III. Sustainability

A. Presidents' Climate Commitment

In 2007, CU-Boulder was one of the original signers to the American College and University Presidents' Climate Commitment (ACUPCC) and has drafted the Conceptual Plan for Carbon Neutrality (CPCN) for reducing greenhouse gas emissions that was formally adopted by the former Chancellor Bud Peterson.. In order to begin meeting the goals identified in the ACUPCC, CU-Boulder made a commitment to work toward the Governor's Executive Orders for "Greening of the State Government." The goals established by the executive orders and found in the CPCN are:

- By 2012 attain the following goals as compared to a 2005 baseline:
    - 20 percent energy intensity reduction.
    - 20 percent reduction in paper consumption.
    - 10 percent reduction in water consumption.
    - 25 percent volumetric decrease in petroleum fuel.
    - A zero-waste goal for all construction projects and operations of all facilities.
- Concurrent Greenhouse gas (GHG) goals relative to a 2005 baseline are:
    - 20 percent GHG reduction by 2020 (This goal should be achieved at the end of the 10-year planning period that this Master Plan addresses).
    - 50 percent GHG reduction by 2030.
    - 80 percent GHG reduction by 2050.

The 2012 goals and the goal of a 20 percent reduction in GHG by 2020, all fall well under the purview of this current Master Plan.

This plan incorporates green building practices, energy efficient methods, and energy production strategies that are the tools by which sustainable buildings are created. However, the efficiency of green also depends on the behaviors of building occupants. Behaviors can be hindered by internal (perceptual, preferential) or external (infrastructure) barriers. Some of the solutions must consider the social aspect of sustainability, where appropriate, to meet short-term and long-term goals. Examples of such goals include: building residence halls that can showcase building elements and systems as sustainability learning tools; asking building occupants how infrastructure changes in their workspace could help them lower energy consumption; and providing people with the information they need to truly gain all the benefits that an efficient campus can offer.

1. Smart Growth

CU-Boulder recognizes that the greenest building out there is the one that doesn't have to be built. With this in mind, it is important to focus on improving space utilization of existing buildings, before building new ones. The Boulder campus recently created a Space Management Advisory Committee to oversee space allocation, maximization of space utilization, as well as develop space standards.

Goal:

- Approach development with a smart growth approach, which speaks to both **campus design elements and community partnerships.**

Guidelines:

- Implement a policy requiring a space utilization audit be conducted for a department prior to granting additional space usage or construction.
- Incorporate into the planning and design for each new facility—or renovation of an existing facility—the identification of the following:
    - Is there any food or beverage service provided? Who is the provider?
    - Who will fund incremental waste and recycling operations, utility use, and adhere to any other applicable guidelines?
    - Will housing or dining accommodations be required?
    - Will parking accommodation be required, and how will it be funded? Will incremental bus or other transportation services be required, and how will it be funded?
    - Are any other downstream operations affected?
- Recognize that preservation and historic heritage are key elements to the campus's smart growth principles. Look first to better use existing resources before considering new development. To read more about preservation, go to Section I.A.6. To learn about the architectural heritage of the campus, go to Section V.A.6

2. Sustainable Buildings

Campuses have a significant impact on the built and natural environment and are under increasing pressure from governments, students, and community members to carefully mitigate their environmental footprint. CU-Boulder is no exception. Nationally, campus development initiatives are factoring in the economic and social needs of surrounding neighborhoods and incorporating design elements that contribute to environmental health as well as architectural aesthetics. New approaches are propelled by a valuable insight: what's good for the community is good for the campus.

With this in mind, this Campus Master Plan incorporates smart growth principles along with sustainable building practices to ensure that efficient, appropriate, and low-impact growth occurs over the next 10 years, aiding in the university's larger efforts of eventually reaching carbon neutrality.

Goals:

- Strengthen community ties by providing opportunities for connectivity in the design of buildings and outdoor spaces that are compatible with community interests.
- Control costs and the outward expansion of the campus, by designing campus buildings in a way that facilitates renovation or reconfiguration for alternate future uses, incorporates flexible core and shell, provides adaptable infrastructure that allows for future change without major reconstruction, and installs systems and equipment that are flexible.
- Reduce campus and community environmental impacts, by attempting to locate new facilities with diverse heating and cooling load demands in proximity to take advantage of energy recovery options (e.g., consolidated data centers as a heat generator), renewable options such as geothermal systems, and incorporating highly efficient district heating and cooling plants.
- Design and locate buildings and infrastructure to allow for easy access for improved serviceability and access for services such as routine maintenance, recycling, composting, and other building services needs.

Guidelines:

- All new buildings and major renovations are built to a LEED Gold Standard plus extra attention is focused on energy and water credits (CU-Boulder's term of LEED Gold "Plus"). This helps ensure that buildings are as energy and water conserving as possible and provide the greatest long-term payback for the investments made. Each project should strive to achieve performance at a minimum level of 45 percent better than the ASHRAE standards in place at the time of the project's construction.
- Ensure that all new and renovated facilities underway (those with formal Program Plan approval) be near net-zero energy facilities. A net-zero energy facility collects as much energy from renewable sources as the facility uses on an annual basis while maintaining an acceptable level of service and functionality. Buildings can exchange energy with the power grid as long as the net energy balance is zero on an annual basis.
- Install visible energy monitoring devices on buildings and make information available to inform and help occupants track conservation behaviors.
- As appropriate, plan and construct facilities that intertwine indoor space with nature to capitalize on the benefits of biophilic design—the term is derived from biophilia, coined in 1984 by a Harvard biologist, Edward O. Wilson, to describe what he considered the innate human attraction to nature—that incorporates real or simulated natural elements in an effort to promote well-being.
- Incorporate designs for outdoor active and passive spaces and structures that allow community members time with nature.
- Establish infrastructure that will allow virtual coursework across all CU-Boulder campuses, allowing students to take classes virtually without travel between campuses.
- Identify 15–25 acres of land for the development of a local food production facility such as solar powered greenhouses in CU-Boulder South. Smaller pilot projects can be accommodated within the campus.

3. LEED and STARS Compliance

The U.S. Green Building Council (USGBC) created the Leadership in Energy and Environmental Design (LEED) rating system as a set of guidelines to design and build the most sustainable and green buildings. LEED addresses five categories: sustainable site, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality.

In 2004, CU-Boulder students approved a Capital Construction Fee, which required that the four new buildings being funded by the students be built to a minimum of LEED Silver rating. After attaining LEED Gold certification on a number of buildings, CU-Boulder self-imposed a goal of LEED Gold "Plus" (as defined above). The campus internally created this term to help focus more on the two major categories of LEED: energy and water. This allows planners to delve deeper into the categories that have the greatest long-term payback.

The Sustainability Tracking Assessment and Rating System (STARS) is a checklist similar to the LEED system but with broader scope. Unlike LEED, an entire campus—not just a single building—is evaluated for an array of sustainability characteristics including academics, research operations, policies, co-curricular activities, and human and community impacts.

CU-Boulder is the first campus in the nation to receive a "Gold" rating from STARS, and will continue to strive for a Gold rating, if not a Platinum rating, in the future by focusing on currently identified STARS gaps.

CU-Boulder has adopted this framework and interwoven STARS's implications in appropriate areas of the Campus Master Plan. This has necessarily widened planners' review from a singular capital construction perspective to additional consideration of policies and operational practices necessary to support broader sustainability outcomes. This promotes synergies, cross-pollination, and the integration of disparate sustainability elements and organizational units behind CU-Boulder's enhanced sustainability vision.

Guidelines:

- All new and renovated facilities shall attain LEED Gold "Plus" certification, which is diving more deeply into the energy and water conservation categories of the LEED requirements, including projected performance at a minimum level of 45 percent better than ASHRAE standards.
- CU-Boulder will utilize the STARS rating to outline opportunities for the campus to improve in building maintenance and operations, clean and renewable

energy, and waste reduction.
- CU-Boulder will re-submit to STARS when changes identified in the gap analysis have been implemented.

4. Energy Efficiency and Carbon Reduction

The manner in which CU-Boulder produces and consumes energy directly affects sustainability and carbon neutrality goals. About 80 percent of CU-Boulder's reported greenhouse gas (GHG) emissions are from the combustion of fuels for heat, power, and chilled water. Conservation, energy efficiency, and renewable fuel sources are among the best methods to reduce these emissions. The utility infrastructure must strive for a balance between costs, conservation, and carbon through "greener" energy solutions.

The Main Campus energy system has the potential to become less carbon intense with the development of viable renewable energy fuel sources (e.g., cogeneration, solar PV, geothermal, synthetic gas, and biomass).

Goals:

- Reduce total energy consumption (BTU/ft^2) by 20 percent by 2012 based on a 2005 baseline.
- Reduce total (Scopes 1, 2, and selected scope 3[1]) GHG emissions (Metric Tons CO2/year) by 20 percent by 2020 based on a 2005 baseline.

Guidelines:

- Designate 15 to 25 acres of land potentially on CU-Boulder South for the development of large-scale renewable energy systems such as solar PV, solar thermal, and other emerging technologies. This site could be co-located with solar greenhouses used to produce local organic food for the campus while providing a research showcase and robust renewable energy facility. Smaller-scale renewable energy projects can be accommodated on campus.
- Utilize information from the STARS gap analysis for improvement in opportune areas such as building operations and maintenance, specifically prioritizing LEED EB level renovations and maintenance standards of the campus's aging building inventory.
- Utilize information learned from the STARS gap analysis to improve in the areas of clean and renewable energy and waste reduction to help overall campus goals of reducing GHG emissions, and eventually achieving carbon neutrality.
- Plan to include utility corridors (similar to land easements) for all utilities as well as designated land use for central plants. (See Sustainable Buildings (Section III.A.2) for net-zero goals and energy efficient building).

B. Resource Conservation

CU-Boulder is facing the challenge of reducing water usage by 10 percent by 2012. Although both LEED and STARS address water efficiency, it is important for CU-Boulder to conserve this valuable resource wherever possible.

Goals (Based on a 2005 baseline):

- Reduce water usage (gal/ft2) by 10 percent by 2012.

Guidelines:

- The design for the campus landscape will follow the seven xeriscape principles, enhance biological diversity using a selection of native and drought tolerant plantings where practical, and removal of invasive species.
- Designs should reflect varied micro climates found on campus.
- Plans will integrate storm water best management practices to use and purify site water within the landscape to the extent possible.
- Raw water (also referred to as ditch water) should be used for all irrigation rather than using treated potable water from the city.
- Per LEED guidelines, low-flow fixtures shall be used in all renovated facilities and new facilities.

The university strives to improve water quality of storm water by reducing pollutant loads to protect existing streams and creeks, improving drainage, and maintaining ground water recharge.

Goal:

- To avoid an increase in storm water runoff on campus, all new designs and renovations should apply appropriate design techniques and look for new design opportunities that mimic natural systems to infiltrate or retain onsite storm water.

Guidelines:

- New building site plans will reduce the storm water runoff rate and volume by 25 percent of pre-construction conditions on developed sites and match existing rates and volumes on undeveloped sites.
- Improve water quality of storm water by using bio-retention, landscape infiltration, and permeable paving.
- Consider using green roof technology in appropriate locations to minimize runoff and reduce heat island effect.
- Ensure that all construction uses Best Management Practices (BMPs) by submitting storm water mitigation plans for approval prior to building permit issuance.

1 **Scope 1:** All direct GHG emissions. **Scope 2:** Indirect GHG emissions from consumption of purchased electricity, heat or steam. **Scope 3:** Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities not covered in Scope 2, outsourced activities, waste disposal, etc.

C. Zero-Waste

As the University of Colorado Boulder continues to achieve progress towards carbon-reduction goals outlined in the university's Conceptual Plan for Carbon Neutrality (CPCN), the campus must place greater emphasis on waste reduction programs in order to decrease its impacts on ecosystems and communities.

Under guiding documents supported by the Boulder City Council, Boulder Board of County Commissioners, and Governor's Executive Orders "Greening of the State Government," the Boulder community is actively pursuing zero waste operations, defined as a 90 percent diversion of municipal solid waste. The City of Boulder has committed to achieving the goal of 85 percent diversion by 2017 and the county has committed a goal of beyond 90 percent levels by 2025.

Goals:

- CU-Boulder should increase its own landfill diversion rate to at least 90 percent by 2020 as a continuous improvement benchmark in pursuit of a zero-waste goal.
- CU-Boulder shall prioritize materials management activities according to the time-honored maxim—"reduce, reuse, and recycle"—that seeks first to work with suppliers to reduce or eliminate incoming supply chain materials.

Guidelines:

- Design and Integrate infrastructure and systems that support zero-waste practices.
- Retrofit zero-waste collection systems in existing facilities and all outdoor containers.
- Site and construct a compost system off campus in partnership with the city or county, capable of processing all campus originated pre-and post consumer organics, and develop on-campus end use destination where possible and market these materials in the community.
- In support of zero-waste goals and the university's educational mission, examine size, location, and operational capabilities of the existing facility as a campus unit or in conjunction with the city or county.
- Acquire or create small, flexible interim storage facilities to manage construction and demolition waste campus wide.
- Actively pursue a partnership with the county to manage construction and demolition (C&D) waste on a regional level.
- Locate recycling, compost, and trash containers, both indoor and outdoor, to optimize behavioral compliance with these programs.
- To facilitate the increased use of reuseable water containers, more public filtered drinking water stations should be located in existing high use/visibility areas, and be specified in new construction/ renovations.
- Include a requirement to vendors and on-campus contractors to "pack it in, pack it out."

D. Transportation

Transportation and particularly alternative modes of transportation are critical to the success of future development of the campus. The Campus Master Plan adopts the goals listed in the Sustainability Task Force document, which are to:

- Move toward a higher proportion of transportation fuels derived from renewable resources.
- Increase the number of passenger miles per vehicle-mile traveled.
- Reverse the growth in the average length of trips taken.
- Work to reduce the growth in the number of trips taken while retaining the current modal hierarchy of pedestrians, bicycles and skateboards, transit, car share/carpool, and single occupancy vehicles (SOV).

To read the Transportation goals in more detail, please see Section V.E.