UtahStateUniversity

CLIMATE ACTION PLAN

LOGAN • UTAH

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Credits

Primary contributors to the production of this document

Stan Albrecht, President, Utah State University

Nat Frazer, Dean, College of Natural Resources

Jack Greene, Sustainability Staff

Jeff R. Broadbent, Associate Vice President for Research, Office of the Vice President for Research

Jordy Guth, USU Architect

Ben Barrett, USU Planner

Patsy Palacios, S. J. and Jessie E. Quinney Natural Resources Research Library Coordinator

Rachel Quistberg, College of Natural Resources Staff Assistant

Executive Summary

UtahStateUniversity

This Climate Action Plan (CAP) has been prepared by the Utah State University Sustainability Council in support of the American College and University Presidents' Climate Commitment (ACUPCC), signed by Utah State University president, Stan Albrecht on January 22, 2007. The CAP outlines specific strategies and mitigation steps to minimize USU's greenhouse gas (GHG) emissions and climate impacts. This will be achieved by (1) reducing campus energy consumption, (2) obtaining energy from renewable and sustainable sources, (3) institutionalizing a sustainable culture among students, faculty, and staff, and as a last resort (4) purchasing carbon offsets.

By adopting this plan, USU commits to the following:

- Reducing net GHG emissions
- Achieving carbon neutrality by our target date of 2050
- Providing resources necessary to implement actions

Our CAP provides a list of specific strategies and actions for reducing emissions. Acknowledging the uncertainty of future carbon legislation and markets, utility fuel mixes, campus population, and financial circumstances, the USU Sustainability Council is in the process of addressing specific means for emissions reductions, including specific projects, building upgrades, and policy changes. Detailed operational actions will be developed as a set of five-year plans, continually revised as new technologies and opportunities arise. USU's CAP also includes strategies for including sustainability and climate change in the curriculum and co-curriculum. Many of the actions listed have significant potential to enhance student learning.

It is highly unlikely that USU will be able to make substantial progress on its climate commitment without a source of designated funding. Potential funding sources may include parking fee revenue, establishment of a revolving loan fund, building endowments, utility company incentives, federal and/or state grants, donations, voluntary student fee increases, and/or increasing the institutional operating budget.

Introduction | UtahStateUniversity

On January 22, 2007 USU President Stan L. Albrecht became a Charter Signatory of the American College and University President's Climate Commitment (ACUPCC) document, and the first university president in Utah to sign the Commitment. The ACUPCC goals include the development of climate neutrality for member campuses, as well as educating students to achieve the same for society at large. President Albrecht's signature and leadership have set in motion numerous actions and activities directed at transitioning USU to a carbon neutral institution by 2050.

Fortunately, USU has a history of implementing sustainable practices and energy conservation, allowing us to "leapfrog" past several common barriers to this effort, especially in the areas of energy generation, physical plant operation, transportation, and waste management. Early impetus came in 1991 with President Stanford Cazier's signing of the Tallories Declaration, a declaration created for and by presidents of institutions of higher learning for sustainability. The Declaration called for institutions of higher learning to become world leaders in developing, creating, supporting, and maintaining sustainability. President George Emert renewed USU's commitment to the Declaration in 1993. In 2001 President Kermit Hall named a committee that produced the AggiEcology Report in 2003 (http://extension.usu.edu/htm/publications/publication=8054). The Report served as a national model for campus sustainability. Given the tradition of such activities, it was no surprise that USU was recently included in the "Princeton Review Guide to 286 Green Colleges" for its strong commitment to sustainability.

Following the signing of the ACUPCC, President Albrecht appointed a University Sustainability Council comprised of faculty, staff, and students. The Council created several standing committees to develop outreach, education, research, and conservation/sustainability efforts. The main focus of the Council is to achieve the goals outlined in the President's Climate Commitment, most specifically to reduce carbon emissions with the goal of accomplishing climate neutrality. USU is a contributing member of the Association for the Advancement of Sustainability in Higher Education (AASHE).

One of the first products of the Council was the USU sustainability policy:

> *"Utah State University (USU) is one of the nation's premier, student-centered, land-grant, and space-grant universities. The University is committed to enhancing the quality of life for individuals and communities by promoting sustainability in its operations and academic and service missions.*
>
> *USU will develop appropriate systems for managing environmental, social, and economic sustainability programs with specific goals and objectives. This policy supports the goal of the USU statewide system to prepare students, faculty, and staff to proactively contribute to a high quality of life for present and future generations."*

USU seeks to implement sustainable practices in all areas of the University with students serving key roles, particularly in special events such as Sustainability Week, Earth Day, multicultural events, and the Bioneers and Sustainable Landscapes conferences. Most recently, an effort was launched to involve all incoming freshmen and new students to our mission through workshops and exhibits during the Student Orientation Advisory and Registration (SOAR) and "Connections" programs.

Some of the more visible efforts include a very ambitious recycling program, University participation in RecycleMania, transforming the Aggie Shuttle system with CNG buses, the Aggie Blue Bikes loaner program, water efficient landscaping with interpretive signing, and several new LEED-certified buildings (both silver and platinum). In addition, the implementing of a Campus Wellness program that promotes healthy lifestyles included maps showing campus walking routes and more sustainable meal choices in the University's dining areas. Further information regarding these programs can be located at our website http://sustainability.usu.edu.

A lone biker pedaled to power the microphone for USU's president, Stan Albrecht, Earth Day 2010 speech

USU Greenhouse Gas Emissions Inventory

UtahStateUniversity

In 2008, USU conducted an inventory of greenhouse gas (GHG) emissions to establish an emissions baseline (see Appendix A). The inventory focused on scope I, II, and several significant scope III emissions (see Box 1 in Appendix A). The majority of USU's emissions were from travel, electricity generation, and natural gas consumption (Figure 1). This suggests that USU's largest opportunities for GHG emissions reductions are related to energy use on campus. However, the relatively large contribution of emissions resulting from commuting and air travel suggests that we also have the potential to reduce GHG emissions significantly through strategies that reduce or compensate for the number of miles travelled per capita, by increasing the efficiency of the means of transportation, or by instituting behavioral changes that result in fewer miles travelled. This will be particularly challenging for students, faculty, and staff at our Regional Campuses.

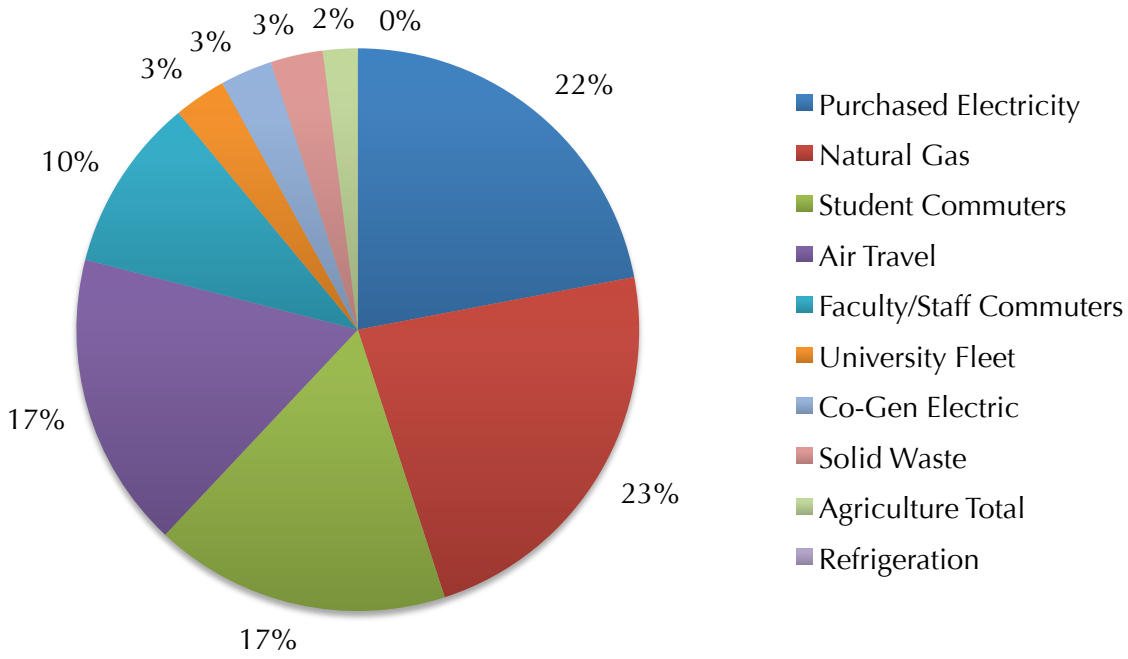


Figure 1. Total USU GHG Emissions by Source

USU has recorded a 20% increase in student population since 1990, but only a 1% increase in our corresponding energy growth. This is a strong indicator of the energy conservation and energy efficiency projects and policies that have been implemented during this time, both from the state level and on our campus have been effective. What follows is a summary of these activities and suggestions for going forward.

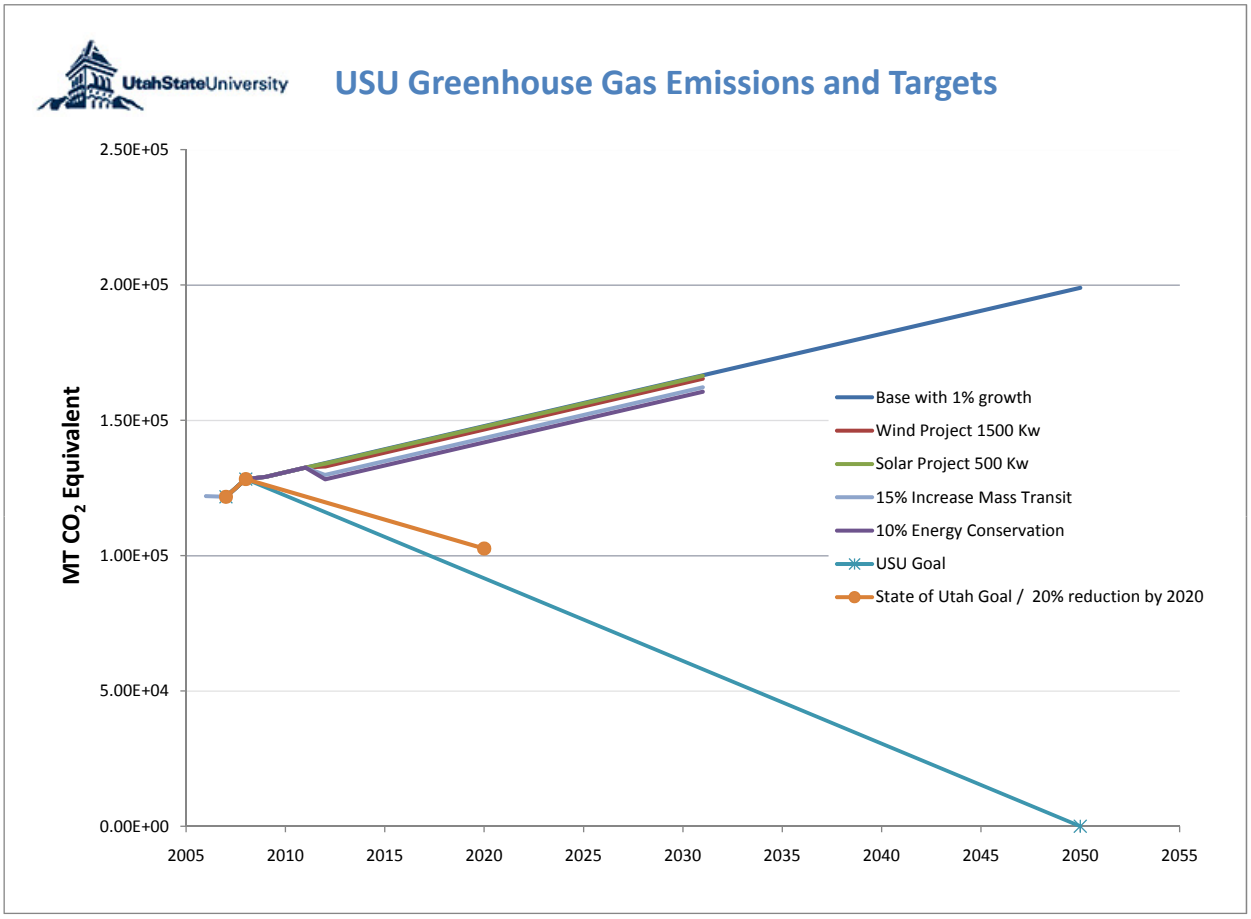


Figure 2. GHG Emissions & Targets Graph

Attaining carbon neutrality by 2050 will require major shifts in behaviors, policy, economics, and technology.

Energy

Physical Plant

USU has taken several measures to increase energy efficiency across campus. We replaced our coal-generated power plant with hydroelectric and natural gas co-generation installations, reducing emissions from 265 tons per year to less than 20 tons per year over the last five years. The new energy plant heats 1/3 of the campus by re-capturing waste heat as a by-product of electricity production. We have installed occupancy sensors for lighting in several campus locations and retrofitted 3.5 million square feet of space with new efficient fluorescent lighting, reducing our power bill by 30%. To date, four USU buildings have been retro-commissioned to maximize energy efficiency. USU has two LEED's certified buildings, including the new Wetland Discovery Point education building at the Utah Botanical center, making it the first state-owned building in Utah to receive Platinum LEED certification. Our recently acquired Swaner Eco-Center also boasts a LEED platinum certification. The State of Utah recently adopted policies that will require all new state buildings to meet at least LEED silver standards. This will increase the energy efficiencies of future campus buildings.

Swaner Eco-Center from www.swanerecocenter.org

The University also has instituted a program working with science departments to encourage closing of fume hood sashes in laboratories to minimum levels when hoods are inactive. We also have established a schedule for maintaining laboratory refrigeration equipment in good condition with condensing coils and having fans cleaned frequently while equipment that is deemed to be in poor condition and low efficiency is replaced. USU also conducted feasibility studies for placing a wind generator on University property and installing a second hydroelectric generation on the Logan River as additional sources of renewable electrical power generation. At present, there are no options for acquiring electrical power generated from renewable resources through the City of Logan. However, we fully expect that as wind and solar become more prevalent in Utah and the Intermountain West, these options will become available over the next few years. Support for renewable energy in our state is evidenced by the defeat of a proposal for a new coal-generated electrical plant in Utah last year.

Utah Botanical Garden from theutahhouse.org

Information Technology

The University IT administration has instituted additional activities to lower carbon emissions primarily through increasing energy efficiency. Energy efficient chillers in the data center were installed to provide air conditioning. The data center has greatly benefited from the existing chilled water plant, including the elimination of all CFC refrigerants, a potent greenhouse gas. Many University servers have been moved to the Data Center, eliminating the need to cool multiple rooms across several buildings. This has resulted in an estimated energy savings of 35 - 40%.

The IT department has implemented an energy conservation program through purchasing Energy Star equipment (all new servers are Energy Star rated) and providing education on powering down equipment where appropriate. They have installed energy efficient lighting with timers in their building space. In addition, they have helped USU create a new paperless travel documentation system, reducing the use of both paper and energy.

Transportation

Transportation accounted for nearly half (47%) of the University's total greenhouse gas emissions for fiscal year 2007. Commuting by students, faculty, and staff contributes 27%, air travel by students, faculty, and staff contributes 17%, while University fleet transportation contributes only 3%.

Wherever possible we encourage and incentivize the following for faculty, staff, and students:

- Use of bicycles for commuting and promotion of a bike friendly campus through AggieBlue Bikes;
- Attendance at multi-campus meetings and training sessions by videoconferencing; and
- Purchase of alternative-fueled, hybrid, and "right-sized" University vehicles.

As mentioned previously, the Aggie Shuttle buses now burn natural gas rather than diesel fuel. The Aggie Blue Bikes program enables students to checkout over 200 bicycles for their own use. Over the last two years, the USU motor pool facilities operations and individual colleges have purchased more efficient vehicles including hybrids and an electric vehicle. The University revised its Vehicle Use Policy in 2010 to comply with Utah House Bill 110 "State Fleet Efficiency Requirements." The bill implements a plan to increase the fleet energy efficiency 20% by the year 2015. New vehicles purchased by any USU unit must be hybrid or alternative fueled and "right-sized" for the intended use. Any request for waivers of the Policy must be approved at the level of Dean or Vice President. The new Policy also requires annual emissions testing on all vehicles in the University's fleet or individual departments.

Aggie Blue Bikers from www.usu.edu/wellness-programs/sustainability

Recycling

USU's recycling program has grown from a small operation with one vehicle for retrieval in 1990, to a full-fledged Recycling Center with 10,000 square feet of space and 11 employees in 2009. Last year USU recycled over 665 tons of material in 23 different categories and expanded services to include collection of move-out goods from residence halls. The University continues to participate in RecycleMania and student organizations (such as Aggie Recyclers) have begun promoting recycling activities among their peers. Future plans call for adding recycling bins to all the offices on campus and converting to a single-stream recycling process.

USU Recycling truck from www.usu.edu/recycle/dropoffs

College of Natural Resources student out on Earth Day 2010 to inspire future generations at the USU Sustainability booth.

Carbon Credits

We recognize that USU is unlikely to be able to achieve carbon neutrality without engaging in the acquisition of carbon credits to offset some emissions. However, we are committed to purchasing such credits only as a last resort. Furthermore, we are committed to purchasing any such credits as close to campus as possible. As responsible stewards of the environment, our commitment is to help improve air quality in Utah, which suffers from severe winter inversions resulting in brief periods where we experience some of the worst air quality in the nation.

Just as we go to press, the Sustainability Council received permission from the Director of Utah's State and Institutional Trust Lands Administration (SITLA) allowing us to claim any carbon sequestered by those SITLA lands previously designated for the benefit of USU. We are currently in the process of engaging University climate, soil, and vegetation scientists to determine the annual amount of carbon sequestered by the more than 28,000 of those land parcels (see Appendix B).

Outreach and Public Engagement

Blue Goes Green

USU actively promotes sustainability efforts on campus and in the greater community by increasing awareness and encouraging involvement.

An important first step for the Sustainability Council was to create a universal symbol for sustainability with a new tagline, "Blue Goes Green," and the corresponding logo shown above. The Council maintains a presence at many USU events and organized USU's first Sustainability Week in 2009. Members of the Council created and maintains a University Sustainability Website, and has implemented a pledge program titled "Take the Challenge," in which students, faculty, and staff who commit to lowering their personal carbon footprint are provided with T-shirts, tote bags or other items and track their progress via email. So far, more than 500 people have taken the Challenge, and USU will continue to promote it within the University and community.

Getting information to the public at the USU "Day on the Quad" Celebration

Several units on campus have established key programs in community outreach. USU's Wellness Program promotes local organic food, drinking water from reusable containers, and alternative transportation choices. The Service Learning Program integrates hands-on sustainability projects as a part of the educational experience. Extension personnel partner with local, state, and federal governmental agencies to deliver educational programs addressing issues such as water conservation, native gardening, and energy. Graduate students have established an organic garden on campus and offer excess produce for sale. The Utah Botanical Center offers demonstration low water and native plant gardens, wetlands classes, and energy efficient buildings as educational components. The recent acquisition of the Swaner EcoCenter and Preserve provide additional opportunities for community education related to sustainable environments. Several annual sustainability conferences, such as Bioneers, Restoring the West, and Sustainable Landscapes are hosted at USU annually. University Catering Services provides recyclable or compostable plates, flatware, and cups.

Future programs to enhance community outreach for sustainability at USU will include:

- Joining Earth Hour and the Graduation Pledge Alliance;
- Developing interpretive maps and providing tours featuring sustainability on campus;
- Greening USU conferences by providing options to conserve energy and resources, offsetting carbon emissions from travel, and using technology to allow remote attendance;
- Increasing awareness of energy consumption within the residence halls by appointing eco-reps and organizing competitions;
- Initiating Little Aggies for sustainability, an educational program to involve local kids in sustainability projects while educating future generations in lifestyle choices that make a difference;
- Initiating a Travelling Road Show throughout the state of Utah that works with Regional Campuses and other communities to explore and implement ideas to reduce our collective carbon footprint;
- Developing an incentive program to reward students, faculty and staff who volunteer their time to community outreach or implement creative strategies for reducing the carbon footprint of USU;
- Securing funds to expand the temporary sustainability intern position into a permanent sustainability coordinator position and to fund sustainability projects, such as the implementation of student sustainability fees, gas or parking taxes, partnering agencies, or through grant opportunities;

Creating a voluntary program for offsetting carbon emissions for university travel, partnering with local agencies or non-profits for implementation.

Marketing

Community outreach is dependent on successful communication with the public. The Public Relations and Marketing department at USU has a designated staff member to work with the Sustainability Council's standing Committee on Outreach. Another key component to visibility and recognition for sustainability programs at USU is the use of the tagline "Blue Goes Green" and corresponding logo. This has become the universal symbol of sustainability at USU. Major events and noteworthy projects are covered in student and local newspapers, and featured on USU's website home page and the University's Public Radio station. The Sustainability Council maintains a presence at major USU events, such as Earth Day on the Quad, wellness expos, health fairs, orientation for incoming students, and the annual Bioneers Conference. The Council has sponsored factoids in The Statesman (student newspaper) and posters with monthly themes highlighted with posters on Aggie Shuttle buses. The Council also participates in events sponsored by the Logan City Environmental Department.

Website

In 2008, the Sustainability Council launched a new website dedicated to promoting and reporting on sustainability activities at USU (http://sustainability.usu.edu). The website is designed to be a key resource for both campus and the community. It has many interactive features, such as a 'wiki' to allow individuals to create and share content, and online access to "Take the Challenge." A Facebook page for USU Sustainability is also linked to the site.

Education Modules

The Sustainability Council is developing educational modules for sustainability to be available to a wide range of programs within the University and community. The modules are designed to educate USU students, employees, and community members about definitions of sustainability, emerging issues and developments in sustainability, sustainable practices being used on campus, and how to get involved in sustainability at USU.

Sustainability Week

The Council launched its first Sustainability Week in the fall of 2009, promoting awareness and highlighting the success of sustainability efforts campus-wide through fun, educational presentations and events. USU will continue to expand and develop Sustainability Week as an annual event free and open to the public.

Wellness

The USU Wellness program was established in 2007, and contributes to reducing USU's carbon footprint through outreach efforts promoting local organic food and water, less meat consumption, and walking and biking to enhance health and reduce harmful emissions.

Service Learning

USU has a strong tradition of service learning as a part of the educational experience. Sustainability projects such as construction of interpretive gardens and trails have been completed through this program. USU will continue to incorporate sustainability projects as a way for students to have a hands-on experience, enhancing sustainability at the University.

Extension Programs

USU has a number of successful extension programs specializing in community education and outreach. The USU extension program has successfully partnered with local, state, and federal agencies, and delivers educational programs in sustainability to communities statewide. These programs provide resources in energy efficiency choices, water wise and native gardening, sustainable agriculture, and urban farming among others. Two of the most successful educational outreach programs are the Utah Botanical Center and the Swaner Preserve and EcoCenter, as mentioned previously.

Student Engagement for Sustainability and Climate Action

USU is striving to engage all students in some aspect of sustainability, both on and off campus through the outreach activities mentioned above, along with course offerings listed below and in Appendix D. Additionally, the SOAR and Connections programs for incoming freshman will offer workshops and exhibits focused on sustainability. Student ambassadors are being trained to include some of this information in their presentations as well. Student service organizations and student interns need to be added to these efforts. Through these opportunities, students experience many real world, hands-on immersions, often resulting in life changing transformations. (Organizations listed in Appendix C)

This combination will assure that virtually all students will have some exposure to the concepts of sustainability as well as the current and potential impacts of climate change on the biosphere, economic systems, and social structures. But most importantly, students will have wide exposure to the University's sustainability actions and see how their personal activities and decisions can contribute towards carbon neutrality and sustainability.

Recycling volunteers from www.usu.edu/recycle/volunteer

Curriculum

USU is in the process of making climate neutrality and sustainability a part of both curriculum and other educational experiences for all students. We have introduced climate and sustainability in the Connections Fall Semester curriculum for approximately 1,700 incoming freshmen. The Connections Program has created information pages for their instructor and student manuals. Instructors will receive information on sustainability issues and Sustainability Council members are available for classroom lectures. (A list of courses offered is shown in Appendix D)

The Sustainability Council also is developing lectures and workshops to be included in the SOAR Program (USU's summer orientation for new students). Sustainability information has also been included in the USU New Student Planner. During SOAR students are being directed to the information and opportunities to become engaged in campus sustainability efforts.

Liberal Education and America's Promise (LEAP) at USU

On October 30, 2009 the Association of American Colleges and Universities announced that Utah is the fifth official state partner in its continuing national initiative, Liberal Education and America's Promise (LEAP): Excellence for Everyone as a Nation Goes to College. The LEAP program will require USU to revise its general education curriculum by focusing on major issues. According to the current chair of the USU General Education Curriculum Committee, this initiative provides many portals for sustainability as it focuses on the world's major questions. We are committed to having 'sustainability' be one of the major themes guiding our general education revisions.

Grass-roots faculty efforts

We have identified over 50 faculty members at USU who routinely teach sustainability and/or climate change in some 70 courses across campus. In a recent meeting with them, we found that most were willing to enhance these aspects of their course content and to share information with each other.

Evaluation

In the absence of information gathering and evaluation, no educational program can be deemed to have been successful. The new head of our institutional research office has pledged to assist us in determining how many individual students take one or more of the 'grass-roots' courses each year. By determining how many unique individuals we have reached in SOAR, Connections, LEAP and other courses by the time they graduate, we will be able to monitor our success at reaching 'all students' as required by the ACUPCC. Plans also have been made to include specific questions on sustainability in the annual freshman/sophomore survey and the survey of recent USU graduates. This will enable us to assess whether our efforts at increasing student awareness of sustainability have been successful.

Aggie student organic farm students selling produce on the USU campus

Climate Change and Sustainability Research

Existing Research and Resources

Utah State University has several established and newly developed programs that perform cutting-edge, sustainability-related research. Because sustainability is a multidisciplinary topic, these programs draw expertise from the physical, life, and social sciences, business economics and policy, and other disciplines distributed across many of USU's departments and colleges. Some of the more prominent programs include:

Intermountain Center for River Rehabilitation and Restoration
http://www.cnr.usu.edu/icrrr/

ICRRR
Intermountain Center for River Rehabilitation and Restoration

ICCRRR conducts its work through completion of targeted research projects, providing decision support to federal agencies and adaptive management programs, evaluating the performance of previously constructed restoration projects, and teaching short courses about stream restoration methodology to practitioners.

ICRRR's regional focus is the streams and rivers of the Intermountain West. These riverine systems are critical ecosystem resources that support valued native and sport fisheries, while also supporting water supply and power production uses by society. The goal is to promote the scientific management, rehabilitation, and restoration of these valuable ecosystems.

Center for Market Diffusion of Renewable Energy and Clean Technology
http://huntsman.usu.edu/cleantech/

Housed in the Jon M. Huntsman School of Business, this research and educational outreach Center is funded by congressionally directed and competitive grants from the U.S. Department of Energy's Wind Powering America program. Directed by experts in the market diffusion of clean technology and green marketing, the Center pursues research aimed at helping Utah overcome market, social and policy barriers to benefit economically from these growing entrepreneurial opportunities, and how wind power development will impact Utah's economy. With the help of a grant from the Marriner S. Eccles Foundation, the center is also studying how wind power and other renewable energy sources will affect Utah's retail electricity rates. In addition, the Center provides research and hands-on marketing opportunities as career accelerators for USU students.

Wind power turbines at the mouth of Spanish Fork Canyon from utahcountyreviews.com

Center for Profitable Uses of Agricultural Byproducts (CPUAB)
http://www.engineering.usu.edu/htm/research/research- by-vectors/engineered-biological-systems/center-for-profitable-uses-of-agricultural-byproducts-cpuab

The CPUAB is focused on profitable uses for food production and processing byproducts and methods to increase the value of salable food products. Researchers in the CPUAB developed a patented anaerobic digester system that produces electricity, heat, and soil amendment from manure and food processing waste. More recent research seeks to adopt this technology and other types of bioreactors toward efficient production of hydrogen gas from agricultural byproducts. In addition to its energy-related work, the CPUAB is also doing research to produce nutriceuticals from food processing waste.

Utah Energy Laboratory (elab)
http://biofuels.usu.edu/

By assembling interdisciplinary research teams at the University and at partnering institutions, elab seeks to develop solutions to America's most intractable energy problems through scientific and technological innovation. The Laboratory provides a cohesive framework that allows faculty, students, and partnering institutions to focus on contemporary energy-related research issues. Its first initiative, which serves as the model for those to follow, is focused on development of enabling technologies that lead to a new class of algal biofuels. Because energy innovations are often driven by economic and policy decisions, elab has a secondary role to provide objective data and analyses on energy-related topics to public and private stakeholders.

Sustainable Agriculture Research and Education (SARE)
http://wsare.usu.edu/

SARE is a program of the U.S. Department of Agriculture that functions through competitive grants conducted cooperatively by farmers, ranchers, researchers and agriculture professionals to advance farm and ranch systems that are profitable, environmentally sound and good for communities.

Utah Center for Water Resources Research (UCWRR)
http://uwrl.usu.edu/partnerships/niwr/index.html

The mission of the UCWRR is related to stewardship of water quantity and quality through collaboration with government and private sectors. The UCWRR facilitates water research, outreach, design, and testing elements within a university environment that supports student education and citizen training. The UCWRR actively assists the Utah Department of Environmental Quality, the Utah Department of Natural Resources, the State Engineer's Office, and all local health departments with specific problems related to each state government unit. The water-related research capabilities of the Center are augmented by an air

quality research group that investigates air quality issues that affect human health and the environment. This team also collaborates with a wide range of local groups and agencies, including various colleagues at USU, the Utah Division of Air Quality, the Bear River Health Department, the Utah County Health Department, the National Park Service, and USU's Space Dynamics Laboratory.

Utah Climate Center (UCC)
http://climate.usurf.usu.edu/

The UCC provides archival weather and climate information and creates computer models based on historic observations to study climate changes and patterns. Its mission is to facilitate access to climate data and information, and to use expertise in atmospheric science to interpret climate information in an accurate and innovative fashion for the public. The mission includes the design of new products to meet present and future needs of agriculture, natural resources, government, industry, tourism, and educational organizations in Utah and the intermountain region. The Climate Center also develops climate-related information to supplement science curriculum in schools.

Utah Science Technology and Research Initiative (USTAR)
http://ustar.usu.edu/

Founded in 2006 by legislation that was developed through collaboration between Utah's business leaders, the Governor's Office, and legislative and university leaders, USTAR is designed to bolster Utah's high-tech economy by investing in recruiting new, high caliber faculty and university research programs. USTAR invests in university research with high commercialization potential that will accelerate the growth of new businesses and industries. Sustainability is a prevalent theme among the USTAR programs that have been funded at Utah State University. Major sustainability-related initiatives include:

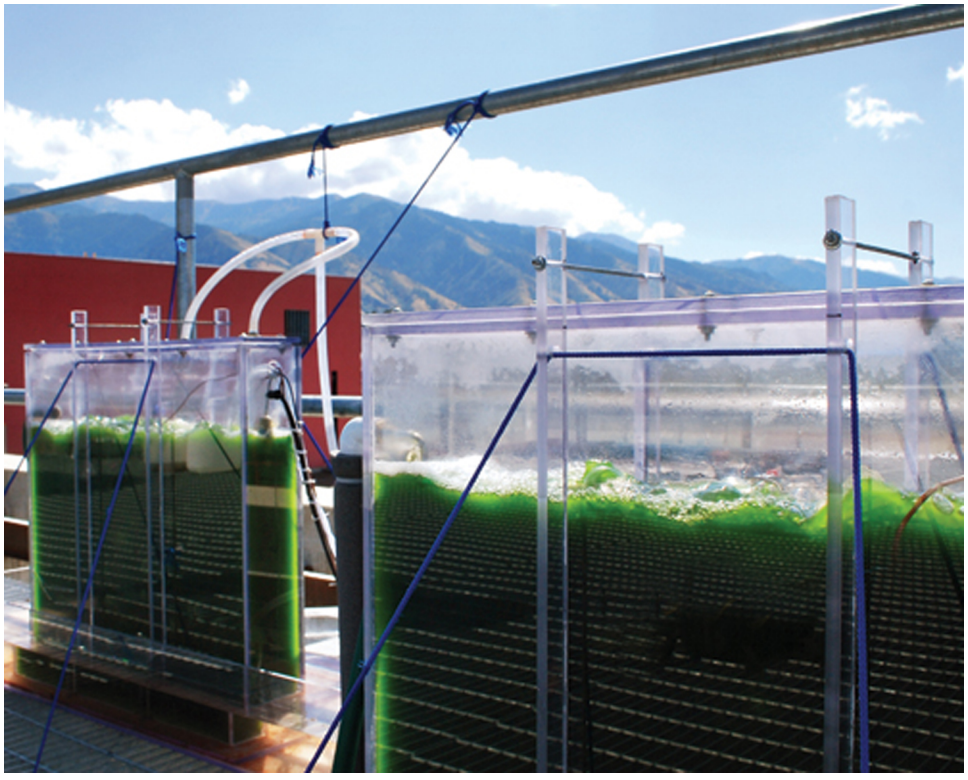
- ***Center for Active Sensing and Imaging (CASI).*** The mission of CASI is to develop radar-like, laser-based LIDAR (light detection and ranging) technology to measure distances instead of radio waves, for a variety of industrial applications. Areas of research focus include use of LIDAR to study wind patterns and geography to find optimal locations for wind farms, and to provide increased detail and accuracy for weather modeling and forecasting. CASI is developing portable instruments that use LIDAR to detect pollution from agricultural sources, such as feedlots. These devices are able to track and quantify gaseous emissions and help those who run agricultural operations meet emissions regulations.
  http://innovationutah.com/advancedcesnsingandimaging.html

- ***Energy Dynamics Laboratory (EDL).*** A business unit of the USU Research Foundation, EDL focuses toward applied research, development, design and implementation of green, renewable energy solutions for government and commercial customers. Supported by funding from USTAR and the Utah Department of Environmental Quality, EDL and USU have teamed with the City of Logan to develop a pilot facility that will serve as a model for wastewater treatment plants across the country and around the

world to comply with environmental standards, and will provide a renewable energy supplement and replacement for currently used fossil fuels.

- ***Institute for Intuitive Buildings (I2B).*** The I2B program is working to create real-time scene measurement and interpretation techniques for electric lighting systems due to a considerable amount of energy wasted in lighting, cooling and ventilating commercial buildings. The primary goal of the I2B team is to cut lighting electrical use by 50% in commercial buildings through anticipatory and task-adaptive lighting systems, and make electrical power consumption more consistent.
  http://innovationutah.com/I2B.html

- ***Synthetic Bio-manufacturing Center (SBC).*** Bio-production of valuable materials and chemicals through the construction of unique production platforms based on microorganisms coupled with downstream processing resulting in products of commercial interest. Researchers in SBC are exploring new manufacturing paradigms that are environmentally neutral, energy and resource efficient, and that may be used to remove unwanted pollutants. Specific goals of the center are to adapt single-cell organisms through synthetic biology to become small solar or chemically powered factories, which may use CO_2 as their primary carbon source, and that will secrete or emit useful and natural biomaterials and energy. The center will also develop the downstream bioprocessing techniques necessary to collect, separate, purify, concentrate, and prepare the new biomaterials for commercial products.
  http://innovationutah.com/research/biomedical/syntheticbiomanufacturing.html



Using algae to produce fuel from research.usu.edu/2020calendar/htm/growing-gasoline

Expanding Climate Change and Sustainability Research

Utah State University is proud to already host a wide range of climate- and sustainability-related research activities and expertise. To advance its leadership in these critical areas, the institution is committed to growing its portfolio of research to address global challenges in climate change and sustainability, including studies to promote new policies that support emerging technologies. To address this goal, USU established a Research Sustainability Committee in 2008, charged with the responsibility to harness the institution's research capabilities to enable Utah and the Intermountain West to move toward climate neutrality and sustainability. The Committee has worked to identify, promote, and expand sustainability-related research activities and opportunities at Utah State University through several different avenues. These include:

Dedicated web presence. A summary of sustainability-related research activities and opportunities has been compiled and inserted into the USU Sustainability web site (see http://sustainability.usu.edu/htm/sustainability/research). The purpose of this site is to provide a primary resource for campus researchers and prospective external partners that wish to become involved in climate change and sustainability research. Thus, the site includes brief summaries of ongoing activities as well as links to internal and external funding opportunities.

Vice President for Research (VPR) Seed Grants. The VPR seed grant program exists to enhance faculty success in securing extramural funding (see http://research.usu.edu/htm/faculty-funding-and-startup/sparc). Several USU faculty interested in developing an extramurally funded research program related to climate neutrality and sustainability have won seed grants to support their ideas. Current federal and state support for research related to climate neutrality and sustainability is strong and appears likely to continue in future years. We anticipate that this favorable funding outlook, in combination with the fact that USU has already established diverse programs in this area, will boost faculty interest in sustainability research. As a result, we expect numbers of sustainability-related seed grant awards will also increase in coming years.

Highlighting faculty research in the 2010 Research Matters publication from research.usu.edu/researchmatters2010

Greater Visibility. USU has used and will continue to employ a series of established venues to elevate the visibility of its research to address climate neutrality and sustainability challenges. Important avenues for this purpose include:

- ***USU Sunrise Sessions,*** a quarterly forum for select faculty to share their research with alumni, community and business leaders from the Salt Lake area. Held in downtown Salt Lake City, these early-morning presentations are intended to feature the work of some of USU's most prestigious scientists to a lay - but highly influential - audience. http://research.usu.edu/htm/sunrise-session

- ***Research Matters,*** an annual VPR publication that highlights the efforts of USU researchers and students to foster a better public understanding of the benefits of research. https://research.usu.edu/researchmatters2010/

- ***Research Calendar,*** another VPR publication filled with beautiful images that feature the work of a USU researcher each month. http://research.usu.edu/2010calendar/

Taking care of Utah trees from research.usu.edu/2010calendar/tm/tree-care-101

Improved Coordination and Communication. As might be expected, the success of existing research programs in sustainability has been heavily reliant on the ability of faculty, students, and administrators to establish effective collaborations and communication among their myriad disciplines. Efforts to grow research in this area will be served through more overt efforts by central administration to facilitate coordination and communication between our disparate researchers, departments, and colleges. To address this need, USU recently revised a core Sponsored Programs document (SPO-1; see http://spo.usu.edu/) to better distribute shared credit among researchers and their respective academic homes.

The SPO-1 revisions have helped alleviate some important challenges to on-campus collaborations, but more direct interventions should also be pursued. One promising template involves semi-formal community meetings between academic and community leaders interested in a common topic. A good example is the USU Energy Research and Development Mixer that was recently organized and hosted by the Office of Strategic Ventures and Economic Development (SVED). This event was designed to foster communication and coordination between researchers and expand USU's central knowledge base in energy research (see http://economicdevelopment.usu.edu/htm/energy-rd). USU will explore whether similar events built on a climate- and sustainability-related research theme would be of interest to faculty and help grow participation in this arena.

Federal and State Initiatives and USU's Land Grant Mission. Perhaps the greatest opportunities for USU to expand its research portfolio of sustainability and climate change research projects relates to several recent developments in state and federal agencies as they relate to the University's role as Utah's Land Grant institution. Because over 75% of the land in Utah is publicly owned, USU works closely with state and federal land management agencies to ensure sustainability of ecosystem functions in the face of climate change. The great majority of Utah's land mass is composed of portions of the Colorado Plateau and the Great Basin (aka, Central Basin and Range, see Figure 3). As the state's only Land Grant institution, it is USU's responsibility to provide the sound science that can be used by federal, state, and local governmental agencies to ensure wise management of Utah's natural resources.

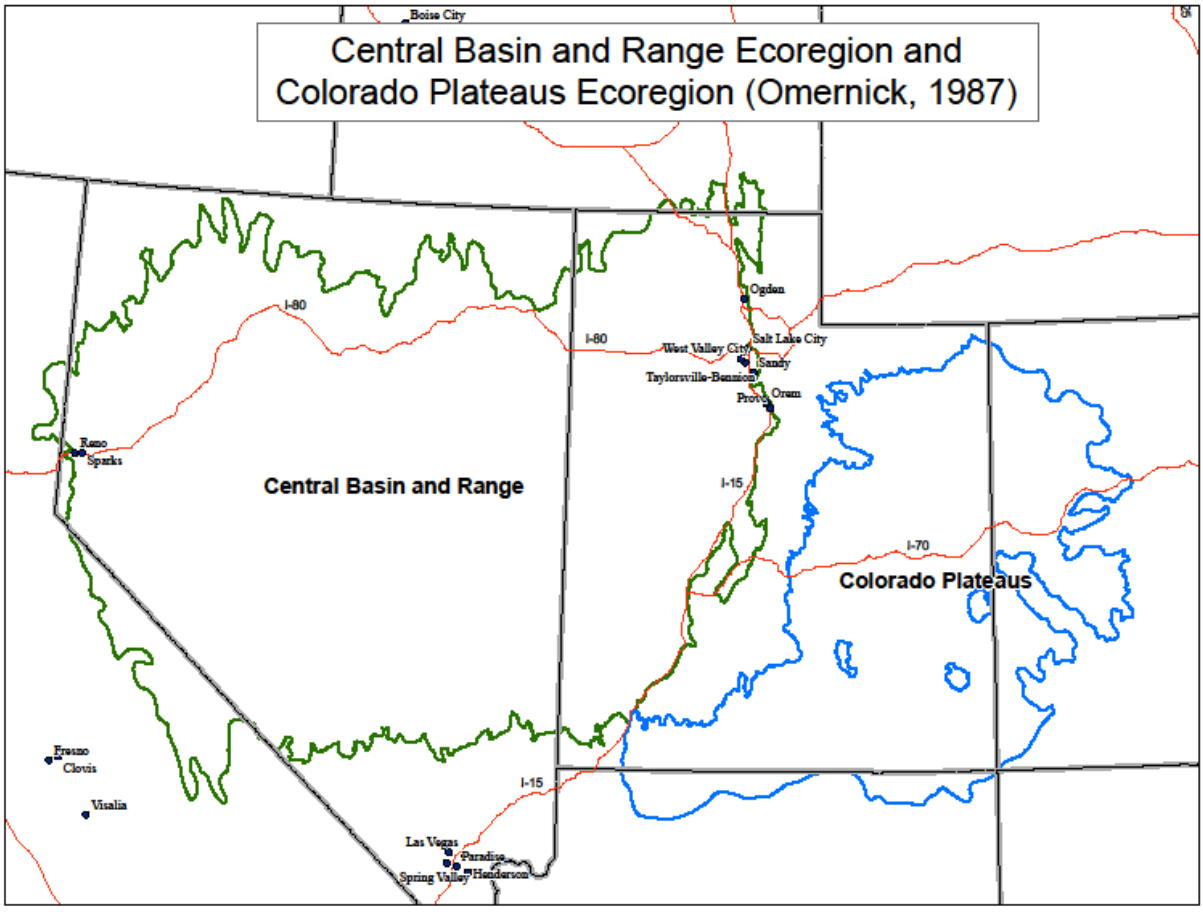


Figure 3. Great Basin and Colorado Plateau make up majority of Utah's land mass

Climate Science Centers. Under Secretarial Order No. 3289, the US Department of the Interior (DOI) is expanding the scope and geographic reach of its agencies' climate-science efforts by establishing eight regional Climate Science Centers (CSCs, see Figure 4, below) and 29 Landscape Conservation Cooperatives (LCCs, see Figure 5, below). According to DOI,

> *"These CSCs will provide scientific information, tools and techniques that land, water, wildlife and cultural resource managers and other interested parties can apply to anticipate, monitor and adapt to climate and ecologically-driven responses at regional-to-local scales. CSCs will deliver basic climate-change-impact science to Landscape Conservation Cooperatives within their respective regions, including physical and biological research, ecological forecasting, and multi-scale modeling. CSCs will prioritize their delivery of fundamental science, data and decision-support activities to meet the needs of the LCCs. This includes working with the LCCs to provide climate-change-impact information on natural and cultural resources and to develop adaptive management and other decision-support tools for managers.*
>
> *"We will be basing these regional CSCs at host institutions with substantial expertise and partnerships in climate-change science. CSCs will include staff from multiple partners, perhaps including LCC staff, and will include a cadre of scientists, as well as information specialists."*

Based on past and current research programs and current research expertise in the Colleges of Agriculture, Engineering, Science, and Natural Resources, Utah State University is expected to contribute to on-the-ground research related to climate change, invasive species, and sustainable management of land, water, flora, and fauna in the North Central, Southwest, and Northwest CSCs.

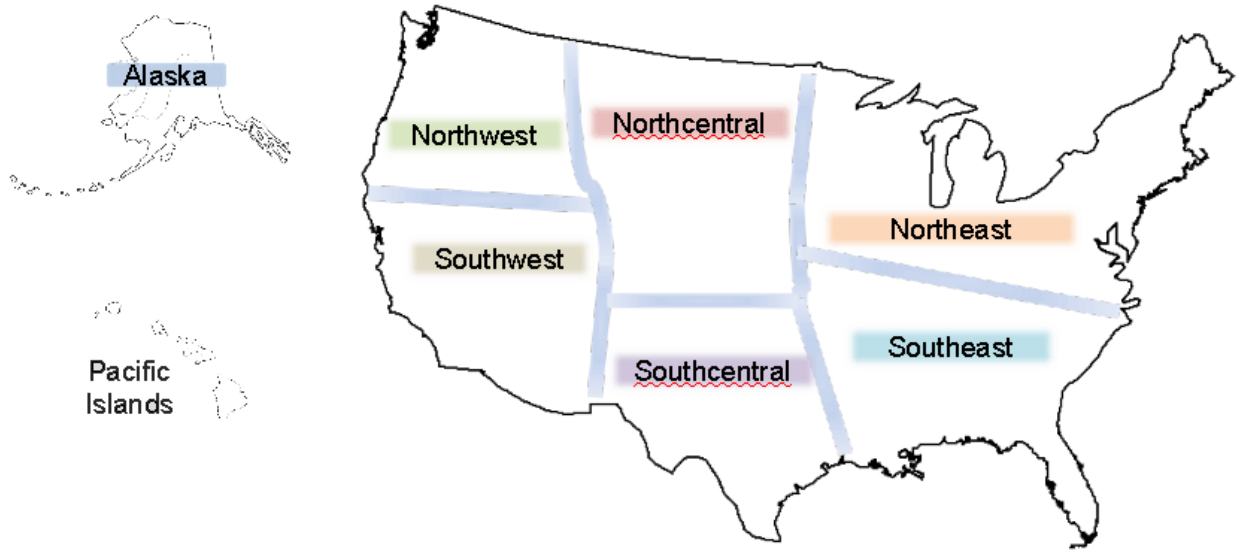


Figure 4. US Department of Interior's proposed regions for Climate Science Centers

Landscape Conservation Cooperatives. According to DOI, as

> *"[A] centerpiece of the U.S. Fish and Wildlife Service (FWS) and Interior Department climate change strategies, LCCs will inform resource management decisions to address landscape-scale stressors including habitat fragmentation, genetic isolation, spread of invasive species, and water scarcity—all of which are magnified by accelerating climate change...LCCs will support adaptive resource management by evaluating conservation strategies, maintaining and sharing information and data, and improving products as new information becomes available. Shared data platforms will serve multiple purposes, including collaborative development of population/habitat models under alternative climate scenarios to inform landscape-scale resource management decisions...In the face of accelerating climate change and other 21st-century conservation challenges, LCCs will regularly evaluate the effectiveness of scientific information and conservation actions and support necessary adjustments as new information becomes available."*

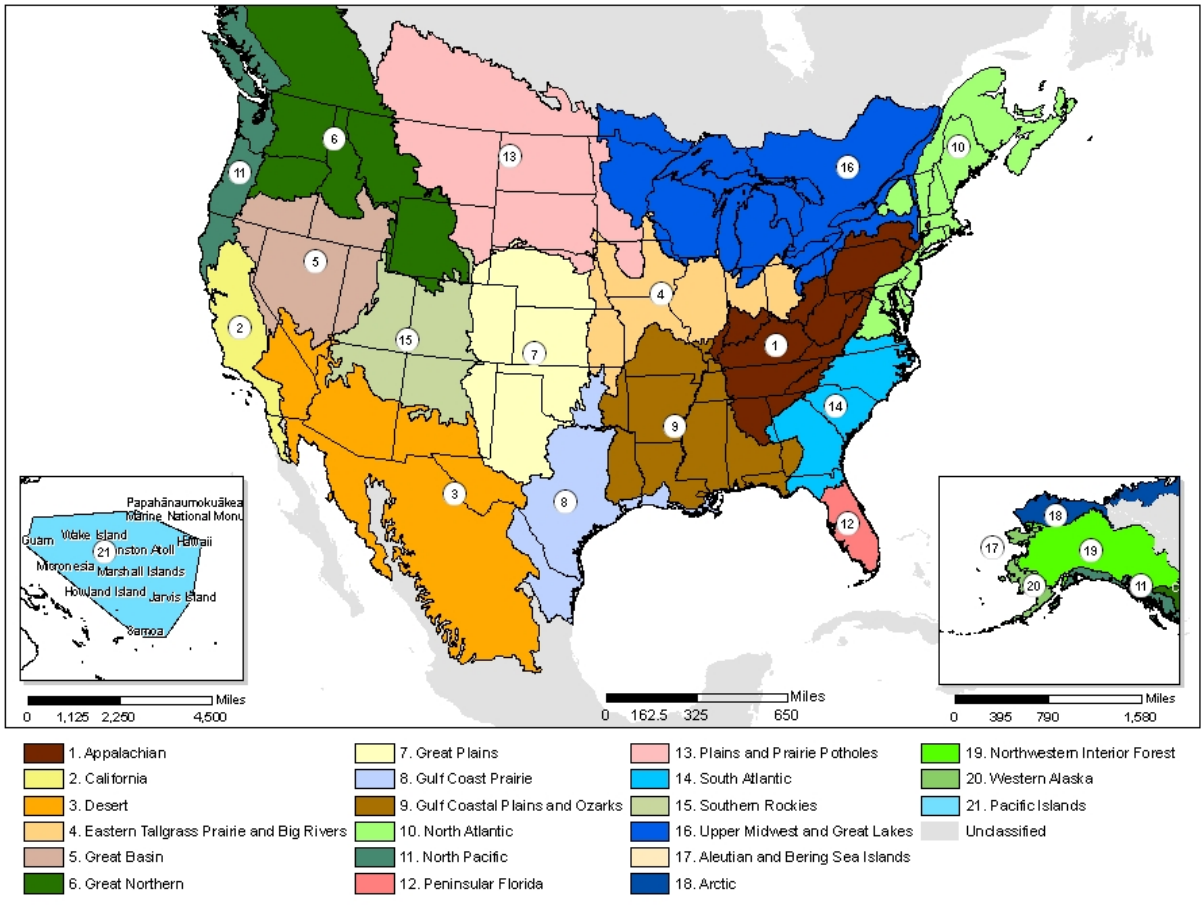


Figure 5. The US Department of Interior's 21 Landscape Conservation Cooperatives, showing Utah as part of the Great Basin (#5) and Southern Rockies (#15) LCCs

In short, LCCs are intended to serve many of the same functions that USU already provides as a Land Grant University and as a member of several statewide or regional partnerships, two examples of which appear below.

Utah Partners for Conservation and Development. The Utah Partners for Conservation and Development (UtahPCD) is an organization composed of state, federal, and local land management agencies and USU's College of Agriculture and College of Natural Resources (see http://www.utahpcd.info/index.html). This unique partnership provides solutions to conservation issues. From Federal agency representation and State leadership, to local coordinators on the ground, the UtahPCD members work together to leverage resources and increase effectiveness. For example, Partners pooled resources to provide for restoration of over 300,000 acres burned in the Milford Flats fire due to invasive species such as cheat grass. The Partners strive to restore and maintain sustainable natural landscapes by combating invasive species, enacting restoration projects, and monitoring rangelands. USU's Colleges of Agriculture and Natural Resources provide much of the research needed to ensure that management and monitoring plans are based on sound science. As climate change continues to increase the incidence of invasive species and fire on Utah's landscapes, we expect UtahPCD to continue to engage USU in research on restoration and projects related to discerning how we can adapt ecological communities to climate change for the maintenance of ecosystem services.

Great Basin Research and Management Partnership. Utah State University also has taken on a leadership role in the Great Basin Research and Management Partnership (GBRMP). GBRMP promotes comprehensive and complementary research and management collaborations to sustain ecosystems, resources, and communities across the Great Basin -- a five state area experiencing similar sociological and ecological concerns. USU's Dean of the College of Natural Resources serves as the Chair of GBRMP's Executive Committee and the Dean of our College of Science serves as the liaison between the Executive Committee and the Coordinating Committee (see Appendix E and the GBRMP website http://greatbasin.wr.usgs.gov/GBRMP/index.html for additional details). The database of research expertise and the collaboration between GBRMP and the Great Basin LCC should result in additional research opportunities for scientists at USU who study sustainable natural landscapes and climate change.

The Great Basin

Canyonlands Research Station. As previously mentioned (see Figure 3, above), the great majority of Utah not covered by the Great Basin is part of the Colorado Plateau. In 1997, the Nature Conservancy (TNC) preserved an ecological treasure and an icon of the American West: the Dugout Ranch. Located at the doorstep of Utah's Canyonlands National Park, in the heart of the Colorado Plateau, this historic cattle ranch encompasses more than 300,000 acres of private property and public land leases, and is known for spectacular scenery as well as critical plant and animal habitat.

Today, the Conservancy's Dugout Ranch is providing the foundation for TNC's Canyonlands Research Center (http://www.nature.org/initiatives/climatechange/work/art24393.html), the first facility dedicated to climate change research within the heart of the Colorado Plateau. The Center will increase our understanding of the interactive effects of climate change and land-use, and arm decision-makers with new information to adapt to challenges such as diminished Colorado River water quantity and quality, grazing and recreation impacts, and invasive species.

View from Canyonlands Research Center from nature.org

According to the website,

> *"At the Canyonlands Research Center, leading scientists from partner organizations such as the Bureau of Land Management, U.S. Geological Survey, Utah State University and the National Park Service, will work with the Conservancy to fill the gaps in our knowledge about how the Plateau's species and natural communities will respond to climate change. The Center's mission is twofold: (1) Provide scientific answers about how interactions of climate change and land uses will affect our natural resources; and (2) Develop land management solutions to help natural and human communities adapt to the inevitable impacts of climate change."*

Because of Utah State's strong record of research related to land management in the Intermountain West and its role as the Land Grant University in Utah, TNC has asked USU to take the lead in involving academic researchers from throughout the region in the Center's activities. The Dean of USU's College of Science and several faculty members from the College of Natural Resources and College of Agriculture sit on TNC's science advisory board for the Center. In addition, USU has an Education Center in Moab, UT near the Dugout Ranch. TNC is raising funds to provide for overnight accommodations for faculty and students who conduct climate change research at the ranch and surrounding government lands.

As USU continues to expand its presence in Southeaster Utah and as TNC continues to develop the Canyonlands Research Center, we anticipate a substantial increase in opportunities for the Univeristy's biological, physical, and social scientists to engage in research related to climate change and sustainability on the Colorado Plateau.

Diversity

In order to build a sustainable society, diverse groups will need to be able to come together and work collaboratively to address sustainability challenges. People of color and low-income communities tend to suffer disproportionate exposure to environmental problems. This environmental injustice happens as a result of unequal and segregated communities. To achieve environmental and social justice, societies must work to address discrimination and promote equality. The historical legacy and persistence of discrimination based on racial, gender, religious, and other differences makes a proactive approach to promoting a culture of inclusiveness an important component of creating an equitable society. Higher education opens doors to opportunities that can help create a more equitable world. In addition, a diverse student body, faculty, and staff provide rich resources for learning and collaboration.

USU Multicultural Student Services (MSS) provides support for student success and direction for campus multicultural relations. MSS achieves its mission through collaborative work in the division of Student Services and with academic departments. MSS offers quality services for all students while providing targeted support to first-generation and historically underserved African-American, Asian-American, Native American, Pacific Island, and Latino students. Programs are designed to promote student recruitment, retention, leadership development, cultural understanding, inclusion, and a positive relational climate on campus.

This includes:

- Educational events and cultural celebrations involving campus and community at-large
- Personal leadership development through clubs and organizations
- Peer mentoring, personal and social support
- Active recruitment efforts and outreach programs serving our core constituents
- Community and campus service opportunities
- Involvement within and support of ASUSU programs
- Academic support
- Life skills/multicultural leadership courses
- Networking and referral to university departments

Students gathered in the USU Taggart Student Center from www.usu.edu/multiculture

Financing Climate Neutrality

UtahStateUniversity

Identifying ways to pay for emission reduction measures or offsets is challenging. A survey of climate plans submitted to ACUPCC reveals that many plans offer little or no information in this area. However, progress toward climate neutrality is not possible without a financial commitment from the signatory institution. Utah State University will not be able to make significant progress on its climate commitment without designated funding from the College. Below is a list of funding strategies to be pursued where appropriate and in combination to finance the reductions steps outlined in this plan.

- Parking Fee Revenue
- Revolving Loan Fund
- Building Endowments
- Utility Incentives and Rebates
- Grants and Donations
- Voluntary Student Contributions or Fees
- Institutional Operating Budget

Further discussion occurs in Appendix F, "Building the Business Case for Campus Sustainability"

USU Recycling Project "Recycle Mania" from www.usu.edu/recycle

The Utah State Sustainability Council will continue to produce annual GHG emissions inventories. These are and will continue to be critical in determining how the University is doing overall on emissions goals. In addition, they will produce a brief document updating progress toward carbon neutrality every other year. This update should include the following:

- Total gross and net greenhouse gas emissions
- Emissions per built square foot
- Emissions per capita and per student
- Progress on actions outlined in this plan
- Total dollars raised and/or invested in emissions reductions projects
- New curricular and co-curricular offerings related to climate neutrality
- Recommended modifications to this plan

Conclusion

UtahStateUniversity

Utah State University took a courageous and critical step in signing the ACUPCC. With that commitment, come both challenges and great potential to become a leader in our community and beyond. The decisions the University makes about how to move forward on climate neutrality will impact our students, our community, and ultimately our planet. This plan has identified realistic steps toward reducing the University's emissions and alternatives for financing this progress, as well as ways to enhance student learning about sustainability. By adopting this plan, Utah State University takes the next critical step in addressing the challenge of climate change, arguably the greatest threat to civilization and the human condition.

Utah State University Climate Action Plan

APPENDIX A

Greenhouse Gas (GHG) Emissions Inventory at USU

GHG EMISSIONS INVENTORY AT USU

To assess the impact an organization imposes on the climate, a thorough evaluation of its carbon footprint is necessary. A greenhouse gas (GHG) emissions inventory identifies, quantifies, and categorizes sources of GHG emissions. Furthermore, a GHG inventory is essential to a legitimate GHG reduction strategy and it reinforces an organization's commitment to addressing climate change. Recognizing this, USU became signatory to the American College & University Presidents Climate Commitment on January 22nd, 2007. The commitment requires the University to develop and implement strategies to reduce GHG emissions.

The inventory is primarily designed to allow the University to establish a GHG emissions baseline. The goal of the inventory is to account for all the emissions generated by the University and to set targets for reductions below the base year emissions. The inventory focused on scope I, II and several significant scope III emissions (see Box 1) as defined by the World Resources Institute (2004).[i] Scope III emissions, (i.e., commuting, air travel, refrigerants and solid

Box 1 - Scope & Emissions Sources

The Concept of Emissions "Scope"

According to the World Resources Institute (2004), three scopes (Scope I, Scope II, and Scope III) are defined for greenhouse gas (GHG) accounting and reporting purposes. Scopes I and II are carefully defined by WRI and WBCSD's Greenhouse Gas Protocol to ensure that two or more organizations will not account for emissions in the same scope.

The Greenhouse Gas Protocol requires organizations to separately account for and report on Scopes I and II at a minimum. The scopes are defined as follows:

Scope I: Direct GHG emissions:
Direct GHG emissions occur from sources that are owned or controlled by the organization. For example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.

Scope II: Electricity indirect GHG emissions:
This encompasses GHG emissions from the generation of purchased electricity consumed by the organization. Scope II emissions physically occur at the facility where electricity is generated, not at the end user site.

Scope III: Other indirect GHG emissions:
This is an optional reporting category under the Greenhouse Gas Protocol that allows for the inclusion of all other indirect emissions. Scope III emissions are a consequence of the activities of the organization, but occur from sources not owned or controlled by the organization. Some examples include extraction and production of purchased materials, and use of sold products and services.

waste), introduced data measurement issues with regard to the inventory calculation, but we added value by broadly representing the GHG emissions over which the University has some control. Also, it has helped us to identify areas where data management can be improved.

Scope & Emissions Sources

The first step in planning an inventory is defining the organizational and operational boundaries (World Resources Institute, 2002).[ii] For the purposes of this inventory, USU is defined as an organization which includes teaching and research buildings funded by the state and student-fee-funded buildings (e.g., Health, Physical Recreation Education Center, University Student Center), University owned farms and other USU owned or managed off-campus locations primarily associated with the University Regional Campus and Distance Education (RCDE) program. Other locations, such as University Extensions, were omitted primarily due to the lack of data, as these operations generally consist of leased space from county governments in the state of Utah. The operational boundaries – otherwise known as USU Scope I, II, and III GHG emissions – include emissions from natural gas-fired boilers, the University fleet, purchased electricity, plus escapee emissions of HCFCs from cooling units, emissions associated with University owned farm animals, faculty, student, and staff commuting in individual-owned vehicles, air travel for University-related business, and landfill emissions caused by University-generated waste. The *operational boundary* does not include business travel in non-university owned cars or supply chain production of materials (e.g., paper), equipment (e.g., computers), or infrastructure (e.g., building materials) used on campus. In setting the operational boundary, we tried to follow the principles outlined by the

Figure 1: Emissions Sources Considered in the GHG Inventory

Emission Source	Scope	Included in Inventory
Natural Gas Use	I	Yes
University Fleet	I	Yes
Coolant	I	Yes
Produced Electricity	I	Yes
Farm Animals	I	Yes
Farm Fertilizer	I	Yes
Purchased Electricity	II	Yes
Air Travel	III	Yes
Solid Waste	III	Yes
Commuting in Individual Owned Vehicles	III	No

GHG Protocol (2004)[iii] – relevance, completeness, consistency, transparency, and accuracy – but were ultimately largely influenced by the availability of data of reasonable quality (i.e., what USU was already measuring, or what could be estimated from something that USU was measuring). Finally, our inventory considers the six Kyoto gases[1] and R-22[2], an HCFC used in some on-campus HVAC systems. Figure 1 summarizes this information, identifying GHG emissions sources by scope and by whether it is included in the GHG inventory.

Methodology & Data Sources

We used the Greenhouse Gas Inventory Calculator (volume 5.0),[iv] developed by Clean Air – Cool Planet (CA-CP) specifically for universities, to generate a GHG inventory for USU. Using the CA-CP Calculator, activity data (e.g., therms of natural gas, kilowatt hours of electricity, number of commuters, miles of air travel) are multiplied by an emissions factor (e.g., kg CO_2/kWh, kg CH_4/kWh) to yield emissions for each activity by specific type of greenhouse gas. However, each GHG has a different heat trapping potential and a different atmospheric lifetime, which results in a different global warming potential (GWP) for each GHG (see Figure 2).

Figure 2: Global Warming Potentials and Atmospheric Lifetime of several greenhouse gases

Gas	Atmospheric Lifetime (Years)	Global Warming Potential (100 Year)
Carbon Dioxide (CO_2)	50-200	1
Methane (CH_4)	9-15	21
Nitrous Oxide (N_2O)	120	310
HFC – 134A	15	1,300
HFC – 404A	>48	3,260
Sulfur Hexafluoride (SF_6)	3,200	23,900

(Source: CA-CP)

[1] Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulphur hexafluoride (SF_6)

[2] R22, also known as Chlorodifluoromethane (CHClF2), is a HCFC with a 100 year global warming potential of 1700 (IPCC, 2001c).

The CA-CP Calculator resolves this problem by converting the GHG emissions to a common unit of measurement, metric tons of carbon dioxide equivalent ($MTCO_2e$) that can be used to compare all emission sources. The following descriptions explain the major sources of GHG emissions from USU operations.

GHG Emissions Sources Included in GHG Inventory

Electricity

USU generates electricity on campus and is responsible for the GHG emissions associated with the generation of the electricity it purchases from its electricity provider.

For academic years 2006 and 2007, total electricity demand was determined from an energy use spreadsheet produced by USU's energy manager, so the data is assumed to be reliable. Total electricity demand for RCDE facilities, farms, research foundation facilities and airport operations were calculated based on monthly electricity bills, so the data is also highly accurate. Prior to 2005, there was limited data available on electricity consumption.

Once annual kWh data is entered, the CA-CP Calculator converts annual electricity consumption data into GHG emissions by region specific emissions factors for CO_2, CH_4, and N_20 and then converts these numbers into $MTCO_2e$.[3] In 2007, electricity consumption at USU was responsible for emitting **30,903 $MTCO_2e$**, roughly 26% of total emissions.

Natural Gas

USU utilizes natural gas on campus for building heating requirements, laboratory research and some fleet vehicles. Natural gas is the third largest emission source at USU, representing roughly one quarter of USU's total GHG emissions.

[3] We chose NWGB, for an emissions factor of .686 kg CO_2 / kWh, .00000662 kg CH_4/ kWh, and .00001521 kg N_2O/ kWh (CA-CP, 2007). The CA-CP Calculator took the factors from the US EPA's Emissions and Generated Resource Integrated Database (eGRID) based on data from 2005.

For academic years 2006 and 2007, total natural gas usage was also determined from an energy use spreadsheet produced by USU's energy manager so we assume the data to be high quality and reliable. Total natural gas demand for RCDE facilities, farms, research foundation facilities and airport operations was calculated based on monthly electricity bills, and the data is highly accurate. Prior to 2005, there was limited data available on electricity consumption.

The CA-CP Calculator converts annual MMBtu natural gas use into GHG emissions by using the appropriate emissions factors for CO_2, CH_4, and N_20 and then converts these numbers into $MTCO_2e$. In 2007, natural gas consumption at USU was responsible for emitting **27,543 $MTCO_2e$**[4], roughly 23% of total emissions.

Campus Vehicle Fleet

The University fleet includes all University-owned cars and trucks, including carpool and vanpool vehicles. The campus fleet is the smallest of the three categories considered in the GHG inventory and emissions from these sources are almost negligible in comparison to electricity and natural gas related emissions.

The University fleet includes both gasoline and diesel vehicles, which are entered into the inventory separately because of their differing emissions factors. Gasoline fleet usage was provided by the Campus Fleet Business office over the 2006 and 2007 time period, and is based on fuel records maintained by the state fleet system for fuel card usage. Prior to 2006, insufficient data exists to make meaningful calculations as they relate to fleet fuel usage. The CA-CP Calculator converts the annual fuel use into GHG emissions by using the appropriate emissions factors for CO_2, CH_4, and N_2O and then converts these numbers into $MTCO_2e$. In 2007, USU fleet fuel consumption was responsible for emitting **3052 $MTCO_2e$**, roughly 3% of total emissions.

[4] The CACP Calculator uses emission factors of 52.8 kg CO_2/MMBtu, 5.3E-03 kg CH_4/MMBtu, and 1.05E-04 kg N_2O/MMBtu.

Other GHG Emissions Sources

Estimations of scope III emissions are provided from several sources. This broader scope allows us to identify potentially significant emissions sources and provide the University with a more accurate reflection of its actual climate footprint and a wider range of mitigation strategies. While some of the "other sources" have relatively small impacts, others (e.g., commuting, air travel) are potentially large GHG emissions sources; and while these emissions might not be considered USU emissions per se, the actions of the University certainly influence these emissions, and so they are relevant when considering mitigation strategies. Furthermore, including these emissions sources improves the comparability of USU's inventory with other organizations, since many of these emissions categories are being reported by universities and corporations nationwide.

Refrigeration

USU currently uses multiple refrigerants to meet cooling demands, but only R-22 is considered a GHG. USU does not currently record information on refrigerant usage on campus or escapee emissions of refrigerants. Therefore, we estimated escapee emissions of R-22 based on a collection of work orders for the 2006-07 fiscal year, which is labeled 2007 in our inventory. These work orders describe how much R-22 is added and how much was reclaimed or recycled. We assume the difference between what is added and what is taken out are the escapee emissions. In 2007, based on available work orders, the net R-22 added to the system was 523 pounds, which is recorded in the inventory as the amount of escapee emissions. Since there was only one year of available data, it was not possible to develop a trend; so, we assumed that 568 pounds were emitted in 2007. Emissions of R-22 are converted to $MTCO_2e$ in the CA-CP Calculator using an emissions factor, yielding an estimate of **560 $MTCO_2e$** for refrigerants, a fraction of 1% of USU's total GHG emissions.

Solid Waste

Waste disposal produces methane gas emissions in the decomposition of organic matter, and is a common GHG emissions category included in campus inventories. Data on USU's solid waste

disposal was provided courtesy of USU Recycling Management Manager, Kevin Phillips. The University transports its waste to the Logan City Landfill for waste disposal, which measures the trash weight. Therefore, waste disposal records for the main USU campus is deemed very reliable. Data for the RCDE campuses, farms and the airport, are not readily available as commercial waste disposal services pick-up this trash and co-mingle it with other disposal customers. Using main campus data, an amount of waste per student at the main campus was calculated. Next this amount per student was applied to the RCDE campuses to estimate RCDE waste. The university farms do not generate much waste and are considered immaterial for inclusion in this category. In 2007, GHG emissions from University waste were **3049 MTCO$_2$e**, roughly 3% of total emissions.

Agriculture - Animals and Fertilizer

Animals produce methane gas emissions and are a common GHG emissions category included in campus inventories of agricultural universities. Methane produced during digestion, is a significant part of global emissions. As food is digested, microbes break down the organic matter creating methane by enteric fermentation. Ruminant animals, such as cows, emit an especially large amount of methane through their digestive process.[v] Data on USU's Animals was provided courtesy of the farm manager for the Animal Dairy and Veterinary Sciences Department. Exacting data on animal types and counts is maintained by the department.

A major direct source of nitrous oxide from agricultural soils is that of synthetic fertilizer use. Widespread increase in the use of such nitrogen based fertilizers has been driven by the need for greater crop yields, and by more intensive farming practices.[vi] Data on USU's fertilizer application was provided courtesy of the farm manager for the USU Agricultural Experiment Station. Exacting data on the amount of fertilizer used is maintained by the department. In 2007, GHG emissions from Agriculture were **2530 MTCO$_2$e**, roughly 2% of total emissions.

Transportation (non-fleet): students, faculty and staff commuting

Non-fleet transportation emissions are a result of students, staff, and faculty commuting to USU. Although these emissions belong to the individual commuters, the University has the potential to encourage alternative modes of transportation through its policy decisions and development pattern; as a result, these sources are relevant to an analysis of how USU can reduce GHG emissions. In order to calculate the GHG emissions from commuters, we estimated the total number of gallons of gasoline consumed. Since there is no easy way of calculating an accurate quantification (as is available with utility bills), the number of gallons consumed is estimated using a stream of assumptions (listed below). The CA-CP spreadsheet is set up to accept the following inputs to estimate total annual gasoline usage.

1. Number of people
2. Fuel efficiency
3. Percentage who drive alone (Single Occupancy Vehicles or SOV)
4. Percentage who carpool
5. Number of daily trips
6. Number of days completing the trip per year
7. Trip distance

This is broken up into 4 sections in the inventory: Students, Summer School Students, and Faculty & Staff. For the students section, the primary data source was the USU Office of Analysis, Assessment and Accreditation (AAA). At AAA, the Institutional Research and Planning group publishes a campus profile each year which documents total enrollment. The national averages included in the CA-CP spreadsheet were utilized to estimate fuel efficiency.

A transportation mode survey was conducted to determine the number of single occupancy vehicle (SOV) drivers, carpoolers and bus riders. Unfortunately, these data were only available for the single point in time that the survey was taken, so extrapolating a trend is not possible. It was, therefore, assumed that each year had the same mode split percentage. The USU Registrar's office was able to provide zip code information. From the zip code distances, an estimate was made from the center of the zip code to the campus of USU for each USU student.

From this process, an average commuter distance was determined to be 15.5 miles each way. The number of trips to campus per week, as well as per day, was also surveyed for each category of faculty, staff and students, and the results were weighted based upon the respective population's sizes. From this data, the amount of total fuel consumed was estimated.[5]

Finally, the CA-CP calculator converts fuel consumption to GHG emissions just as it did for USU fleet. In 2007, student commuting was responsible for approximately **20,675 MT CO_2e**, representing **10%** of total GHG emissions. Faculty/Staff commuting in 2007 was estimated using the same methods, and resulted in **12,551 MT CO_2e**, or **17%** of total emissions. The results of the inventory prove that commuting is the single largest source of GHG emissions at USU.

Air Travel

Air Travel emissions are associated with the flights of USU faculty and staff while on University-related business. In the CA-CP Calculator, the input is air miles for faculty and staff. However, USU does not have thorough documentation of all air travel from all USU faculty and administration nor students. The USU Controllers office tracks total travel costs, which can also include car rental and hotel costs. Furthermore, since travel planning is extremely decentralized, there are many ways in which people on campus can purchase and get reimbursed for travel expenses.

Estimating the miles flown

A substantial portion of USU air travel is booked through an approved state travel agency. The agencies track the travel using the departure and arrival three digit airport codes. The total air travel using state travel agencies was downloaded on to a spreadsheet (approximately 8,000 flight records) and the actual mileage for each individual flight was calculated. In order to estimate the total number of miles traveled, we did a study of travel authorizations that

[5] Fuel Consumption = MPG / [(Total Students x % Drive Alone) + (Total Students x % Carpool)/2] x Trips/Day x Days/Year x Miles/Trip

included airfare to determine what percentage of travel authorizations used a state travel agent and what percentage booked air travel by another means, such as an online purchase. We determined that 56% of travelers used a travel agency and 44% did not. To determine total air miles for faculty and staff, we simply extended the calculated air miles for those traveling using a state agency to estimate total for each year.

Student Estimate

The university does not track student travel. However, further research provided data from other institutions that track student travel, relative to faculty and staff travel, was applied to USU. Based upon this research, it was determined that student travel is approximately 20% of faculty and staff travel and the resulting estimation was included in the inventory.

In 2007, we estimate air travel at approximately 26.4 million miles, translating into emissions of **20,505 MT CO_2e**, which represent 17% of USU's total emissions.

Current GHG Emissions

Assessment of Current USU Emissions Sources

Figure 3 displays the total GHG emissions for the most current period (2007) by emissions source. In 2007, total emissions were approximately 121,812 $MTCO_2e$.

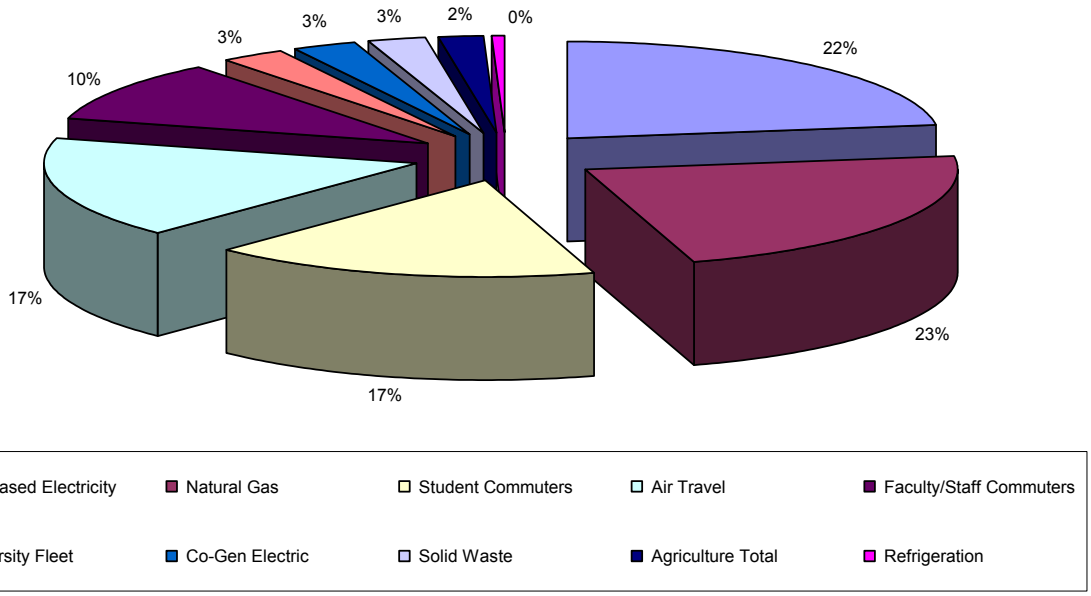
Figure 3: USU Total GHG Emissions for FY2007

	Energy Consumption MMBtu	CO2 kg	CH4 kg	N2O kg	eCO2 Metric Tonnes	Percent of Total
Purchased Electricity	313,893	27,388,960	432	992	27,693	23%
Natural Gas	531,182	27,461,024	2,780	61	27,543	23%
Co-Gen Electric	60,639	3,201,217	320	6	3,210	3%
Total Stationary Sources	591,821	30,662,241	3,100	67	30,753	25%
University Fleet	52,473	3,436,448	673	168	3,502	3%
Student Commuters	287,008	20,194,788	3,821	1,325	20,675	17%
Faculty/Staff Commuters	174,388	12,247,776	2,423	835	12,551	10%
Air Travel	103,997	20,432,263	201	231	20,505	17%
Total Transportation	617,866	56,311,275	7,119	2,559	57,233	47%
Agriculture Total	-	-	83,960	2,025	2,530	2%
Solid Waste	-	-	132,574	-	3,049	3%
Refrigeration					560	0%
Total	1,523,580	114,362,476	227,184	5,644	121,818	100%
Offsets						
Composting					(6)	
Total					121,812	

The majority of the emissions were from travel, electricity and natural gas consumption (Figure 4). To give some perspective, this is approximately the amount of GHG emitted by 20,720 cars per year.[6]

[6] For one car = 15,000 miles/year * 0.045 gallons/mile * 0.00871 $MTCO_2e$/gallon = 5.88 $MTCO_2e$/year 121,812 $MTCO_2e$ / 5.88 $MTCO_2e$ = 20,720 cars

Figure 4: Total USU GHG Emissions by Source



The results of the inventory suggest that the largest opportunities for GHG emissions reductions are likely to be related to electricity and natural gas consumption. However, the relatively large size of these "other" emissions – commuting and air travel, in particular – suggests that the USU does have the potential to reduce GHG emissions significantly through strategies that address these categories of emissions as well.

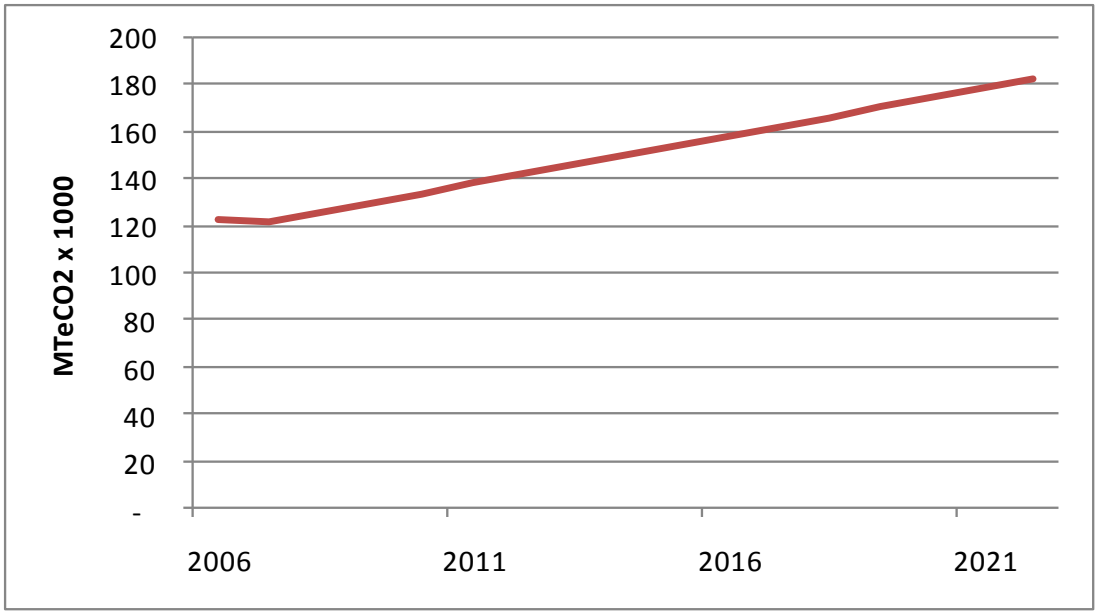
Campus Growth Projections

According to the Office of Campus Planning and Design, the long range development plan for the University is to grow from the current population of students to 26,000 FTE's.[vii] Using this information, we can project campus emissions as well. Emissions divided by total number of students for each year, illustrates that this intensity index is about 6.6 $MTCO_2e$ per student for the past 2 years. Although the GHG emissions per student intensity has shown a decreasing trend in the past year, several new buildings are being constructed, which will increase energy consumption on campus significantly. USU's projected growth, however, is not likely to differ significantly from its current academic profile (it is likely to continue to grow in both the

sciences and the humanities).[7] As a result of these two facts – the stability of the intensity metric over the last 2 years and the knowledge about the balanced nature of projected campus growth – the intensity metric (total GHG emissions/total students) can reasonably be utilized to project a business as usual scenario for USU's GHG emissions into the future.

Utilizing the intensity index, we assume that each of the 625 new students per year will increase USU's GHG emissions by 6.5 $MTCO_2e$ annually, totaling 4,062 $MTCO_2e$ per year. We utilize this projection (Figure 5) as a baseline from which we can quantify the emissions reductions that would be required to meet particular reductions targets through 2022 (displayed in Figure 5 as the vertical distance between any target line and the projected campus emissions line for any particular year). We chose a fifteen year time horizon for our analysis because it conforms well to the University's planning horizon.

Figure 5: Unmitigated Projected Campus Emissions Growth



[7] Science buildings tend to be much more energy intensive than Humanities buildings, so if USU's projected growth was likely going to be targeted towards the sciences, this would have implications for the growth in GHG emissions through time and would make our use of the current intensity index (GHG emissions/student) less reliable.

References

[i] World Resources Institute and World Business Council for Sustainable Development. (2004). The Greenhouse Gas Protocol. Washington, D.C.: Ranganathan, J., Corbier, L., Bhatia, P., Schmitz, S., Gage, P., Oren, K.

[ii] World Resources Institute. (2002, December). *Working 9 to 5 on climate change: An office guide*. Washington, D.C.: Putt del Pino S. & Bhatia, P.

[iii] The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard, revised edition, World Resources Institute (2004) Accessed August 2007.

[iv] Clean Air Cool Planet Campus Carbon Calculator v5.0 ©2006 All Rights Reserved. CA-CP is a non-profit based in Portsmouth, NH dedicated to finding and promoting solutions to global warming. http://www.cleanair-coolplanet.org/

[v] *Methane Emissions From Domestic Animals,* Prepared by Brown University Center For Environmental Studies, September 2000, Accessed 11/16/2007. *http://www.brown.edu/Research/EnvStudies_Theses/GHG/Sections/Agriculture.htm*

[vi] GHG Online, Nitrous Oxide Sources - Agricultural soils, Accessed 11/16/2007 http://www.ghgonline.org/nitrousagri.htm

[vii] University Physical Resources, Planning Committee, Facilities Planning, Utah State University June 23, 2000

Utah State University Climate Action Plan

APPENDIX B

State and Institutional Trust Lands Administration (SITLA) Land Parcels Designated for USU Carbon Sequestration

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T6N R2E S26 SL	Active Available	Weber Utah State University	Ownership Surface	1 160.00
NE4				
T6N R2E S26 SL	Active Available	Weber Utah State University	Ownership Surface	2 160.00
SE4				
T6N R2E S26 SL	Active Available	Weber Utah State University	Ownership Surface	3 160.00
SW4				
T13N R6E S4 SL	Active Block	Rich Utah State University	Ownership Surface	1 38.32
LOT 2 (NW4NE4)				
T13N R6E S12 SL	Active Block	Rich Utah State University	Ownership Surface	1 40.00
NE4NE4				
T11N R19W S3 SL	Active Available	Box Elder Utah State University	Ownership Surface	1 80.00
E2SE4				
T11N R19W S3 SL	Active Available	Box Elder Utah State University	Ownership Surface	2 80.00
E2SW4				
T11N R19W S3 SL	Active Available	Box Elder Utah State University	Ownership Surface	3 40.00
NW4SW4				
T11N R19W S3 SL	Active Available	Box Elder Utah State University	Ownership Surface	4 80.00
S2NW4				
T11N R19W S3 SL	Active Available	Box Elder Utah State University	Ownership Surface	5 40.00
SW4NE4				
T11N R19W S3 SL	Active Available	Box Elder Utah State University	Ownership Surface	6 80.00
W2SE4				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T11N R19W S10 SL	Active Available	Box Elder Utah State University	Ownership Surface	1 40.00
NE4NE4				
T7S R18W S36 SL	Active Available	Tooele Utah State University	Ownership Surface	1 572.42
LOTS 1-9, NW4, NW4SW4, S2NE4, NW4NE4				
T18S R1W S26 SL	Active Available	Sanpete Utah State University	Ownership Surface	1 40.00
TRACT 148 (NW4SW4)				
T18S R1W S33 SL	Active Available	Sanpete Utah State University	Ownership Surface	1 40.00
SE4SE4				
T18S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	9 37.59
TRACT 137 (NW4NW4)				
T18S R8W S15 SL	Active Available	Millard Utah State University	Ownership Surface	2 40.00
SE4SW4				
T18S R8W S22 SL	Active Available	Millard Utah State University	Ownership Surface	2 40.00
NW4NE4				
T18S R8W S29 SL	Active Available	Millard Utah State University	Ownership Surface	1 18.00
LOT 1 (NW4NW4)				
T18S R8W S29 SL	Active Available	Millard Utah State University	Ownership Surface	2 38.35
LOT 2 (SW4NW4)				
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	1 12.76
LOT 1 (NW4NW4)				
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	2 21.71
LOT 2 (NE4NW4)				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	3 49.92
LOT 3 (W2NE4)				
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	4 23.91
LOT 4 (NE4NE4)				
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	5 22.95
LOT 5 (SE4NE4)				
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	6 38.88
LOT 6 (NE4SE4)				
T18S R8W S30 SL	Active Available	Millard Utah State University	Ownership Surface	7 12.39
LOT 7 (SE4SE4)				
T18S R8W S31 SL	Active Available	Millard Utah State University	Ownership Surface	1 19.08
LOT 1 (NE4NE4)				
T18S R8W S31 SL	Active Available	Millard Utah State University	Ownership Surface	2 32.07
LOT 2 (SE4NE4)				
T18S R8W S31 SL	Active Available	Millard Utah State University	Ownership Surface	3 31.30
LOT 3 (NE4SE4)				
T18S R8W S31 SL	Active Available	Millard Utah State University	Ownership Surface	4 16.77
LOT 4 (SE4SE4)				
T18S R9W S5 SL	Active Available	Millard Utah State University	Ownership Surface	1 640.40
LOTS 1-4, S2N2, S2 (ALL)				
T18S R9W S8 SL	Active Available	Millard Utah State University	Ownership Surface	1 320.00
E2				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T18S R9W S9 SL E2SE4	Active Available	Millard Utah State University	Ownership Surface	1 80.00
T18S R9W S9 SL E2SW4	Active Available	Millard Utah State University	Ownership Surface	2 80.00
T18S R9W S9 SL NE4NW4	Active Available	Millard Utah State University	Ownership Surface	4 40.00
T18S R9W S9 SL W2NW4	Active Available	Millard Utah State University	Ownership Surface	6 80.00
T18S R9W S9 SL W2SW4	Active Available	Millard Utah State University	Ownership Surface	8 80.00
T18S R9W S10 SL NE4SE4	Active Available	Millard Utah State University	Ownership Surface	1 40.00
T18S R9W S10 SL NW4	Active Available	Millard Utah State University	Ownership Surface	2 160.00
T18S R9W S10 SL NW4NE4	Active Available	Millard Utah State University	Ownership Surface	3 40.00
T18S R9W S10 SL SE4NE4	Active Available	Millard Utah State University	Ownership Surface	4 40.00
T18S R9W S11 SL S2SE4	Active Available	Millard Utah State University	Ownership Surface	1 80.00
T18S R9W S11 SL SE4SW4	Active Available	Millard Utah State University	Ownership Surface	2 40.00

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T18S R9W S11 SL	Active Available	Millard Utah State University	Ownership Surface	3 80.00
W2SW4				
T18S R9W S17 SL	Active Available	Millard Utah State University	Ownership Surface	1 320.00
E2				
T18S R9W S26 SL	Active Available	Millard Utah State University	Ownership Surface	1 320.00
S2				
T18S R9W S27 SL	Active Available	Millard Utah State University	Ownership Surface	1 640.00
ALL				
T18S R9W S28 SL	Active Available	Millard Utah State University	Ownership Surface	1 640.00
ALL				
T18S R9W S34 SL	Active Available	Millard Utah State University	Ownership Surface	1 320.00
N2				
T18S R9W S35 SL	Active Available	Millard Utah State University	Ownership Surface	1 640.00
ALL				
T19S R1W S9 SL	Active Available	Sanpete Utah State University	Ownership Surface	2 40.24
TRACT 106 (SE4NE4)				
T19S R1W S9 SL	Active Available	Sanpete Utah State University	Ownership Surface	3 40.23
TRACT 108 (NE4NE4)				
T19S R1W S15 SL	Active Available	Sanpete Utah State University	Ownership Surface	2 33.31
TRACT 88 (NW4SW4)				
T19S R1W S15 SL	Active Available	Sanpete Utah State University	Ownership Surface	3 33.51
TRACT 91 (SW4NW4)				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T19S R1W S15 SL	Active Available	Sanpete Utah State University	Ownership Surface	4 33.59
TRACT 95 (NW4NW4)				
T19S R1W S21 SL	Active Available	Sanpete Utah State University	Ownership Surface	1 39.41
NE4SE4 (PARTIAL)				
T19S R1W S21 SL	Active Available	Sanpete Utah State University	Ownership Surface	2 46.87
TRACT 60 (SE4NE4)				
T19S R1W S21 SL	Active Available	Sanpete Utah State University	Ownership Surface	3 63.56
TRACT 62 (NE4NE4)				
T19S R1W S21 SL	Active Available	Sanpete Utah State University	Ownership Surface	4 10.80
W part of NE4NE4				
T19S R1W S21 SL	Active Available	Sanpete Utah State University	Ownership Surface	5 80.00
W2NE4				
T19S R1W S21 SL	Active Available	Sanpete Utah State University	Ownership Surface	6 25.90
part of SE4NE4				
T19S R1W S22 SL	Active Available	Sanpete Utah State University	Ownership Surface	6 46.35
TRACT 61 (NE4NW4)				
T19S R1W S22 SL	Active Available	Sanpete Utah State University	Ownership Surface	8 50.77
TRACT 66 (N2SW4)				
T19S R1W S22 SL	Active Available	Sanpete Utah State University	Ownership Surface	9 50.86
TRACT 67 (SW4)				
T19S R1W S22 SL	Active Available	Sanpete Utah State University	Ownership Surface	10 5.33
part NW4SW4				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T19S R1W S22 SL	Active Available	Sanpete Utah State University	Ownership Surface	11 17.17
part SW4SW4				
T19S R1W S27 SL	Active Available	Sanpete Utah State University	Ownership Surface	1 8.00
NE4SW4 (PARTIAL)				
T19S R1W S27 SL	Active Available	Sanpete Utah State University	Ownership Surface	2 15.22
NW4NW4 (PARTIAL)				
T19S R1W S27 SL	Active Available	Sanpete Utah State University	Ownership Surface	3 21.18
SW4NW4 (PARTIAL)				
T19S R1W S27 SL	Active Available	Sanpete Utah State University	Ownership Surface	15 37.34
part of NW4SW4				
T19S R1W S27 SL	Active Available	Sanpete Utah State University	Ownership Surface	16 30.50
part of SE4SW4				
T19S R1W S27 SL	Active Available	Sanpete Utah State University	Ownership Surface	17 57.26
TRACT 53 (S2SW4 SEC 22 AND N2NW4 SEC 27)				
T19S R1W S28 SL	Active Available	Sanpete Utah State University	Ownership Surface	1 40.00
SE4NE4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	1 39.31
NE4NW4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	2 40.00
NE4SW4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	3 40.00
SE4NW4				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	7 16.14
part of SW4NE4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	8 2.37
part of NW4NE4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	9 26.98
part of NW4SE4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	10 15.00
part of SE4SE4				
T19S R1W S34 SL	Active Available	Sanpete Utah State University	Ownership Surface	11 39.20
part of SW4SE4				
T29S R3W S29 SL	Active Available	Piute Utah State University	Ownership Surface	1 160.00
SW4				
T29S R3W S30 SL	Active Available	Piute Utah State University	Ownership Surface	1 40.00
SE4SE4				
T42S R14W S17 SL	Active Available	Washington Utah State University	Ownership Surface	1 10.00
NW4NW4NW4				
T42S R14W S18 SL	Active Available	Washington Utah State University	Ownership Surface	1 73.70
LOTS 9, 21, 22, 24, 26, W2NW4NW4NE4, LESS SUBDIVIDED PORTIONS (SEE M&B)				
T42S R14W S18 SL	Active Available	Washington Utah State University	Ownership Surface	2 189.98
LOTS 29, 30, 33, 35, 36, 38, 40, NE4NW4NE4, E2NW4NW4NE4, S2NW4NE4, SW4NE4, LESS SUBDIVIDED PARCELS (SEE M&B)				
T42S R15W S13 SL	Active Available	Washington Utah State University	Ownership Surface	1 40.00
E2NE4SE4, SE4NW4NE4SE4, E2SW4NE4SE4, SW4SW4NE4SE4, N2N2SE4SE4				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status / Land Status	County / Beneficiary	Parcel Type / Parcel Layer	Parcel Nbr / Acres
T42S R16W S15 SL	Active	Washington	Ownership	2
	Available	Utah State University	Surface	12.05
TRACT 37 (SE4SE4SW4), LESS M&B				
T2S R6E S23 SL	Active	Summit	Ownership	3
	Available	Utah State University	Surface	33.85
S2N2SW4 LESS 6.15 ACRES SOLD UNDER CERTIFICATE OF SALE C23863, PAT NUMBER 17993				
Samak June Sale				
T2S R6E S27 SL	Active	Summit	Ownership	1
	Available	Utah State University	Surface	160.00
SE4				
T19S R2E S14 SL	Active	Sanpete	Ownership	1
	Available	Utah State University	Surface	640.00
ALL				
T19S R2E S15 SL	Active	Sanpete	Ownership	1
	Available	Utah State University	Surface	80.00
S2SE4				
T19S R2E S15 SL	Active	Sanpete	Ownership	2
	Available	Utah State University	Surface	80.00
S2SW4				
T21S R16E S1 SL	Active	Grand	Ownership	1
	Available	Utah State University	Surface	160.00
SW4				
T26S R25E S1 SL	Active	Grand	Ownership	1
	Available	Utah State University	Surface	640.80
ALL				
T26S R25E S2 SL	Active	Grand	Ownership	1
	Available	Utah State University	Surface	640.58
LOTS 1-4, S2N2, S2 (ALL)				
T26S R25E S3 SL	Active	Grand	Ownership	1
	Available	Utah State University	Surface	638.76
LOTS 1(39.83), 2(39.74), 3(39.64), 4(39.55), S2N2, S2 [ALL]				
T26S R25E S4 SL	Active	Grand	Ownership	1
	Available	Utah State University	Surface	637.40
ALL				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T26S R25E S5 SL	Active Available	Grand Utah State University	Ownership Surface	1 636.58
ALL				
T26S R25E S6 SL	Active Available	Grand Utah State University	Ownership Surface	1 618.21
ALL				
T26S R25E S7 SL	Active Available	Grand Utah State University	Ownership Surface	1 627.48
ALL				
T26S R25E S8 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S9 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S10 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S11 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S12 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S13 SL	Active Available	Grand Utah State University	Ownership Surface	1 620.00
N2, N2SW4, SW4SW4, W2SE4SW4, SE4				
T26S R25E S14 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S15 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T26S R25E S17 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S18 SL	Active Available	Grand Utah State University	Ownership Surface	1 628.35
ALL				
T26S R25E S22 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S23 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S24 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S25 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S26 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S27 SL	Active Available	Grand Utah State University	Ownership Surface	1 640.00
ALL				
T26S R25E S34 SL	Active Available	Grand Utah State University	Ownership Surface	1 320.00
N2				
T26S R25E S34 SL	Active Available	San Juan Utah State University	Ownership Surface	1 320.00
S2				
T26S R25E S35 SL	Active Available	Grand Utah State University	Ownership Surface	1 320.00
N2				

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Selective Parcel Search

TRS	Record Status Land Status	County Beneficiary	Parcel Type Parcel Layer	Parcel Nbr Acres
T26S R25E S35 SL	Active Available	San Juan Utah State University	Ownership Surface	1 320.00
S2				
T37S R11E S20 SL	Active Available	Garfield Utah State University	Ownership Surface	1 640.00
ALL				
T1S R8W S18 US	Active Available	Duchesne Utah State University	Ownership Surface	1 35.09
LOT 4 (SW4SW4)				
T1S R8W S19 US	Active Available	Duchesne Utah State University	Ownership Surface	1 35.30
LOT 3 (NW4SW4)				
T1S R8W S19 US	Active Available	Duchesne Utah State University	Ownership Surface	2 20.00
N2NE4NW4				
T1S R8W S28 US	Active Available	Duchesne Utah State University	Ownership Surface	1 640.00
ALL				
T1S R8W S29 US	Active Available	Duchesne Utah State University	Ownership Surface	1 640.00
ALL				
T1S R8W S31 US	Active Available	Duchesne Utah State University	Ownership Surface	1 35.75
LOT 2 (SW4NW4)				
T1S R8W S31 US	Active Available	Duchesne Utah State University	Ownership Surface	2 40.00
NE4NW4				
T1S R8W S32 US	Active Available	Duchesne Utah State University	Ownership Surface	1 640.00
ALL				

Inactive Acres:	0.00
Active Acres:	28,167.10
Total Acres:	28,167.10

Selection Criteria:

Record 1 of 131

Township:
Range:
Acres:
Beneficiary: Utah State University
Business Unit:
ClassIfication: All
County: All

Disposition: All
Geographical: All
Heritage: All
Land Status: All
Parcel Description:
Potential Use: All
Record Status: Active

Reservation: All
Resource: All
Restrictions: All
Source: All
Study: All
Water Rights: All
Wilderness Study: All

Utah State University Climate Action Plan

APPENDIX C

USU Student Organizations Related to Sustainability

USU Student Organizations Related to Sustainability

Conservation/Environmental

Aggie Blue Bikes

Our mission is to get more people on more bikes more often to promote health, sustainable communities, to better the air quality in Cache Valley, and reduce vehicle congestion. We intend to do this through bicycle lending, education, and advocacy.

Aggie Recyclers

Our organization is here to serve the community and the environment. We do this through educating people how to live in a sustainable way. We are very involved with recycling on campus as well as promoting other sustainable practices. In addition to raising awareness we participate in a variety of service activities. We hope you'll join us!!

ECOS

The purposes of the Environmental Coalition of Students (ECOS) is: • To increase awareness and education about environmental issues affecting students at Utah State University and people of the surrounding community • To promote better use of the Earth's ecosystems, energy, and natural resources • To encourage, enlist, and organize USU students and other student organizations to enjoy, preserve, and protect the wild places of Utah

Engineers Without Borders

The USU chapter of Engineers Without Borders is a non-profit organization. Contributions help us build projects that developing communities will own and operate. We work with communities worldwide to improve their quality of life by promoting sustainable development in water supply, housing construction, food production, energy, sanitation, transportation, communication, and employment. EWB's vision is of a world where all people have the knowledge and resources needed to meet basic human needs. We involve international professionals and students in all fields as we build this vision together.

Entomology Club

This club and other organizations have been formed on a national and global scale. Despite the damage from these brutes, we recognize the benefits that come from many of them. Roughly one-third of the world's food is dependent on them; the decomposition of wastes and other materials depends on them as well. Countless other benefits come from them. We cannot live without them. If you want to find out how to make a difference in the world and if you are brave enough to face the odds, then get involved.

Forestry Club

The USU Forestry Club, or USU Student Chapter of the Society of American Foresters, is an informal group of people interested in forestry and it related fields. Our goal is to advance the science, technology, education, and practice of professional foresters, and to use the knowledge and skill of the profession to benefit society. The Forestry club is open to any student with an interest in forestry (you

don't have to be a forestry major) and membership is FREE. All you have to do to be a member is participate in any or all of our activities throughout the year. The club sponsors several activities throughout the year that allow us to expand our knowledge as well as get to know each other and have a little (or a lot) of fun.

Student Organic Farm Club

Our mission is to establish a student-led organic farm that promotes a healthy community and sustainable environment through food production, education, outreach and advocacy. We have formed a Community Supported Agricultural (CSA) program to help support the operation and pay for modest student stipends. Further, we contribute produce to local food banks. A composting operation is being developed in cooperation with the campus food services.

Student Sustainability Council (SSC)

The SSC serves as an umbrella organization for other student organizations who are interested in collaborating and networking on sustainability events and activities. SSC is a committee of the USU Sustainability Council which was formed to assist with the President's Climate Commitment. They help coordinate Earth Week, Sustainability Week, Utah bioneers, and other sustainable initiatives.

The Wildlife Society

We are committed to promoting sound stewardship of wildlife resources and of the environments upon which wildlife and humans depend. We seek to increase awareness and appreciation of wildlife values by attending and sponsoring wildlife-related conferences, and working in cooperation with other wildlife organizations and agencies.

Val R. Christensen Service Center

The Val R. Christensen Service Center is designed to prepare students to make lifelong contributions through service and allow the opportunity for students to serve. With over 20 volunteer programs, the Service Center is also committed to promote positive attitudes, personal growth, and change, through service of the community and environment.

Multicultural/Diversity

Amnesty International

To inspire hope in a better world through internationally recognized human rights for all.
The Amnesty International Club will operate under the goals of its parent organization, Amnesty International. Its purpose is to educate USU students and local residents about human rights issues across the globe. These issues include ensuring the right to freedom of expression, the right to life; and social, cultural and economic rights. The club will organize events to raise awareness on campus about these crucial issues and to encourage future activism.

Anthropology Club

The Anthropology Club is a forum to promote interest and raise awareness in the field of Anthropology. This organization shall provide a forum for speakers to make presentations to members on contemporary aspects of the anthropology discipline, schedule field trips, provide direct hands-on learning experiences, and provide social activities and events for members and otherwise interested

parties. Our goal as an Anthropology club is to produce members that have an increased appreciation for other cultures and peoples as well as generate successful members of our community and discipline.

Asian American Student Council

Our mission is to preserve the Asian culture, promote cross-cultural experience and create a supportive learning environment. AASC shares the Asian culture through a week of awareness, education, community projects and festivities. Our goal is to provide an environment for students that balances the academic cultural and social dimensions of college life. The Asian American Student Council is opened to the entire Utah State University campus and community. We meet on a weekly basis and hold events and activities throughout the year.

A.W.A.R.E

We intend to be welcoming to people from all backgrounds, stand up for those who cannot stand up for themselves, denounce inequality, fight against discrimination, demand a life of respect through non-violent and non-destructive means, and to promote human dignity. We will be combating discrimination of all minorities, with a focus on GLBTQA issues and discrimination.

Child Rights and You

We believe that children are citizens in their own right, entitled to the full spectrum of human rights. At CRY, we do not believe in charity. Nor do we run schools, orphanages or dispensaries. Instead we partner grassroots-level NGOs working with children, their parents and communities. It will require that we, start thinking of children, not as objects of sympathy, but as citizens with the same rights that we consider our due. That we believe, really believe, that every child, regardless of birth and circumstances is truly equal. That we realize the policies and the everyday choices we make, must seek to address the root causes of children's problems not just their superficial manifestations. Finally, we must all - as voters, parents, teachers, investors, neighbors, businesspersons, lawyers, consumers, activists, students, judges, administrators, journalists and politicians alike - overcome our apathy, cynicism and sheer inertia and reconfigure our priorities to put children first.

Chinese Club

Have a great time learning more about Chinese culture, language, and customs. We have monthly events regularly involving the Chinese Student Association and the Taiwanese Student Association.

Dominican Student Association

The Dominican Student Association of Utah State University is an organization dedicated to the education of its students. The organization seeks to support service to USU and the Cache Valley Community. We, as students, wish to bring our culture to USU and promote diversity, equality, and harmony among cultures.

International Cultural Exchange Club

The I.C.E. club is for International or Study Abroad students; those who have been to other countries; anyone who wants to learn about other countries, cultures & travel and whoever wants to help show the beautiful Utah area & culture to our International Students.

International Studies Association

The International Studies Association recognizes the political and global situation in the world today as well as appreciating multiculturalism by providing service and embracing culture activities.

Medical UNITY

To enrich the total scholastic experience of students at Utah State University, intercultural interaction and association is vital to provide a healthy understanding of the ever growing multicultural USA. According to Census Bureau 2004, the Hispanic population has risen to 9.9% of Utah's total population and continues to rise making the need for bilingualism an increasing need, especially in the medical field. Medical Unity is USU's pre-health club that will encourage pre-health students to broaden their understanding of the Latino culture, Spanish medical terminology, and interpreting skills that will aid their preparation for the field of medicine.

Middle East Club

The purpose of this club is to promote an accurate understanding of the Middle East, her people, culture, religion, and political significance.

Native American Student Council

The Native American Student Council is an organization that promotes the cultures of American Indian/ Alaskan Natives at Utah State University. NASC also contributes in significant ways by supporting American Indian/ Alaskan Natives with elements of peer support, leadership development, cultural experiences, and enhancing the appreciation and contributions of the Native people of North America.

Polynesian Student Union

The Polynesian Student Union (PSU) is housed under the Multicultural Student Services on campus at Utah State University. To learn more about our organization, please visit our site listed on the panel to your right.

Rotaract Club

Rotaract is a Rotary-sponsored service club for young men and women ages 18 to 30. Rotaract conducts meetings every two weeks on Tuesday nights. Rotaractors spend some of their weekends together for service projects, social events, and workshops. We organize and participate in Community and International service projects, and develop leadership skills useful beyond club and school situations. Rotaract Goals: Recognize, practice, and promote ethical standards such as leadership qualities and vocational responsibilities, while developing professional and leadership skills. Learn about the needs and opportunities of local and global communities. Serve the community and promote international understanding and goodwill.

Society of Hispanic Professional Engineers

To improve the equality of all people through the use of engineering, Math, science and technology. We value excellence in education, professional pursuits and leadership. To promote Hispanics students to attend college.

Theta Nu Xi Multicultural Sorority, Inc.

To promote scholarship, leadership and multiculturalism through academic excellence, involvement in and service to the campus and community as well as being living examples of sisterhood across different races, cultures, religions and backgrounds.

USU Effect

USU Effect offers students a great opportunity to become involved in educating the underprivileged in developing nations. We are currently focused on India and Nepal. USU Effect works hand in hand with Effect International, a new non-profit organization with similar goals. Come see how you can become involved in helping educate others and meet new people with like interests.

Other

United Campus Volunteers

Each month, United Campus Volunteers organizes a service project. Students have a variety of projects they can be a part of throughout the school year. Examples of past projects are listed below.

USU SHAFT

The USU Secular Humanists, Atheists, and Free Thinkers aims to promote the ideals of scientific inquiry, critical thinking, secularism, and human based ethics on Utah State's campus. We hope to enrich USU campus life by sponsoring educational events and fostering student dialogue on matters of faith, science, and reason. Our philosophy is informed by the methods of science, is free from dogma, and is open to revision at any time as more compelling reasons and new evidence are presented. We believe that free inquiry, and empirical investigation when possible, lead to a more accurate understanding of the universe and our place in it than revelation, faith or authority. To further these goals, SHAFT will provide a friendly, positive and comfortable forum for the discussion, public outreach, personal exploration, and education of secular worldviews, including scientific naturalism, humanism, transhumanism, atheism, agnosticism, and skepticism.

VOX Voices for Planned Parenthood

Educate the university community about reproductive health and rights.

Utah State University Climate Action Plan

APPENDIX D

USU Courses Related to Sustainability

Courses That Deal With A Variety of Sustainability Issues

This resource lists courses taught at Utah State University that focus on some aspect of environmental sustainability, sustainable development and/or carbon neutrality.

Course	Course Name	Course Instructor
CHEM 3650	Environmental Chemistry	Bialkowski
CHEM 3670	Intermediate Environmental Chemistry	Bialkowski
GEO 1110	The Dynamic Earth: Physical Geology	Pederson
GEO/PHYS 3150	Energy in the Twenty-First Century	Evans/Taylor
GEO 5630	Photogeology	Janecke
GEO 5680/6680	Paleoclimatology	Rittenour
GEO 6600/7600	Graduate Seminar in Geophysics	Lowry
USU 1350	Integrated Life Sciences	Etchberger
USU 1360	IPS Planet Earth	Lowry
USU 1360	IPS Energy	Triplett
USU 1360	IPS (USU vernal	Jones
BIO 1010	Biology and the Citizen	Morgan
BIO 3000	Discovering Utah's Biodiversity	Lindahl
BIO 3220	Field Ecology	Evans
BIO 5590	Animal Community Ecology	Morgan
BIO 5580	Mammology	MacMahon
BIO 5570	Herpetology	Brodie
GEO 3100	Natural Disasters	Larsen/Morgan
GEO 3300	Geology of the World's Oceans	Liddell
GEO 5530	Paleontology	Liddell
GEO 5404	Paleoecology	Liddell
PSC 3820	Climate Change	Gilles
POLS 3250	Chinese Governments/Politics	Feng
WATS 1200	Biodiversity & Sustainability	Holt

APPENDIX E

Great Basin Research and Management Partnership (GBRMP) Executive and Coordinating Committee Members List And Major Responsibilities

Great Basin Research and Management Partnership (GBRMP)

Executive Committee

The Executive Committee provides guidance, oversight and authority for meeting the goals of this charter and provides direction to the Coordinating Committee.

The Executive Committee is comprised of representatives from federal agencies, state universities, state and local agencies, tribal governments, and non-governmental organizations that are signatory to this charter. These members will be individuals who are the chief administrative official for their agency or organization at the regional, state, tribal or local level.
Major responsibilities of the Executive Committee

* Provide leadership, commitment and authority for the collaborative partnership and projects and activities.
* Pursue and allocate resources (staff, facilities, funds), create incentives and develop strategies to support the collaborative partnership.
* Ensure that only high priority issues of regional importance are addressed by the Partnership.
* Review and approve actions recommended by the Coordinating Committee.
* Evaluate progress in goal achievement of the coordinating committee and working groups and ensure a transparent reporting process.

Members

* Michael Auerbach - - Desert Research Institute
* Don Banks - - Bureau of Land Management
* Terry Bowyer - - Idaho State University
* David Bubenheim - - NASA Ames Research Center
* James Dobrowolski - - USDA-CSREES
* Sam Foster - - USFS Rocky Mountain Research Station
* Nat B. Frazer (Chairperson) - - Utah State University
* Andrew C. Hammond - - USDA-ARS-PWA
* Mike Holbert - - Bureau of Land Management
* Rangesan Narayanan - - University of Nevada, Reno
* Douglas Neighbor (Co-Chairperson) - - NPS
* Rory Reynolds - - Utah Department of Natural Resources
* Frank Roth - - Forest Service
* Carol Schuler - - FWS
* Rich Holdren - - OSU
* Stanley D. Smith - - University of Nevada, Las Vegas
* Steve Warren - - Forest Service
* Bob D. Williams - - US Fish and Wildlife Service

Executive/Coordinating Committee Liason

* James A. MacMahon - - Utah State University

Coordinating Committee

The purpose of the Coordinating Committee will be to assist signatory agencies and organizations and non-signatory cooperators in carrying out GBRMP activities as approved by the Executive Committee.

The Coordinating Committee will have the same organizational representation as the Executive Committee. Coordinating Committee members will be selected by the Executive Committee from a pool of interested applicants from each membership category in consultation with the existing Coordinating Committee. Membership on the Coordinating Committee will be limited to five years, and members will not serve more than two consecutive terms. Term length of initial members will be determined by lot in order to stagger membership and facilitate Committee turnover.
Major responsibilities of the Coordinating Committee

* Report annually or as needed to the Executive Committee and GBRMP members on Partnership activities and progress toward goals.
* Provide recommendations to the Executive Committee for Partnership projects and activities.
* Anticipate information, strategy and policy needs of the Executive Committee.
* Identify needs, issues, and potential problems that need to be addressed by the Executive Committee.
* Respond to requests for information and implement action items identified by the Executive Committee.
* Interpret and communicate decisions of the Executive Committee.
* Devise strategies to facilitate existing and new collaborations among Partnership participants.
* Approve formation of Working Groups, participate in development of Working Group charters, and oversee progress toward Working Group and Partnership goals.

Members

* Jeanne Chambers (Co-Chair) - - USDA Forest Service
* Stuart P. Hardegree (Co-Chair) - - USDA Agricultural Research Service
* Bob Alverts - - Science and Mgmt Consultant
* Steve Caicco - - US Fish and Wildlife Service
* Paul S. Doescher - - Oregon State University
* Angie Evenden - - National Park Service
* Matt Germino - - Idaho State University
* Sean Finn - - U.S. Geological Survey
* Jeanne Higgins - - USDA Forest Service
* Kurt Pregitzer - - University of Nevada, Reno
* Mike Pellant - - BLM
* Sue Phillips - - USGS
* Paul Verburg - - Desert Research Institute

Executive/Coordinating Committee Liason

* Dr. James A. MacMahon - - Utah State University

Utah State University Climate Action Plan

APPENDIX F

Building the Business Case for Campus Sustainability

Building the Business Case for Campus Sustainability

by Michael Crowley, M.S., LEED AP February 3, 2009

Sustainability programs that are integrated into campus operations can stabilize operating costs, improve environmental performance, and enhance community relations and campus life.

To capitalize on these benefits and to formulate a business case for campus sustainability, it's essential to understand the basics of sustainability finance concepts, such as life cycle costing, and to understand how rebates, grants, and other incentives can support your case. These tools and resources are now more important than ever, as institutions world-wide are looking to sustainability programs to provide a solid foundation for long-term master planning, environmental stewardship, and economic planning.

Life-Cycle Cost Analysis

Investment opportunities for sustainability projects are often not realized because their long-term operational savings are not recognized in capital project budgets. To overcome this limitation, many institutions are adopting Life-Cycle Cost Analysis (LCCA) to drive capital investment decisions. LCCA is an economic method of project evaluation that considers all costs and savings over the long-term from initial investment to operations, maintenance, and renewal. The two most common uses of LCCA are:

1. to choose among two or more mutually exclusive project alternatives, and
2. to prioritize potential opportunities from among a number of independent projects given limited funding.

In most cases, LCCA will demonstrate that sustainability projects have favorable returns on investment, and that longer-term approaches to campus planning will maximize performance from overall institutional investments.

Financial Strategies—Utility Rebates

While life cycle costing will help accurately weigh the pros and cons of sustainability project investments, seeking out incentives and supplemental funding will have an immediate impact by reducing capital costs. Utility rebates are state-mandated energy conservation funds that are collected through a small line–item on all consumer utility bills. Customers are entitled to access these funds in order to assist in implementing energy conservation projects. In many cases, utility rebates can offset capital costs by as much as 50% for qualified projects.

Tax Credits

States offer an increasing number of tax credits for the localized installation of renewable energy systems. Although institutions with a non-profit status may not be able to take advantage of such credits, there are still some ways to benefit from these credits through alternative arrangements, such as power–purchasing agreements. Power–purchasing agreements allow campuses to install renewable energy systems that are owned by third-party investors, and organized by a power purchasing provider. The power purchasing provider then sells the energy produced by the renewable energy systems to the campus at a fixed, long-term price. In many cases, the campus will have an option to buy the system once the contract has ended. The agreement works because third-party investors enjoy tax credits and the power purchasing provider secures a long-term energy contract.

A word of caution – unless the campus purchases the Renewable Energy Certificates (RECs) generated from the project they cannot rightfully claim to have offset their greenhouse gas emissions through on-site renewable energy. That is because RECs, are a tradable commodity that represent the attributes of clean, renewable energy.

Federally Legislated Incentives
There are a growing number of tax incentives and grants available from the federal government as well. One provision in the Higher Education Opportunity Act of 2008 includes $50 million in grants for 25 to 200 sustainability projects per year. That translates into grants ranging from $250,000 to $2,000,000 per project that individual institutions can receive from the federal government. Although the funding still needs to be appropriated, if it becomes available it could greatly accelerate the number of projects that campuses could pursue each year.

In the Federal Stimulus bill being circulated through Congress this week, it provides $54 billion to a "State Fiscal Stabilization Fund" for education, $3.4 billion of which may be spent on higher education modernization. It is uncertain how these provisions will survive the House and Senate votes. Having a list of projects 'shovel-ready' is essential for institutions to apply for funding as soon as possible after the bill is signed by President Obama.

Economic Recovery Bill and Tax Deductions
The 2008 Economic Recovery Bill, more widely known as the bailout package, contains the most comprehensive incentives for energy conservation and renewable energy to date. For example, one key provision in the legislation grants an extension of the Commercial Building Tax Deduction (CBTD) through 2013. This allows commercial building owners to claim a deduction of up to $1.80 per square foot for heating, ventilating and air conditioning (HVAC), lighting, or envelope upgrades that result in 50% savings over most regional building codes. Previously the deduction had to be renewed every year, which did not guarantee that the funding would be made available for long-term construction projects. The new bill extends the provision for five years, virtually guaranteeing that funding will be available for projects that are just now in the planning stages.

Public colleges and universities that are tax exempt can take advantage of the CBTD by passing through the tax deduction to the commercial project designers.

Revolving Loan Funds
Revolving loan funds are increasingly being used on campuses to invest in energy and resource conservation projects. The funding mechanism is simple and direct: Capital is provided to fund sustainability projects, and then the savings generated from those projects are reinvested into the fund. Revolving loan funds are another way to bridge capital and operating costs, as well as a way to gain visibility for sustainability efforts. Campuses such as Harvard University and California State University have used this model to grow their sustainability program, while quantifying the benefits of each of their projects.

Student Fees
Funding for sustainability programs does not always come only from administration. Students have increasingly been voting for fee increases to fund their own sustainability programs on campus. Typically, fees are either dedicated to a particular project, or are allocated to a yearly budget to fund sustainability organizations and incentives on campus. If the administration supports allocating student fees to sustainability, it can be a great way to involve students more directly in sustainability programs and foster new collaborations between students, faculty, and staff.

Conclusions
Sustainability on campus can be highly profitable. Institutions can benefit from aligning sustainability perspectives and incentives to reward long-term approaches. To achieve this end, capital and operating budgets need to be more integrated through the use of tools such as LCCA. Utility, rebate, and grant incentives should be leveraged, and new tools such as tax deductions for project designers and revolving loan funds should be put into practice as mechanisms for project identification, funding, and implementation.

When sustainability is integrated with the core business functions of higher education institutions it can reveal smarter on-campus investment opportunities and lead to more stable long-term operations.

This article is taken from a white paper entitled ***"Profiting through Campus Sustainability: Financial Tools and Strategies."*** *You can download the complete white paper at:* http://www.eheinc.com/sustainfinancewp.htm.

Michael Crowley, M.S., LEED AP, is the former Assistant Director of the Harvard Green Campus Initiative and now leads EH&E's Pathways to Campus Sustainability Program. He led the USGBC LEED certification process for 28 university buildings; managed the Green Campus Revolving Loan Fund; developed Harvard's web-based green design/build resources; and developed Harvard's Faculty of Arts and Sciences greenhouse gas reduction commitment. For additional information, contact Mike at mcrowley@eheinc.com.

Utah State University Climate Action Plan

APPENDIX G

List of Webstie Addresses From the USU – CAP 2010 Report

AggiEcology – USU Thinks Green Report, September 2003
http://extension.usu.edu/htm/publications/publication=8054
This report serves as a revision to the Environmental Campus Task Force Report that was presented to President Hall on April 1, 2003. As a revision, this report contains additional information on topics that were not addressed in the original report. This report also is supplemental to the earlier report, as information contained within this report is complementary to what is covered in the earlier report.

"Blue Goes Green" – Utah State University Sustainability
http://sustainability.usu.edu
The Utah State University Sustainability Council was formed and first convened in early 2007, upon the signing of the President's Climate Commitment by USU President Stan Albrecht.
The council is comprised of USU faculty, staff, and students committed to the development and promotion of sustainable practices on campus. The council is organized into several committees to implement outreach, education, and conservation efforts. The main focus of the Council is to achieve the goals outlined in the Presidents Climate Commitment, most specifically to reduce global warming by achieving climate neutrality.

Canyonlands Research Center, Dugout Ranch, Utah
http://www.nature.org/initiatives/climatechange/work/art24393.html
The Nature Conservancy preserved the Dugout Ranch in 1997. Located at the doorstep of Utah's Canyonlands National Park this historic cattle ranch encompasses more than 300,000 acres of private property and public land leases, and is known for spectacular scenery as well as critical plant and animal habitat. The Dugout Ranch is providing the foundation for the Canyonlands Research Center, the first facility dedicated to climate change research within the heart of the Colorado Plateau. The Center will increase our understanding of the interactive effects of climate change and land-use, and arm decision-makers with new information to adapt to challenges such as diminished Colorado River water quantity and quality, grazing and recreation impacts, and invasive species.

Center for Profitable Uses of Agricultural Byproducts (CPUAB)
http://www.engineering.usu.edu/htm/research/research-by-vectors/engineered-biological-systems/center-for-profitable-uses-of-agricultural-byproducts-cpuab
The research being conducted at the CPUAB involves finding profitable uses for food production and processing byproducts and also to further increase value of salable food products. The CPUAB invented an anaerobic digester system based on the induced blanket reactor or IBR that can produce electricity, heat, and soil amendment from manure and food processing waste. Recent research is to use the IBR, other types of bioreactors, and some unique biotechnology to selectively maintain the mix of bacterial cultures in the bioreactors to produce large quantities of hydrogen from agricultural byproducts. A high pressure injector was invented that can be used to increase value of meat, fish, poultry, and other food products. The CPUAB is also doing research to produce nutricuticals from food processing waste.

Center for the Market Diffusion of Renewable Energy and Clean Technology
http://huntsman.usu.edu/cleantech/
The Center for the Market Diffusion of Renewable Energy and Clean Technology is a new research and educational outreach center in the Jon. M. Huntsman School of Business that is funded by congressionally-directed and competitive grants from the U.S. Department of Energy, Department of Energy's Wind Powering America program. The center provides research and hands-on marketing opportunities as career accelerators for USU students.

Center of Active Sensing and Imaging (CASI) Advanced Sensing and Imaging
http://innovationutah.com/advancedsensingandimaging.html
Dedicated to helping Utah take the international lead in using advanced laser technology that has the potential to revolutionize a myriad of industries. The goal is to use radar-like, laser-based lidar technology to measure distances instead of radio waves, for a variety of industrial applications, including siting wind farms, controlling emissions, and rapid replacement of bridges, runways and other infrastructure.

Intermountain Center for River Rehabilitation and Restoration (ICRRR)
http://www.cnr.usu.edu/icrrr/
The mission of ICRRR is to advance the science and practice of river restoration and environmental management and to transfer that knowledge to the public and private sectors. ICRRR conducts its work through completion of targeted research projects, providing decision support to federal agencies and adaptive management programs, evaluating the performance of previously constructed restoration projects, and teaching short courses about stream restoration methodology to practitioners. ICRRR's regional focus is the streams and rivers of the Intermountain West.

Institute for Intuitive Buildings (12B)
http://innovationutah.com/I2B.html
The Institute for Intuitive Buildings (I2B) team is hosted by the Energy Dynamics Laboratory (EDL), the newest business unit of the Utah State Research Foundation. Because a considerable amount of energy is wasted in lighting, cooling and ventilating commercial buildings, the I2B team will create real-time scene measurement and interpretation techniques for electric lighting systems. The team goal is to cut lighting electrical use in half in buildings through anticipatory and task-adaptive lighting systems.

SEED Program to Advance Research Collaborations (SPARC)
http://research.usu.edu/htm/faculty-funding-and-startup/sparc
The SPARC program provides 1-year seed funding of up to $35,000 to catalyze development of large interdisciplinary research teams and projects that involve scholarly research in more than one department, research center, college or institution. Successful SPARC proposals will require mutual effort by faculty and researchers from multiple disciplines, and provide outcomes that will enhance USU faculty success in securing new, large-scale, interdisciplinary externally funded grants (EFGs). It is anticipated that new EFGs catalyzed by SPARC will extend the University’s research capability and increase extramural funding for scholarly activities from government agencies and private sources.

Synthetic Biomanufacturing Center
http://innovationutah.com/research/biomedical/syntheticbiomanufacturing.html
A group of Utah State University researchers in the colleges of science and engineering have joined together to create the Synthetic Biomanufacturing Center. The center is funded by the Utah Science, Technology and Research Initiative (USTAR). The team goal statement: "Use the chemical makeup present in single cell organisms to transform raw materials into environmentally friendly products such as low cost bioplastics, biodiesel, light energy and pharmaceuticals".

USU Energy Lab (elab)
http://biofuels.usu.edu/
Utah State University started elab in 2007 with the purpose of assembling interdisciplinary research teams that crosscut multiple scientific and engineering disciplines both at the University and at partnering institutions. With an anchoring facility on USU's Innovation Campus and satellite labs across the remainder of USU, elab seeks to develop solutions to America's most intractable energy problems through scientific and technological innovation.
They provide a cohesive framework permitting faculty, students, and partnering institutions to focus on contemporary energy-related research issues. Their first initiative - the model for those to come - is focused on developing enabling technologies leading to a new class of algal biofuels.

USU Research 2010 Calendar
http://research.usu.edu/2010calendar/
Utah's environment is one of the most diverse in the nation, and research at Utah State University is equally diverse. This year's Research Calendar highlights Utah scenes and a variety of USU projects that are especially important to our state and nation.

USU Research Office - Research Matters 2010
https://research.usu.edu/researchmatters2010/
In this year's Research Matters, you'll read about projects that are making communication systems more reliable, improving local food businesses, reducing fear of criminal victimization, and creating the next generation of energy independence. These programs thrive with broad-based support.

USU Research Sustainability
http://sustainability.usu.edu/htm/sustainability/research
The USU Research Sustainability Committee is charged with developing an action plan to harness the research capabilities of USU to provide research needed to enable Utah and the Intermountain West to move toward climate neutrality and sustainability. To address this responsibility, the Research Sustainability Committee seeks to identify, promote, and recognize climate neutrality- and sustainability-related research activities and opportunities at Utah State University. This information will allow the committee to determine USU's unique research contributions toward climate neutrality and sustainability, and develop policy recommendations to enhance USU leadership in this area.

USU Sponsored Programs Office
http://spo.usu.edu/
The Sponsored Programs Office is a unit within the Vice President for Research Office created to serve the faculty, staff and students by assisting and/or facilitating the pursuit of external funding for scholarly, research, public service, and instructional activities. Preserving the rights and interests of the university, the researcher, the sponsor, and the community is a crucial aspect of the Sponsored Programs Office.

USU Sunrise Sessions
http://research.usu.edu/htm/sunrise-session
At Utah State University's Sunrise Sessions, faculty and students share their research with alumni, community and business leaders from the Salt Lake area. Held quarterly in downtown Salt Lake City, these early-morning presentations detail how USU research is addressing pressing issues such as the obesity epidemic and hearing loss in children. All are invited to attend these events at no charge thanks to generous sponsorship by Regence Blue Cross Blue Shield.

Utah Center for Water Resources Research
http://uwrl.usu.edu/partnerships/niwr/index.html
The Utah Center for Water Resources Research (UCWRR) is located USU as part of the Utah Water Research Laboratory (UWRL) and is one of 54 state water institutes that were authorized by the Water Resources Research Act of 1964. The mission is related to stewardship of water quantity and quality through collaboration with government and private sectors. The UCWRR facilitates water research, outreach, design, and testing elements within a university environment that supports student education and citizen training. The UCWRR actively assists the Utah Department of Environmental Quality (UDEQ), the Utah Department of Natural Resources (UDNR), the State Engineer's Office, and all 12 local health departments with specific problems related to each state government unit.

Utah Climate Center (UCC)
http://climate.usurf.usu.edu/
The mission of UCC is to facilitate access to climate data and information, and to use expertise in atmospheric science to interpret climate information in an accurate and innovative fashion for the public. The mission includes the design of new products to meet present and future needs of agriculture, natural resources, government, industry, tourism, and educational organizations in Utah and the intermountain region.

Utah Partners for Conservation and Development (UtahPCD)
http://www.utahpcd.info/index.html
UtahPCD is a unique partnership of several natural resource oriented agencies and organizations committed to providing solutions to conservation issues. From Federal agency representation and State leadership, to local coordinators on the ground, the UtahPCD members work together to leverage resources and increase effectiveness. UtahPCD is a partnership committed to providing conservation solutions.

Utah Science Technology and Research Initiative (USTAR)
http://ustar.usu.edu/
USTAR is an innovative and far-reaching initiative of the Utah State legislature to bolster Utah's high-tech economy by investing in recruiting new, high caliber faculty and university research programs. USTAR has been developed by Utah's business leaders in collaboration with the Governor's Office, economic development leaders, key legislators, and university leaders. USTAR is designed to increase the flow and commercialization of university discoveries, inventions, and innovations. By investing in university research with high commercialization potential, Utah will accelerate the growth of new businesses and industries, thus creating high-paying jobs, and providing additional tax revenues.

Western Sustainable Agriculture Research & Education (SARE)
http://wsare.usu.edu/
SARE is a program of the U.S. Department of Agriculture that functions through competitive grants conducted cooperatively by farmers, ranchers, researchers and ag professionals to advance farm and ranch systems that are profitable, environmentally sound and good for communities.

Great Basin Research and Management Partnership
http://greatbasin.wr.usgs.gov/GBRMP/index.html
The Great Basin Research and Management Partnership (GBRMP) promotes comprehensive and complementary research and management collaborations to sustain ecosystems, resources and communities across the Great Basin -- a five state area experiencing similar sociological and ecological concerns. Our vision is of teams representing the full spectrum of organizations and stakeholders working together to solve the region's ecological and socio-economic issues through the integration of research and management.