentives for improvement
4. Facilitate information sharing, and
5. Build a stronger, more diverse sustainability community

⁹ Apparently, the minimum dollar threshold has been changed and is now \$5 million.

IV. Case Studies

a. Case Study #1: S.J. Quinney College of Law Building

We met with officials of the Law School and other University officials to better understand the University's commitment to sustainability, the sustainable building process in general, the building process for the new Law Building and, in particular, how the Law School accomplished LEED Platinum certification.

Assessing the benefits of sustainable building practices and components is complicated by data that is difficult to access, benefits that can be hard to quantify, and economic returns that can take years to realize. While the goals of performance and environmental impact are clear, the ability to implement sustainable building practices is not black and white and varies from one department or College to another. There are significant benefits and consequences that need to be considered when taking action and making decisions to pursue and achieve sustainability.

In order to gain perspective on the current integration of sustainability at the University of Utah, we met with Amy Wildermuth, Chief Sustainability Officer. Professor Wildermuth outlined three major components that play crucial roles in the University's present and future achievements in sustainability: the University's commitment to hiring staff with sustainability expertise in leadership positions, establishing minimum requirements for building codes, and providing a supporting academic framework.

In regard to experienced and expert staff, she identified Robin Burr, Chief Design & Construction Officer, and Myron Willson, Deputy Chief Sustainability Officer, who guide and assist projects in achieving sustainability.

With respect to minimum standards, she identified the requirement to achieve LEED Silver in new buildings, as well as placing a focus on energy efficiency in order to achieve the University's goal of reaching a "100 percent reduction in carbon emissions" by 2050, as stated in the Climate Action Plan. A new development that the University should stay mindful of, she said, is that the University will soon have the sole responsibility of paying for its energy usage – thinking about long-term energy cost savings is critical.

Lastly, she said that there is significant value in having academic structure and support for the issue of sustainability. Establishing curriculum and programs like the Environmental and Sustainability Studies Undergraduate degree, the Environmental Humanities Masters Program, Sustainable Campus Initiative Fund and the Global Change

and Sustainability Center help to establish campus-wide interest in, support for, and commitment to the University-wide goal of sustainability.

Professor Wildermuth also noted significant challenges associated with the integration of sustainability, especially when considering building construction. While most sustainability investments will have long-term payoffs, she said that funding their substantial upfront costs is a difficult and complicated process. A main limitation is the issue of public funding; the State provides an annual budget for the University that has already been allocated among various departments and uses on campus. There is no feasible way to save this money for projects and expenses associated with sustainable building. Also, public funding generally is not available for costly investments that require a decade or longer before savings are achieved. Finding donors to make large donations to fund projects such as the Law Building and the Exec Ed Building also is challenging. Competition for private funding is intense across university priorities. In addition, those projects compete for donor support against other universities and organizations across the region and beyond. In some cases, large donations must come from alumni out of state, national foundations, and/or federal agencies such as National Science Foundation or National Institute of Health (NIH gave large sums to the Thatcher Chemistry Building). Furthermore, large donations often come with restrictions on how funds must be spent.

In order to gain further perspective into how these factors were successfully addressed with recently constructed campus buildings, a meeting was arranged with Law School Dean Robert Adler to discuss the process and execution methods that were established in order to achieve LEED Platinum certification for the Law Building.

Dean Adler said that the fundamental influencing factor in the decision to build a highly sustainable new home for the Law School was the national recognition and superlative reputation already enjoyed by the Law School in environmental and natural resources law. Accordingly, the previous Dean, Hiram Chodosh, and now Dean Adler, then Head of the Building Design Committee, made the decision from the out-set that their new building would be built to high sustainability standards with the intention of enhancing innovation in legal education, bolstering community service and most importantly for our discussion, upholding their support for the teaching of environmental protection and sustainability; doing any less, he said, would have been ironic and in direct conflict with their curriculum. Following this critical first step of visioning and ambitious goal setting, two additional actions were instrumental:

Key Step #1: Architects/Builders

The Law Building and its Building Design Committee sought and selected architectural firms and builders with proven expertise and interests in sustainable building. Specifically, the Law School worked with a local architectural firm, VCBO, as

well as a Washington D.C. firm, Smith Group JJR. Likewise, they selected a local builder, Big D Construction, to complete the building process. This early decision to achieve high goals in sustainability was beneficial because the designers and builders of the Law Building were able to integrate several passive energy strategies into the building's structure and design at low cost including:

- Enhanced exterior insulation to reduce thermal conductivity
- Fixed exterior sunshades to minimize solar heat gain during the summer
- Exterior overhang that also act as sunshades to reduce the building heat gain in the summer
- Low emissivity; insulating glass to reduce thermal transmittance and glare while improving visible light transmittance.¹⁰

Implementing tactics like those above from the beginning of the design phase allowed the building to go beyond minimum standards and meet the LEED gold certification requirement.

Key Step #2: Chicago Alternative Visions Fund

The next key step was critical in allowing the Law Building to make the jump to LEED platinum and meet its budget.

After several years of strategic cultivation, solicitation, and stewardship by Law School officials, the Alternative Visions Fund agreed to donate \$4.5 million, to which the Law School added \$500,000 in matching funds, specifically designated to install green features in the building. This fund allowed the Law Building to achieve Platinum certification through features including:

- On-site Solar Power generation
- Chilled beam cooling and heating systems: a chilled beam HVAC system to heat and cool the building and radiant floor heating and cooling to supplement the chilled beam system.
- Utilization of irrigation well water for cooling.
- Heat recovery system to transfer the heat from the exhausted conditioned air into the fresh ventilation air.
- Highly efficient fixtures including regenerative elevators to convert the excess energy generated by an elevator into electricity that can be used elsewhere in the building.
- Enhanced lighting system control that includes occupancy sensors and daylight sensors.
- Recycling and re-using grey water to flush toilets.

¹⁰ <https://law.utah.edu/sustainability/>

- Most importantly, the building was designed to meet 65% reduction in energy costs, beyond code requirements through smart structural design and passive solar orientation.¹¹

These features are meant to save the Law School and the University as whole significant operating costs associated with energy emissions and otherwise.

Although the Law Building adds substantial aesthetic, sustainability, and academic value to the campus as a whole, there were some difficult tradeoffs and challenges. As we have learned throughout this project, measuring the benefits of green building can be extremely difficult. Compiling the data to prove benefits takes a significant amount of time and additionally some of the benefits themselves are difficult to quantify. The Law School expects to have a detailed compilation of the building's performance data after May 3rd – data that a future course could continue to evaluate in order to provide on campus research of the benefits of sustainable building.

The principal benefits accruing to the Law Building are as follows:

- Being on campus allows the building to have a longer payback period for some of the upfront costs of efficiency measures than if the building were a commercial building.
- The achievement of a high standard of sustainability sets a standard and example that reinforces the Law School's reputation for leadership and hopefully attracts students, faculty and new donors.
- Recognizing the foresight of a leadership sustainability donor can encourage others to do the same.
- Long term cost reductions in operating expenses should be significant, allowing future flexibility in annual budgets, compared to older buildings that have few options against rising utility costs.
- The Law School, the architects, and the builders have won awards in building design and green initiatives including:
 - Community Justice Award from the Disability Law Center for the building's universal accessibility design
 - Award of Excellence – Institutional Architecture from AIA
 - Project of the Year- Green Building from the AGC of Utah
 - Finalist for the Governor's Energy Innovation Award for unique use of groundwater
- Obvious positive benefits to air quality, water use, energy reduction, and other environmental impacts.

Some of the down-sides attributable to the Law School's process are:

¹¹ <https://law.utah.edu/sustainability/>

- The building's construction cost has still not been fully funded and students may be expected to bear that burden of paying back the costs of borrowing money through a bonding process for years.
- Still quantifying data relating to energy efficiency and operating costs.
- Higher construction costs and directing donor funding to building costs comes at expense of being able to invest in scholarships and new program development.

b. Case Study #2: the new Robert H. and Katharine B. Garff Executive Education Building

In order to better understand how sustainable building practices have been implemented in connection with the design of the new Exec Ed Building at the Business School, a preliminary meeting (prior to meeting with representatives of the Business School) was held with staff of Facilities Management, consisting of:

- Shireen Ghorbani, Communications and Organizational Development
- Robin Burr, the new Chief of Design and Constructions
- Bob Simonton, Director of Capital Projects.

Questions were asked to specifically ascertain how new buildings are planned on campus, including, more specifically, how sustainability is incorporated and budgeted for in the building planning process. A matter of particular concern in this meeting was the clause in Section 5.1 of the Design Requirements University of Utah Supplement (November 1, 2016) which permits the Associate Vice President for Facilities to approve an exception from the requirement that all University of Utah projects exceeding \$5 million of design and construction costs shall achieve a minimum of LEED v4 Silver Certification. It was proposed that the Exec Ed Building proceed without LEED certification under this exception.

The interviewees advised that donors have not, historically, been highly interested in the sustainable design of the building. They have been more concerned that buildings should be designed as affordably as possible. Consequently, a building proponent may determine to build to LEED standards, while seeking an exception from LEED *certification* in order to save on additional certification costs. In theory, the building can still be designed and built according to high performance building standards, equivalent to LEED Silver, but without the additional certification costs. It was further advised that Silver certification is not considered the highest standard of sustainable design, since Gold and Platinum certification are higher standards. In addition, sustainability is still believed to be important to the University of Utah student population. LEED Silver certification may therefore be considered as a means of gaining the confidence of students with regards to the sustainability of new buildings on campus.

At the conclusion of the meeting, an agreement was reached that a commitment to the sustainable designs and construction of the Exec Ed Building should be made, and LEED Silver certification pursued. Furthermore, the current exception standard should be amended to avoid future construction projects from being exempted from pursuing LEED certification without a more rigorous and transparent process.

Considering the revision of the exception clause, the Sustainability Office will be required to study the implications of the policy on all future projects at the University. Their primary concern is that there are some types of projects, which do not qualify for LEED certification, such as renovations or upgrade projects where certification may not be realistic. Consequently, it would not be possible to completely remove the exception clause.

Currently, the Sustainability Office has proposed an amendment to the exemption policy that states that Robin Burr cannot approve an exception without permission from the President of the University (see Appendix A attached to this Report). Robin Burr has further been tasked by the Sustainability Office to assist in re-imagining the exception process, including, specifically, what standards would be in effect when LEED is not required, such as using the International Green Construction Code.

At the time of this project, recommendations to amend the Facilities Management design manual will be presented to Facilities Management in mid to late April. After that point, input from Facilities Management will need to be taken into account. Once this process is complete, Robin Burr will be able to provide her final recommendation to the President and other senior administration for approval.

In our follow-up meeting, we contacted the Business School in order to investigate the same questions, namely how sustainable building practices have been implemented into the Exec Ed Building. Meeting participants included:

- Assistant Dean Reyn Gallacher, Chief Finance Officer
- Mikel Brownie, Director of Technical and Trades

During this second meeting, the proposal and design process for the Exec Ed Building was clarified, with a focus on when and how building sustainability was incorporated.

The new building, which officially broke ground on January 24, 2017, will be 150,000 square-feet and house classrooms and office space for faculty and staff for several of the school's executive and administrative advanced degrees. The original estimate for the building's cost was \$60 million, which the decision makers were able to reduce to \$40 million. The total cost estimate now sits between \$40-45 million. As part of an effort to save costs, an exception from the University's standard of LEED silver certification was pursued, and the exception was granted by the interim Chief of Design and Construction in the University's Facilities Management department. Subsequently, this decision was

reversed and it has been determined that LEED Silver certification would in fact, be pursued. This decision is due, in part, to student interest in the exemption. It is currently estimated that pursuing the certification will add \$120,000 to the building's budget. This is largely due to application costs, as the architect had been tracking sustainability measures, and estimated that the approved design would qualify at the silver level.

It was indicated that environmental sustainability was considered at all stages in the design process, from site selection to construction, although it seems that economic sustainability (cost) has been the main concern for building decision makers. Dean Gallacher and Mr. Brownie stated that they are very supportive of sustainability initiatives, as long as they had quantifiable payoffs on a relatively short time frame (approximately 5-10 years).

As the Business School will be responsible for operation and maintenance costs of the Exec Ed Building, Mr. Brownie stated that he is in favor of energy efficiency measures, but emphasized that upfront and replacement costs need to be considered when deciding whether or not to adopt these technologies. He cited the "ice stone" that was originally installed in the Eccles Business Building, and had to be replaced (at high cost) after only three years of use, as well as a glycol heating system that failed.

Dean Gallacher and Mr. Brownie expressed a point of view, perhaps held by more than a few, that the expense of LEED certification (at the silver level) may not be worth the money. They feel that the application process is too expensive and that certification encourages "chasing points", rather than wise and context-appropriate sustainability design elements. They believe that well-thought-out energy efficiency standards for state buildings are the most effective and efficient way to ensure building sustainability.

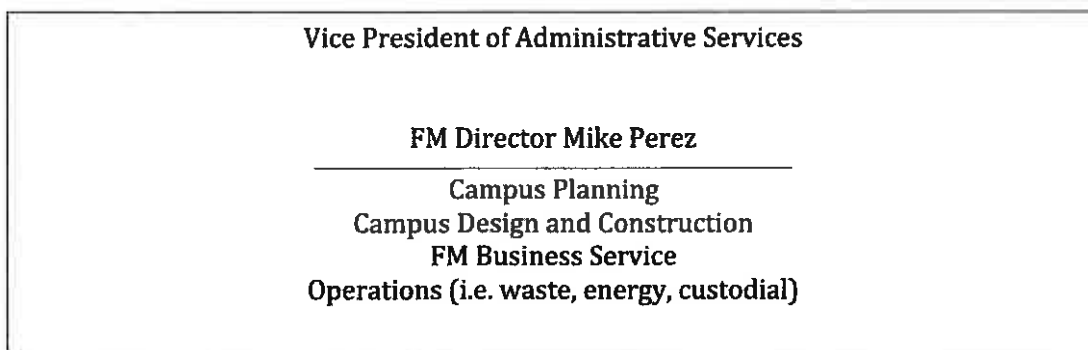
One of the key "battles" regarding building sustainability in the approval and design process of the new business Exec Ed Building at the University of Utah was short term versus long-term costs savings. With the current discounting rates used for future expenses/cost savings calculations and comparisons, it can be difficult to argue for the installation of energy saving technologies that don't pay off for 30+ years. This issue is apparently exasperated by the University's funding process for new buildings, which is largely removed from considerations of long term operating costs.

Additional insights about the LEED exemption of the new Exec Ed Building were gained during a meeting with Myron Wilson, Director of the University of Utah Sustainability Office.

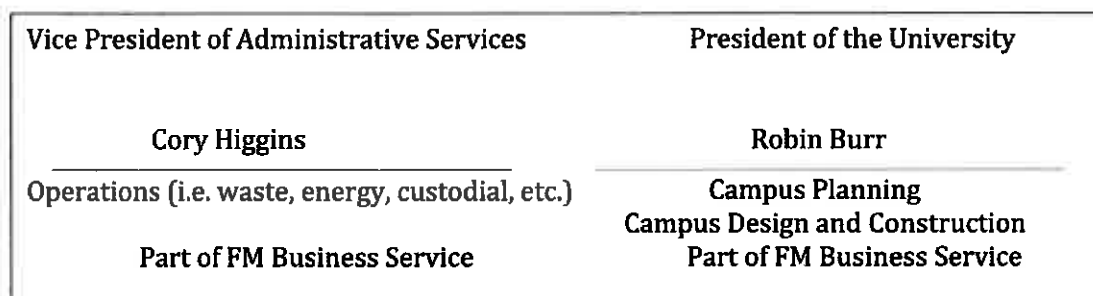
Mr. Willson addressed sustainable building process on campus by first outlining recent structural changes in Facilities Management (FM). According to him, FM used to be one

entity, which was headed by director Mike Perez who answered to the Vice President of Administrative Services. Recently, FM reorganized and split into two entities, one of which is headed by Cory Higgins, who answers to the V.P. of Administrative Services and the other by Robin Burr, who reports directly to the President. Below are adapted versions of the diagrams Mr Willson drew:

Original Facilities Management Structure



New Facilities Management Structure



The change in FM is significant because this process occurred while the new Exec Ed building was developed. Myron reports that several people in FM were promoted and/or left the University, leaving positions unfilled and the remaining staff overwhelmed. One unfilled position fell under the energy section of the Operations Department, which oversees design projects housed under the Campus Design and Construction Department (refer to the green dashed arrow above). This vacancy within an understaffed, overtasked department was a major reason the new business building originally received an exception from LEED certification.

V. The Sustainable Building Process: Areas of Concern and Possible Solutions

The exploration and examination of the sustainable building process on campus, which we have undertaken, reveals that much progress has been made over the last ten years in planning for and building and maintaining a more sustainable campus.

In this Section V, we identify several areas of concern regarding the sustainability of our campus built environment and suggest potential improvements and solutions. The primary issue identified is that the building design, construction, and funding process does not yet provide for optimally sustainable results or for accountability for such results as are obtained. Other areas of concern include incompatibility between sustainable design processes and building design and construction timeline expectations as well as a problematic narrow view of the definition of sustainability on campus. Each of these issues is presented in detail below. Suggestions for improvement with respect to these issues derived from a literature review and interviews with key informants are also outlined below.

A table highlighting the key findings presented in this Section V is presented at the end of the section.

A. Accountability and Benchmarking Issues

The sustainable building process on campus could benefit from improved accountability on both macro- and micro-levels. The macro-level accountability issues pertain to the overarching sustainability goals established by the University. The micro-level issues revolve around the responsibilities of the stakeholders and key decision makers in the sustainable building design process on campus.

1. Macro-Level Issues

On a macro-level, the University laudably has been pursuing environmental goals and efficiency improvements for some time. In 2008, the University established well-intentioned high-level sustainability goals when it signed the ACUPCC, setting a goal of reaching carbon neutrality by 2050 and committing to developing an institutional plan to achieve net zero GHG emissions and to expand the University's research and educational efforts related to sustainability. In 2010, to accomplish the carbon neutrality goal under the ACUPCC, the University adopted the Climate Action Plan. To further its sustainability objectives, the University also committed to a qualified minimum Leadership in Energy and Environmental Design (LEED) Silver certification requirement for new building construction above \$2.5 million.¹²

¹² See Section 5.1 of the Design Requirements University of Utah Supplement (November 1, 2016) (<https://facilities.utah.edu/project-resources/documents-standards/UofU%20Design%20Requirements%20Supplement.pdf.pdf>). The \$2.5 million threshold was apparently subsequently raised to and is currently \$5 million.

However, the University has not clearly defined what “sustainability” means in respect of its built environment and no system currently exists to accurately measure and track the University’s overall progress toward achieving sustainability. For example, it is easy and simplistic to equate “sustainability” with “energy efficiency,” but this definition would omit elements of sustainability (such as other environmental, social and economic impacts) deemed equally important to sustainability as energy efficiency by experts. We believe that the University should undertake to define better what it means by “sustainability”, perhaps in connection with the development of its strategic plan, which is now underway.

While the University did set an interim goal of a minimum reduction of twenty-five percent (25%) in GHG emissions from 2007 baseline levels by 2020, the Climate Action Plan does not have a defined set of incremental benchmarks outlining the periodic achievements the University must make to reach its 2050 carbon neutrality goal on time¹³. Additionally, even if benchmarks were in place, the University’s progress could not be easily tracked. Many existing buildings on campus are not equipped with energy meters, creating a data deficit that makes it difficult to accurately measure and reduce energy consumption on campus. Nor are there specific energy usage reduction benchmarks in place, separate and apart from the long-term carbon neutrality goals. In addition, there is no plan in place to retrofit existing buildings for energy efficiency, which buildings comprise most of the square footage on campus. Altogether, in the absence of a clearer definition of sustainability, incremental benchmarks, sufficient data, and more comprehensive plans and standards, achievement of sustainability goals and accountability for making consistent progress toward sustainability goals is problematic.

Another macro-level issue associated with sustainability goal achievement are the existing new building exception provisions. Currently, the Associate Vice President of Facilities Management can grant decision makers in the sustainable building process an exemption from the LEED Silver certification requirement.¹⁴ However, there are no standards for granting exceptions, and exceptions do not require input and review from other stakeholders (such as faculty and students). Such exceptions, unless standards-based and transparently justified, are contrary to the University’s sustainability goals, preventing the University from making progress toward these goals.

¹³ We are not aware that benchmarks have been adopted since the Climate Action Plan was adopted but additional inquiry should be undertaken.

¹⁴ See Section 5.1 A. of the Design Requirements University of Utah Supplement (November 1, 2016) (<https://facilities.utah.edu/project-resources/documents-standards/UofU%20Design%20Requirements%20Supplement.pdf.pdf>)

The solutions to these macro-level issues should be relatively straightforward. First, the University should consider better defining its commitment to building sustainability (and overall sustainability) by adopting the Second Nature Climate Commitment¹⁵ and/or subscribe to the Sustainability Tracking, Assessment & Rating System™ (STARS) of the Association for the Advancement of Sustainability in Higher Education (AASHE).¹⁶ Another measurement system, which the University might consider utilizing, is the Social Cost of Carbon measurement system.¹⁷

The Climate Commitment developed by the Second developed by the Second Nature organization¹⁸ in 2015 grew out of the 2008 ACUPCC climate commitment and integrates the goals of carbon neutrality with climate resilience, provides a systems approach to mitigating and adapting to a changing climate and is intended to lead educational institutions to strong leadership, tangible outcomes, and the ability to track progress. The Climate Commitment is intended to result in significant changes within the institutions adopting it, in the higher education sector at large, and beyond.¹⁹

STARS is a transparent, self-reporting framework developed by the AASHE to which colleges and universities can subscribe to measure their sustainability performance. The AASHE states that STARS is designed to (i) provide a framework for understanding sustainability; (ii) enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the international campus sustainability community; (iii) create incentives for continual improvement toward sustainability; (iv) facilitate information sharing about higher education sustainability practices and performance, and (v) build a stronger, more diverse campus sustainability community.

The University should also address the other specific concerns identified above. In fact, we understand that University personnel are currently making progress toward eliminating some of these issues. For instance, we understand that Facilities Management is working on an effort to finalize a metering project by this summer. Once

¹⁵ Further information about the Climate Leadership Commitments can be found at <http://secondnature.org/climate-guidance/the-commitments/>.

¹⁶ Further information about STARS can be found at: <https://stars.aashe.org/pages/about/stars-overview.html>.

¹⁷ See: <https://www.epa.gov/climatechange/social-cost-carbon>

¹⁸ Second Nature is a tax-exempt, non-profit organization, which works to help build a sustainable and positive global future through leadership networks in higher education.

¹⁹ A good example of a university with a published well-defined and robust sustainability commitment is Ball State University. See: <https://cms.bsu.edu/academics/centersandinstitutes/cote/sustainability/statement>.

fully complete, this project will eliminate the data deficit problem. Likewise, the Facilities Management is also revising the LEED requirement exception clause so that exceptions may only be granted with the consent of the president of the University. This change will improve the visibility and transparency of any future exceptions and increase support for upholding sustainability policies. The Sustainability Office has also been working on standards for smaller projects and for retro-fitting existing buildings which should also be considered and adopted.

2. Micro-Level Issues

On the micro-level, we believe that the primary drivers and decision makers in the new building process are not sufficiently accountable for the consequences of failing to implement (or failing to sufficiently implement) sustainable building design elements. Deans of the colleges are the primary drivers of new building design and construction. In addition, lead financial donors appear to strongly influence the design of the buildings they fund. Other stakeholders, such as interested students and faculty, may have little or no input into sustainability decisions.

With apparently few exceptions (one, however, being the Law Building Case Study; see Section IV of this Report), the deans and lead donors may not be as sensitive to sustainability concerns as other aspects of building projects (such as up-front construction cost, siting and aesthetic design and speed of completion) and may be relatively uninvolved in the sustainability aspects of building design and construction. Sustainability conversations during the design process typically primarily involve consultants, project managers, and the Sustainability Office, none of whom have final decision-making power over construction cost decisions. This disconnect between sustainability concerns and decision-making power can prevent individual colleges from achieving high levels of sustainability in new buildings. It should also be noted that numerous studies have shown that both “high-cost” and “low-cost” buildings may achieve LEED certification. Similarly, both “high-cost” and “low-cost” buildings may not seek or achieve LEED certification. There is no absolute correlation between sustainability and cost and “cost” can be measured in many different ways, and not simple, for example, energy cost. At the end of the day, decision makers should measure and consider institutional standards, values and priorities as well as dollars and cents costs in determining appropriate levels of building sustainability.²⁰

Furthermore, when a college fails to achieve high levels of sustainability through the new building design and construction process, the decision makers in that process may not be accountable for the consequences. For example, one consequence of low levels of

²⁰ See: <http://www.treehugger.com/green-architecture/energy-efficiency-isnt-enough-anymore.html> and <http://www.treehugger.com/green-architecture/defence-leed-six-years-later-why-are-people-still-bashing-bike-racks.html>.

sustainability achievement may be inefficiency in the resulting building, including, for example, a high level of non-renewable energy consumption, which may increase building operation and maintenance (O&M) costs. However, in many cases, the deans, colleges, and other administrative units often have limited or no financial responsibility for O&M. Even when they do have some financial responsibility for O&M, the individuals and departments responsible may not be the same and accountability may therefore suffer. In addition, donors are not generally asked to consider or fund O&M costs.

To the extent that decision makers are not accountable for the performance outcomes associated with different levels of sustainability achievement, sustainability achievement may often come down to primarily construction cost-weighted decision-making made by each dean and donor involved in specific new building projects. We would suggest that if sustainability is made a high priority for these individuals, high levels of sustainability will result. Only the minimum level of sustainability will be achieved if sustainability is not a high priority for these decision makers. The two case studies included in this report highlight each of these scenarios (See Section IV of this Report).

Lastly, we observed that there is a school of thought among some involved in the new building process at the University that the extra costs of LEED certification (such as consulting costs, verification costs, and certification costs) are not worth the benefit or could be better spent on the building construction itself. Proponents of LEED certification argue that the certification process entails a rigor and discipline that may be absent if certification is not sought and obtained. To the extent this disagreement persists among stakeholders in the new building planning and design process, we suggest that more analysis be done by stakeholders to determine the approach most appropriate at the University.²¹

Potential solutions to these issues involve closing the gap between the major decision makers and sustainability design processes and their tangible consequences. One method to achieve this which we recommend is to take steps to assure that deans and donors better understand and more fully participate in the design processes (the “Design Processes”) mandated by Section 5.0 “High Performance Building System” of the Division of Facilities Construction and Management of the State of Utah Design Requirements (March 31, 2015), which requires that all state building projects meet the sustainability design standards of the Integrated Design Process in Section 5.1 thereof²² and by Section 5.1 of the Design Requirements University of Utah Supplement (November 1, 2016) which requires that, unless exempt (i) all University of Utah projects exceeding \$5 million of design and construction costs shall meet the additional minimum standards set forth in Section 5.0; (ii) all projects shall achieve a minimum of LEED v4

²¹ For an interesting discussion titled “Is LEED Certification Worth It?”, see: <http://www.metalarchitecture.com/articles/columns/is-leed-certification-worth-it.aspx>

²² See: https://dfcm.utah.gov/wp-content/uploads/design_requirements.pdf#page=45

Silver Certification; and (iii) all projects shall specifically achieve the LEED credits as further outlined in Table 5.1.^{23 24}

It is our understanding that deans and donors for the new Law Building participated in this process, and a high level of sustainability was achieved for that project (see Section IV of this Report). Unfortunately, time and other constraints on decision makers may discourage high levels of participation and inhibit such a requirement. An alternative solution is to require or, at least, encourage, all deans and major donors engaged in a building process to complete an education module outlining the Section 5.1 design process and the benefits and consequences of different levels of sustainability achievement. Each of these steps would reduce the disconnects between decision makers and the sustainable building design process.

In addition, to achieve high levels of sustainability on campus, we believe that decision makers should be held appropriately accountable for the consequences of their decisions. One way to accomplish this is to make sustainability a formal part of the fund-raising process to encourage or require donors to assume responsibility for O&M costs²⁵. This process works successfully at other universities (such as, apparently, Brigham Young University) and should increase the likelihood that donors will understand and support sustainable building practices. Similarly, Colleges and administrative units should be financially accountable for part or all of their energy use costs and for the consequences of their sustainability decisions. This would encourage them to choose more sustainable options.

B. Design Process Disconnects

During the design phase for every new building on campus, sustainability measures are evaluated and, in particular, energy modeling is completed to estimate the energy efficiency of each new building. Ideally, the results of these models should be used by decision makers and building project steering committees to adapt their building designs in order to achieve higher energy efficiency and overall levels of sustainability. In fact, the Design Processes guidelines referred to above amount to a very thorough

²³ See: <https://facilities.utah.edu/project-resources/documents-standards/UofU%20Design%20Requirements%20Supplement.pdf.pdf>

²⁴ The “Design Process”, DFCM Design Manual University of Utah Supplement (January 15, 2016) provides additional design process requirements. See: <http://facilities.utah.edu/project-resources/documents-standards/UofU%20Design%20Process%20Supplement%2001-15-2016.pdf>

²⁵ We also recommend that engagement with the University’s Development Office be initiated to raise sensitivities in that office to the University’s sustainability commitments.

sustainability checklist.²⁶ Unfortunately, energy modeling is not always fully incorporated in final designs. This is because energy modeling takes time. Each time a building project steering committee completes and submits a design, it takes at least two weeks and often two months or more to complete the energy model for that design. This is problematic. There is an expectation at the University for buildings to be built quickly and cost effectively. It is our understanding that building project steering committees often move onto the next phase of development before energy models and cost estimates are completed and fully integrated into the project outcome. There appears to be no strong incentive for the steering committee to spend the time and money returning to the design phase after modeling has been completed to achieve a higher level of sustainability if minimum levels have been achieved. Thus, the time required to create a highly sustainable building design is incompatible with the current expectations and pressures surrounding the building design process on campus.

To address this issue, we believe that it is important for decision makers at the University to understand the time requirements needed for sustainable building design and align their expectations accordingly. This requires education as well as a cultural shift on campus if the University is to maintain its commitment to achieving its sustainability goals.

C. A Narrow Scope for Sustainability

We believe that the sustainable building process on campus is currently framed around a perhaps too narrow view of sustainability. The view is too narrow both horizontally – focusing on only a few aspects of large projects, and longitudinally – focusing primarily on short-term benefits.

1. The Horizontal Scope of Sustainability

The current sustainable building policies on campus focus on large building projects costing \$5 million dollars or more. Smaller projects, such as building repairs and renovations, do not currently have to follow any sustainability guidelines²⁷. While the focus on large projects has, and will continue to have, a substantial impact on overall sustainable building on campus, we believe this is not enough to maximize sustainability on campus or fully meet the University's current sustainability goals.

²⁶ In 2009, the noted surgeon, writer, and public health researcher, Atul Gawande, published a book called the Checklist Manifesto. In it, he describes the use of checklists to enhance success rates in a wide range of human endeavor and advocates for their wider use. He argues that checklists are especially helpful where the task or project is highly complex. We suggest that a more robust design and construction checklist process in respect of sustainability measures may improve results.

²⁷ Smaller amounts of dollars can add up. Everett Dirksen, a prominent United States Senator from Illinois in the 1960's famously said, "A million here, a million there, and sooner or later you're talking about real money."

New policies requiring sustainability standards and guidelines for smaller projects will support the University's commitment to sustainability. In the past, University personnel have worked on a process that would require smaller, non-LEED projects to follow the International Green Construction Code (IGCC)²⁸. Additionally, Facilities Management is also working to prioritize smaller building retrofit projects to increase energy efficiency. This plan is expected to be finalized short after the Facilities Management metering project is complete. Each of these projects should be completed to expand the horizontal scope of sustainability on campus. Additionally, the University Development Office apparently does not currently pursue donor support for smaller renovation projects for existing buildings. It is recommended that this policy be reviewed, as renovation projects aimed at improving sustainability may in fact be attractive to certain donors. Any additional financial resources which would help the University increase the number of small, building renovation and energy retrofitting projects on campus should be pursued.

2. The Longitudinal Scope of Sustainability

Additionally, and notwithstanding the University's announced long-term carbon neutrality goal, the University as a whole currently takes a relatively short-term view of sustainability measures. The current life cycle and energy modeling assessment tool used in the building design phase is the Life Cycle Cost Analysis (LCCA). This tool does not calculate the costs of acquiring building materials or building demolition and disposal. This shortcoming may inhibit decision makers from considering the more long-term costs of their building design decisions. Additionally, the LEED standards adopted by the University are design standards, which only measure design performance and not operational performance. Once a building receives LEED design certification, there is no mandate to monitor or maintain a high level of on-going sustainability performance.

Each of these issues prevents the University from achieving optimal long-term, on-going performance during the sustainable building design process. Potential solutions include adopting the Life Cycle Assessment (LCA) tool in addition to or to replace the LCCA. The LCA is a broad measure of building cost, including the financial and carbon costs of material acquisition, construction, operation and maintenance and demolition and disposal. Additionally, the University should consider adopting the LEED for Existing Buildings: Operations and Maintenance (LEED EB, O&M) guidelines. The implementation of the LCA and the LEED EB, O&M on campus would increase the scope of sustainability on campus and increase accountability for on-going sustainability performance, enhancing the University's ability to maintain high levels of sustainability for longer periods.

²⁸ More information on the IGCC can be found at <https://www.iccsafe.org/codes-tech-support/codes/2015-i-codes/igcc/>

Table V

Problems in the Sustainable Building Process

Problem	Description	Recommended Solutions
<p>Accountability & Benchmarking</p> <p>Macro-level</p> <p>Micro-level</p>	<p>Incremental benchmarks and energy use data are not available to hold the University accountable for making regular progress toward sustainability goals</p> <p>Facilities Management can exempt buildings from LEED Certification requirements</p> <p>Key decision makers are rarely involved in sustainable design process.</p> <p>Key decision makers are not accountable for the cost of failing to implement sustainable elements</p>	<ul style="list-style-type: none"> • Establish incremental benchmarks based on the 3 Climate Commitments or STARS Platinum program • Increase energy metering for individual campus buildings • Require presidential approval for all LEED certification exemptions • Educate and involve key decision makers on the sustainable design process • Require donors to fund O&M costs • Require Colleges and administrative units to fund O&M costs
<p>Incompatible Timelines</p>	<p>Decision makers are pressured to conclude the design phase before energy models are complete and fully integrated into building designs</p>	<ul style="list-style-type: none"> • Educate U authorizes on the time required for sustainable design • Change the culture – prioritize high levels of sustainability over short design and construction timelines
<p>Narrow Scope for Sustainability</p> <p>Horizontal scope</p> <p>Longitudinal scope</p>	<p>Sustainability policies do not pertain to small building projects under \$2.5 million</p> <p>Current policies are short term in scope, focusing on design and ignoring material acquisition costs, demolition costs, and on-going performance</p>	<ul style="list-style-type: none"> • Adopt IGCC policies for small building projects • Continue progress on prioritizing retrofit projects • Solicit donors for small building projects • Replace the LCCA with the LCA • Adopt the LEED EB O&M guidelines

VI. Student Perspectives: Determining Student Attitudes Towards Implementing Environmentally Sustainable Features in Buildings at the U

a. Introduction:

This section of the Report describes our survey of student attitudes as part of our study of building sustainability on campus. Our survey assessed student opinion concerning issues of sustainability and how their specific college at the University of Utah approaches sustainable solutions for campus building projects.

Our interest initially developed after it was discovered that the new Exec Ed Building at the Business School was to be built without acquiring LEED certification. This decision was made despite the University of Utah's public commitment to sustainability. According to our interviews and research, our group members identified gaps in the University's process of translating its commitments to implementing sustainable features into tangible results. Personnel in Facilities Management and the Sustainability Office and others suggested to us that if evidence of student support for environmentally and economically conscious building projects could be demonstrated, the results would be useful for administrators when making such decisions.

Our goal for this survey was to gauge if there was considerable student support for implementing sustainable features into buildings on campus, as well as to determine if students receive enough information from the University to allow them to form opinions about sustainable building projects. Special attention was paid to the attitudes and responses from students in the Business School with the hope that responses would identify support for incorporating LEED certification into the new Exec Ed building currently under consideration.

b. Methods:

Our survey was designed to require students to identify themselves with their affiliated college and then answer questions based on their opinions concerning issues of sustainability in their specific college. The survey was constructed on Google Forms and the appropriate settings were implemented so responses were anonymous and no identifying information of respondents was recorded upon submitting survey results. An introductory paragraph read by respondents identified the purpose of the survey and emphasized that participation in the survey is completely voluntary, all answers are anonymously recorded, and it is not required to answer every question.

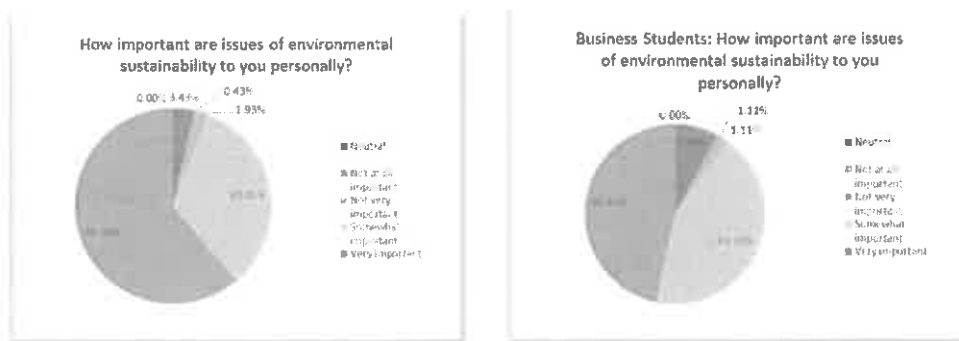
Surveys were distributed via email and in person submissions on iPads. Our team contacted each college of the University of Utah for permission of distribution via email

that would provide the link of the survey and an explanatory blurb to students who voluntarily agreed to participate. Of the seventeen colleges, fourteen consented to distribution. To specifically target Business students, team members tabled in the lobby of the Eccles Business School and provided iPads for students to voluntarily record their responses. The survey was available to students starting on April 8th, 2017 and was officially closed April 22nd, 2017. In this two-week period 472 responses were recorded.

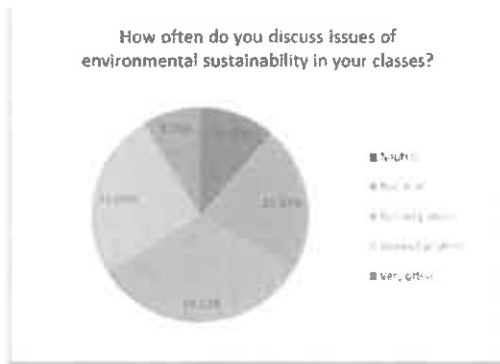
c. Results:

Of the 472 respondents, 92 were business students, constituting 19.5% of respondents, our largest demographic. The second largest demographic was represented by students in the College of Education at 12.3%, followed by students in the College of Health represented by 10.4% of respondents. No student in the School of Dentistry or the College of Nursing participated in this survey.

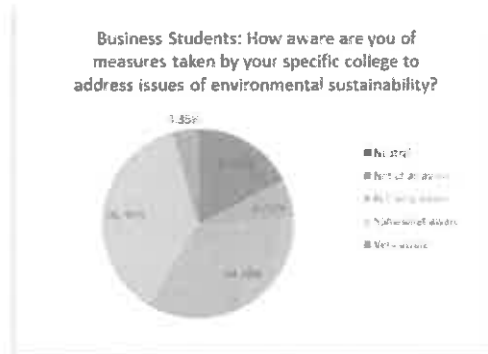
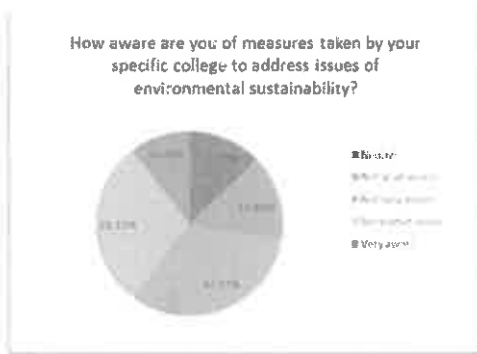
A majority of 61.4% of respondents identified that environmental sustainability was “very important” to them personally. Overall 90.4% of students responded positively that environmental sustainability was important to them to some degree and 76.7% responded that they were likely to some degree to participate in future sustainable initiatives led by their specific college. For students in the Business School, 46.7% rated sustainability as “very important” and 90% responded positively that environmental sustainability was important to them to some degree. A large majority of all survey respondents identified sustainability as important in some aspect to the University and to their college.



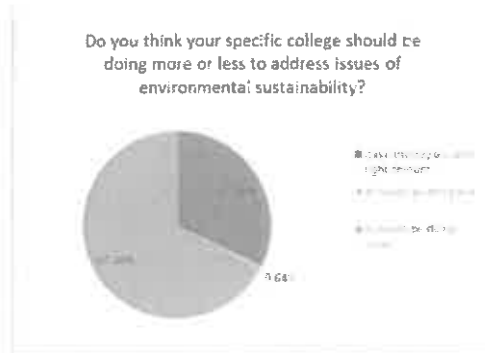
When asked how often do you discuss issues of environmental sustainability in classes, a majority of 55% answered negatively that issues were either mentioned “not very often” or “not at all” (33.1% “not very often” and 21.9% “not at all”). This trend held with students in the Business School, with 54.35% saying that issues of sustainability were not mentioned in classes (43.5% answered “not very often” and 10.9% answered “not at all”).



When asked how aware students were about measures taken by their specific college to address issues of environmental sustainability, the majority of respondents at 47.7% answered that they were either “not very aware” or “not at all aware” (32.8% “not very aware” and 15% “not at all aware”). 41.3% of students in the Business School were unaware to some degree of what measure their college had taken to address issues of sustainability (34.8% “not very aware” and 6.5% “not at all aware”).



A majority of 67.2% of respondents believed that their specific college should be doing more to address issues of environmental sustainability. This trend held to the same percentage for Business School student responses.



d. Discussion:

The survey responses demonstrate that issues of sustainability are important to University of Utah students. Yet despite believing that the University of Utah has interest in the subject, a majority of students do not discuss sustainability topics in their course curriculum and are unaware of specific measures their school has taken to implement the University's commitment to sustainability. There also is an overwhelming majority that believes their specific college could be doing more to address issues of sustainability. To us this suggests unclear communication, or possibly a lack of information, from the University to students concerning issues of how they fulfill their commitments to sustainable building initiatives. We believe these results demonstrate that students would react favorably to incorporation of environmentally and economically sustainable features in buildings, such as implementation of LEED certification into the new Exec Ed building.

**Proposed LEED Design Standard Change
For May 1, 2017 Publication
April 3, 2017 DRAFT**

The following is proposed to address concerns about waivers of LEED Design Standard requirements. This approach acknowledges the current uncertainty of how to approach remodeling projects which was an open question when the current standard was adopted and has not yet been resolved. Alternatives which have been considered in the past and which will be reviewed over the coming months include applicable LEED certifications as well as the International Green Construction Code. The intent is to resolve the approach to be taken for remodeling projects (as well as to define the types of projects for which this requirement does not apply such as utility and infrastructure projects) in time to include this revision in the subsequent publication of our design standards on November 1, 2017.

5.0 HIGH PERFORMANCE BUILDING SYSTEMS

The DFCM HPBS shall be followed on all University projects, along with the additional University requirements detailed below.

5.1 LEED Requirements

A. All University of Utah projects exceeding \$5 million of design and construction costs shall meet the following additional minimum standards, unless the ~~Associate Vice President for Facilities~~Chief Design and Construction Officer (CDCO) of the University of Utah approves an exception. The CDCO may not approve an exception for a new building without first consulting with the University President.

B. The project shall achieve a minimum of LEED v4 Silver Certification.

C. The project shall specifically achieve the LEED credits as outlined in Table 5.1

(1) Table 5.1 is not inclusive of all credits allowed under LEED v4 but shows the required credits in the University's Design Requirements as listed under University of Utah LEED Conditions column.

(2) The DFCM HPBS Requirements column shows the DFCM High Performance Building Standard items that shall be followed in addition to the University's requirements.

(3) HPBS requirements not listed are either not as strict as University's Design Requirements or not as strict as LEED requirements. LEED credits that are not listed but would be required to achieve LEED v4 Silver can be pursued at the design firms' discretion as long as the outcome is a minimum of LEEDv4 Silver certification.

APPENDIX B

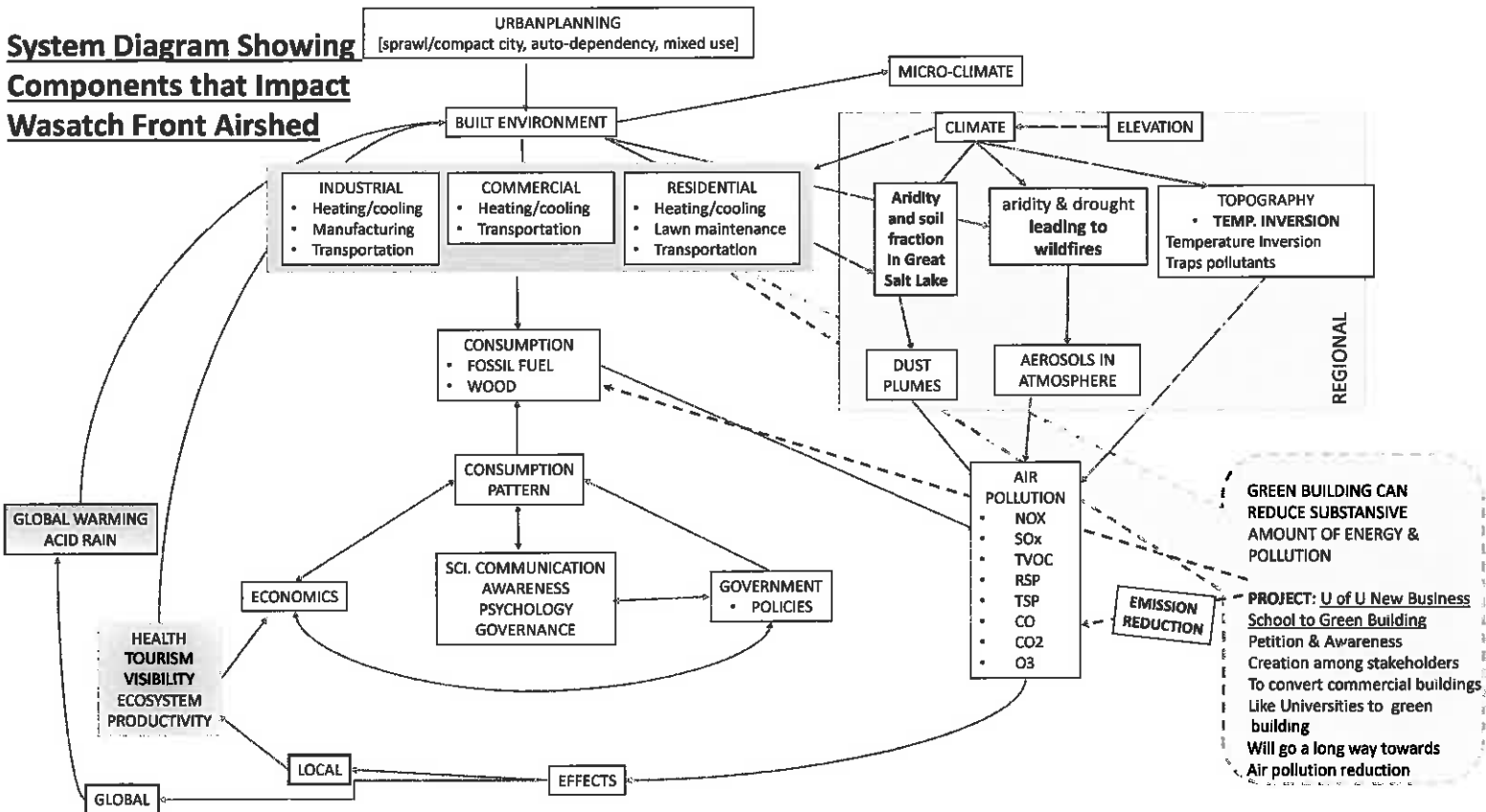
**SUST 6000 Class Project
Spring Term 2017**

**Sustainability and New Building Construction at the University
of Utah:
A Progress Report**

**Submitted By: Debolina Banerjee, Ruan de Lange, Brenden Femal, Frode Jensen, Qwynne Lackey,
Cody Lutz, Sally Meehan, and Emily Post**

April 25, 2017

System Diagram Showing Components that Impact Wasatch Front Airshed



GHG Emissions in Salt Lake City, 2009

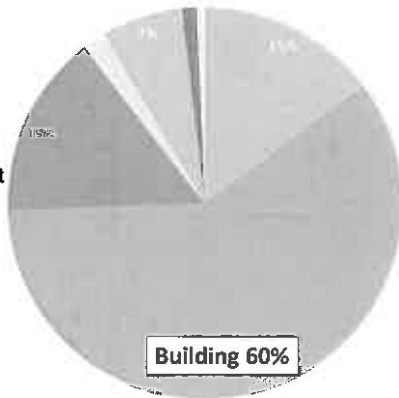
Why buildings?

Community GHG emission by Sector, 2009

Total = 4.75 Million Metric Tons Carbon Dioxide Equivalent

BUILDINGS = 74%

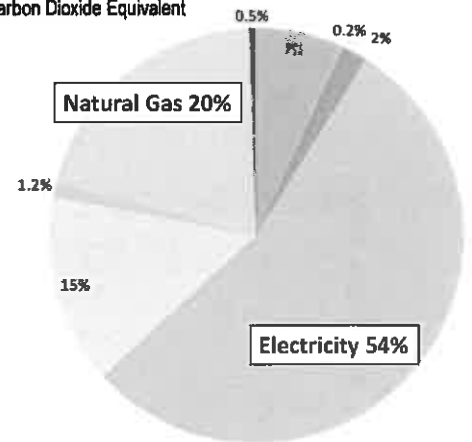
- Residential
- Commercial/Industrial
- TRANSPORTATION = 24%**
 - On-road transportation
 - Off-road vehicles and equipment
- Air traffic
- WASTE DISPOSAL = 1%**
 - Solid waste
 - Wastewater treatment
- OTHER = <1%**
 - Irrigation
 - Street and highway lighting
 - Propane



Community GHG emission by source, 2009

Total = 4.75 Million Metric Tons Carbon Dioxide Equivalent

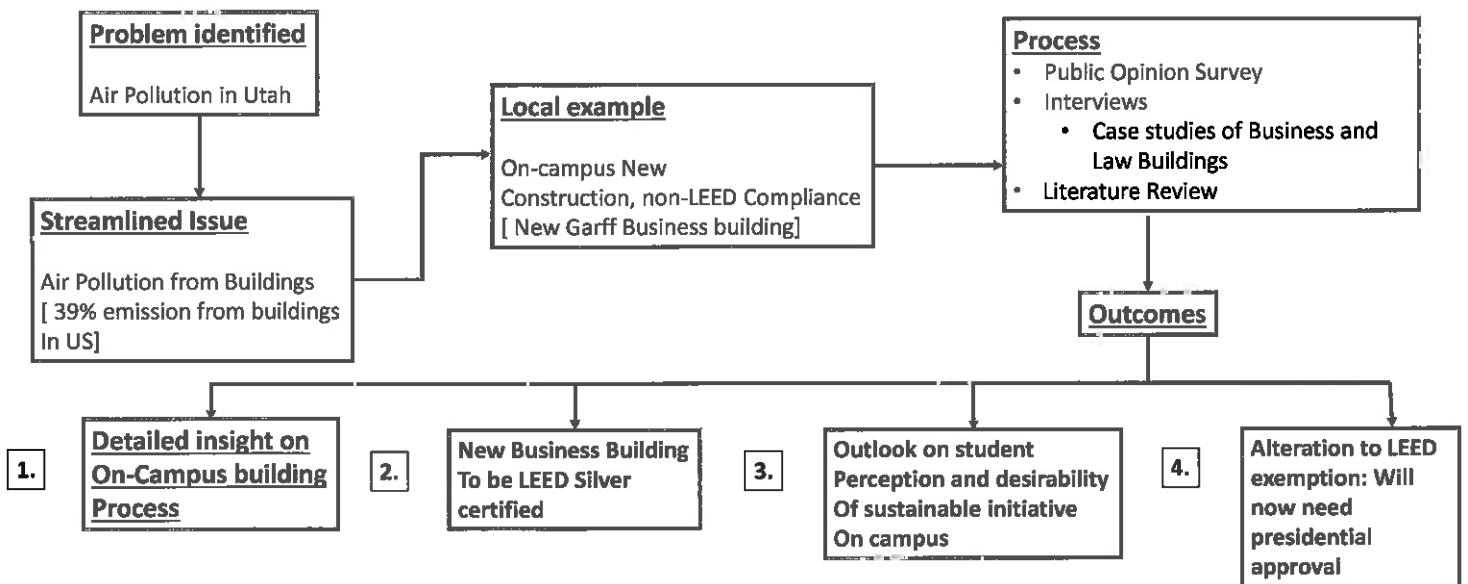
- Aviation fuels
- Compressed natural gas
- Diesel
- Electricity
- Gasoline
- Methane and nitrous oxide from waste disposal
- Natural gas
- Propane



Electricity = 2.6 million metric tons of GHG emission, Of which Buildings comprise 51%

Natural Gases= 960,000 metric ton of CO equivalent, of which Buildings comprise 20%

Workflow



History & Background

- I. The History and Background of the U's 'Commitment to Sustainability.'
 - a. The Role of the President
 - Establishment of Sustainability Office
 - Signing ACUPCC commitment in 2008
 - Publication of 2010 climate Action Plan
 - President's 7 core commitment
 - Updated Climate Action Plan
 - b. The Role of the Facilities Management Department in supporting the 'Sustainability Commitment' of the University.
 - DCFM High Performance Building Standards
 - DCFM Integrated building process
 - Facilities Management LEED requirements
 - c. The Role of the Sustainability Office in supporting the 'Sustainability Commitment' of the University.
 - Mission to integrate sustainability on campus
 - Vision to create culture of responsibility for sustainability
 - Core Values: Collect data and best practices to track progress and implement change

Case Studies

SJ Quinney Law School

- Decision was made from the on-set of the design to construct a new building that corresponds with their environmental curriculum
- Sustainability minded Architects and Builders
- Alternative Vision Funds – \$5 million donation designated specifically for green infrastructure and features

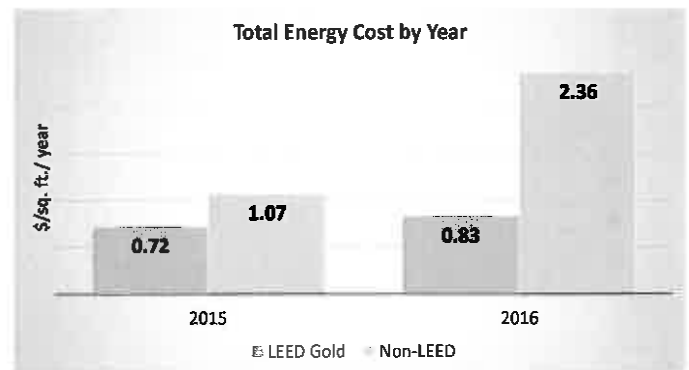
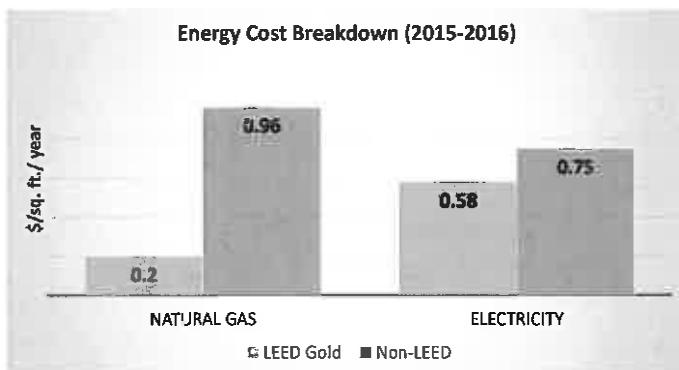
David Eccles School of Business Robert H and Katherine B. Garff Executive Education Building

- Cost reduction from \$60-\$40 M.
 - LEED silver exemption from Chief of Design and Construction to save costs
- Stated commitment to sustainability
- Value saving construction costs over operating cost reductions

Comparison of Energy Use and Cost in LEED Vs. Non-LEED Building – On Campus

Building on Campus:

- 112 – LEED Gold – 163,726 sq. ft.
- 806 – Non-LEED – 43,485 sq. ft.



Back of the envelope calculations:

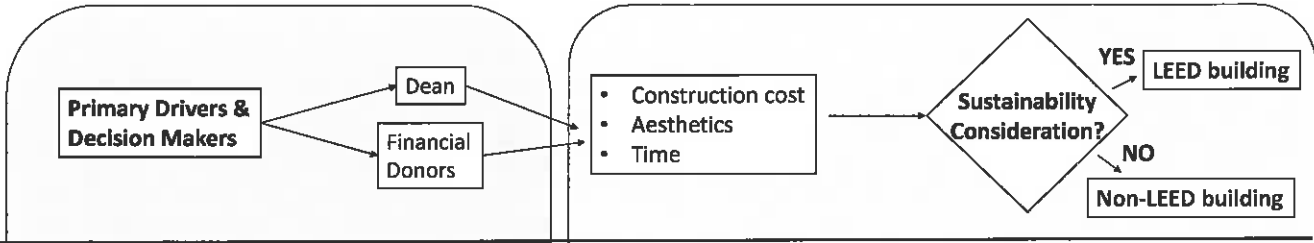
~ **\$100,000 savings/year** for a 100,000 sq. ft. building

Over 50 year life span of a 100,000 sq. ft. building: ~ **\$5,000,000** in energy savings

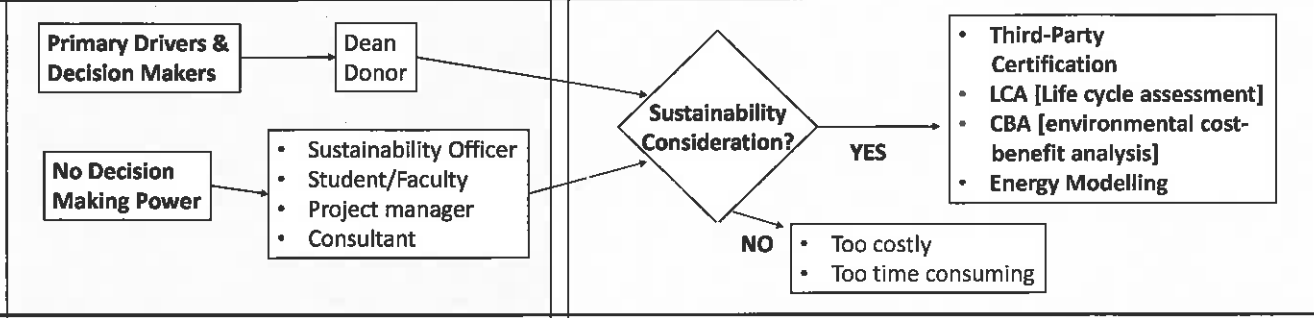
- Much less natural gas usage, provides security from price changes in fossil fuels

***On-campus
Building
Process***

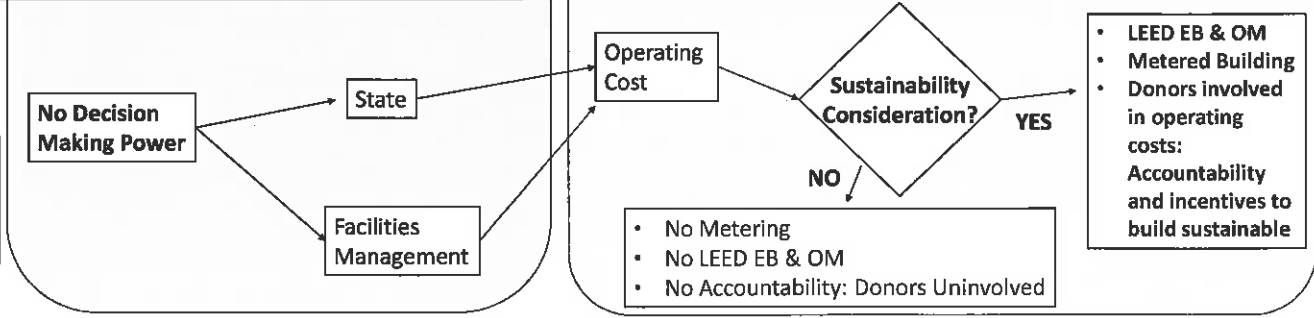
**CONCEPTION
PHASE**



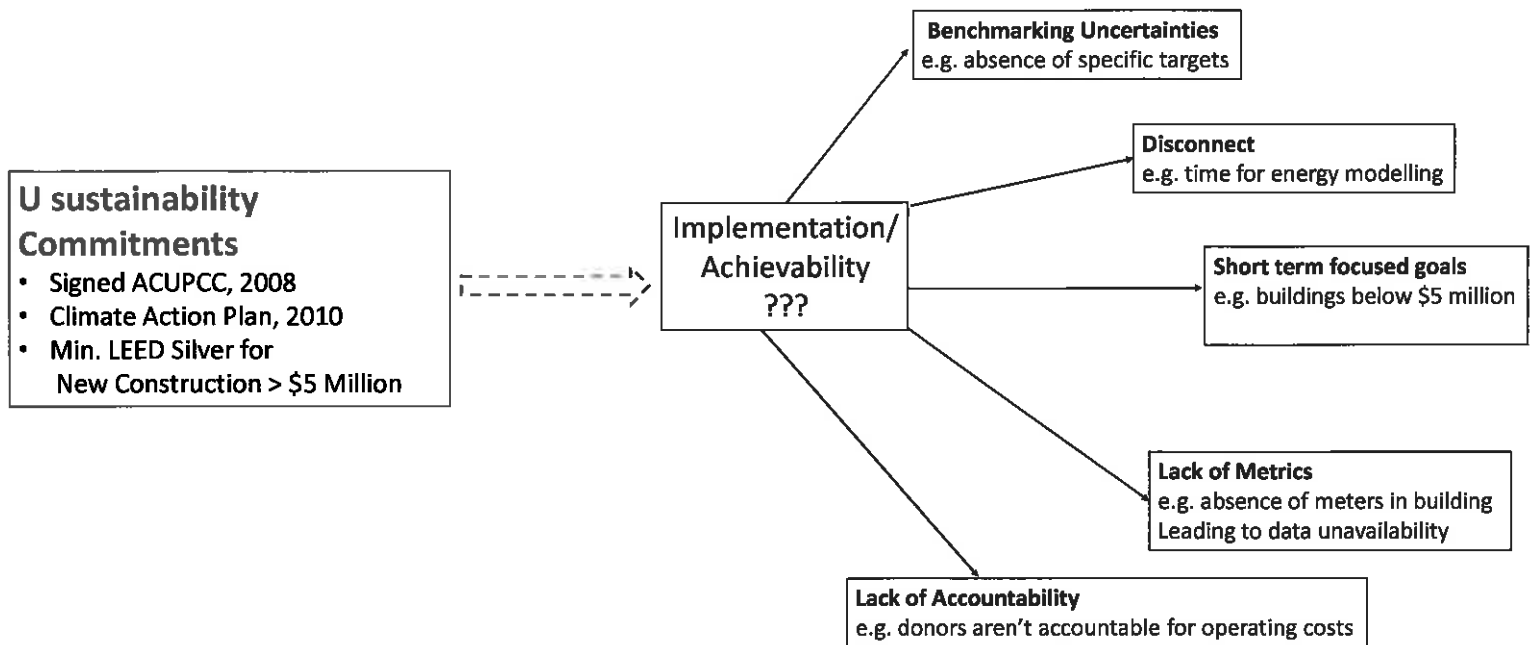
**DESIGN
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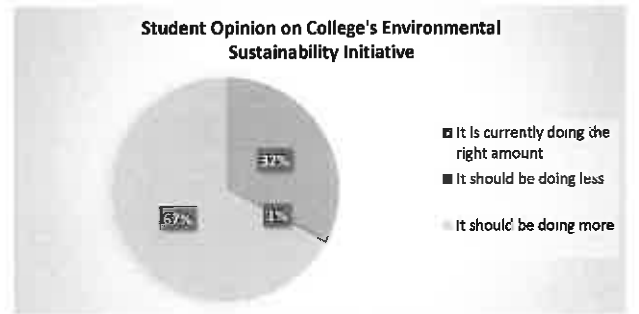
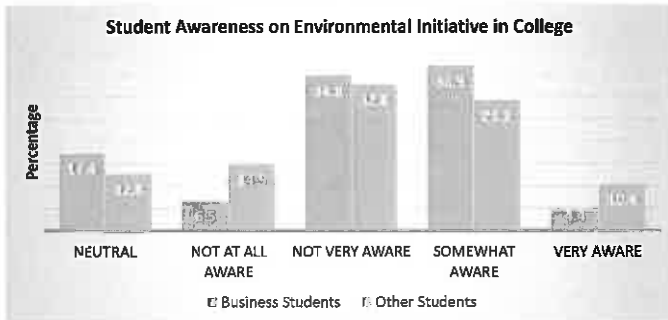
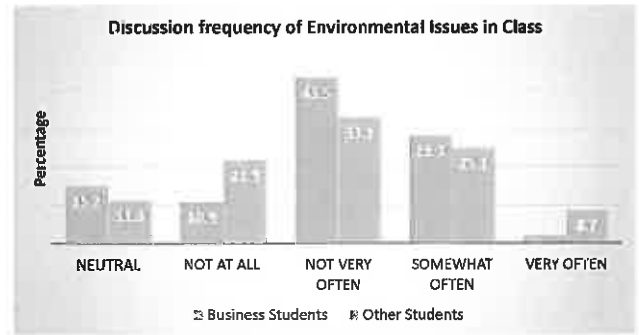
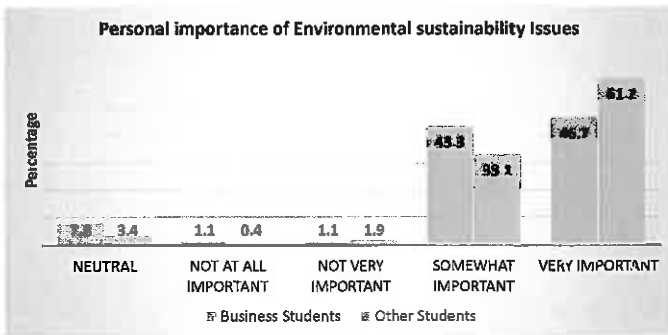
**POST-
CONSTRUCTION
PHASE**



Macro-Level Sustainability Issues in Construction- On Campus



Student Opinion survey on Campus sustainability & Involvement



Takeaways from Survey Results

- University of Utah students, including those in the Business school, demonstrate that issues concerning sustainability are of value to them.
- An overwhelming majority of students believe more should be done concerning sustainable initiatives on campus.
- While the University is perceived as being committed to sustainable initiatives, information concerning sustainability is not incorporated into course curricula and students do not seem aware of specific measures their school has taken to be sustainable.
- Seems to be unclear communication and little information flowing from the University to students concerning issues of how they honor their commitments to sustainability.

Are student opinions being taken into account?

Suggestions for Future

- Establish incremental benchmarks and increase energy metering for individual campus buildings to promote accountability
- Adopt policies that include a wider scope of building projects
- Alleviate pressures decision makers face during designing processes that prioritize short-term design and construction timelines
- Make key decision makers in building process more involved and accountable towards implementing sustainable goals through alternations in approval and funding processes (on both macro- and micro-levels)

Concluding Thoughts

University of Utah has a unique opportunity to lead the region in all areas of sustainability, but there are gaps in the process that restrict us from achieving our full potential.

- Sustainable commitments appear uneven across departments and reflect conflict between greater upfront costs vs. long term pay-offs.
- High student interest compared with low student awareness of sustainable measures reflects the need for catch-up of the University in meeting student needs.
- The University may need to incorporate more requirements and incentives that support greater sustainability investments.

The administration's positive response
shows we have the potential to improve!