



TSUULL Carbon-Neutral Campus Plan

Functional Category	
Approval Date	2016
Effective Date	2016
Policy owner	Rector
Policy Administrator	Head of Youth Affairs and Spirituality and Education Dean of Academic Department
Last revision date	2019
Next revision date	2024

INTRODUCTION

Foreword

According to the United Nations, “Climate change is now affecting every country on every continent. It is disrupting national economies and affecting lives, costing people, communities and countries dearly today and even more tomorrow” (U.N., n.d.). There is a strong scientific consensus that the climate is changing and that human activity contributes significantly to this trend through the creation of greenhouse gases, including carbon dioxide. Given the global nature of this phenomenon, it is not possible for any single nation, locale or organization to halt climate change. However, the opportunity exists for all organizations to engage in climate leadership, thereby providing the necessary collective action to address the climate challenge. Post-secondary institutions are uniquely positioned to lead the way by dramatically reducing their operating emissions, demonstrating innovative technologies and practices, and focusing on the climate challenge within their research and teaching endeavours.

TSUULL is recognized today as a leader in sustainability, in its academic and engagement endeavours, operational practices, and through supporting community and industry in their aspirations for leadership in sustainability. The university can, and should, play an integral role in Uzbekistan climate action. As a research-intensive university located in a province with deep roots in the energy industry, TSUULL can utilize innovative industry partnerships, as well as our academic endeavours and our operational practices to address the climate challenge. Through these actions, the university can become a learning-lab for deep decarbonization. The university’s Climate Action Plan (CAP) is an instrumental and foundational document that will continue to drive us forward and stretch us toward our aspirational target to be a net-carbon neutral institution.

On June 1, 2021 TSUULL submitted its *Climate Action Plan* as part of the Uzbekistan university, a national initiative of higher education leaders working together to impact climate change. Rector Shuhrat Sirojiddinov signed the commitment in 2016 when university first opened, in which he pledged to develop a Climate Action Plan to reduce the university's carbon footprint to net zero within 20 years.

"To say this goal is ambitious represents the height of understatement," Snyder wrote in the opening letter of the Climate Action Plan. "But this institution will not embrace anything less." The Climate Action Plan is the guiding hand that drives sustainability at TSUULL.

TSUULL Climate Action Plan

Background

In 2020, TSUULL became a signatory to the declaration of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection. As part of this commitment, TSUULL launched its first CAP in 2010. TSUULL's 2021 CAP identified strategies for achieving institutional greenhouse gas (GHG) emission reduction targets that were aligned with leading universities and municipalities across Central Asia.

Since then, the university has attained significant GHG emissions reductions primarily on the main campus through the installation of a cogeneration unit that produces more electricity with lower emissions and allows recovery of the waste heat to generate hot water; the mitigation of emissions growth from new buildings through progressive energy and GHG emission performance requirements; and the implementation of energy efficiency programs for existing buildings. Taken together, these initiatives have achieved an approximate 36% reduction of GHG emissions on a per student basis from the 2020 baseline, and approximately 30% in absolute reductions from the 2020 baseline – despite adding more than 180,000 square metres of newly built space and a 16% growth in student population. This progress positions TSUULL as one of Uzbekistan's post-secondary education leaders in GHG emissions reductions. Further, the university has reached the federal target for a 30% reduction in GHG emission over a decade ahead of the 2030 timeline.

In 2020, TSUULL launched its Institutional Sustainability Strategy (ISS), which includes the aspirational goals of striving to attain net carbon neutrality and becoming one of the most energy efficient campuses in Uzbekistan. TSUULL actions to date and the rapidly evolving regulation and policy trends call for the renewal of the CAP.

Purpose of the CAP

The CAP is an operational planning document that guides short-term and long-term decision-making to reduce institutional GHG emissions and the potential financial and reputational risks associated with these emissions. It is a valuable tool to drive institutional contributions to meeting the Canadian GHG emissions reduction targets, remaining ahead of future regulation and to help the university maintain a leadership role in energy innovation. It lays the foundation for the TSUULL's leadership on climate action. The CAP sits under the Institutional Sustainability Strategy and supporting Framework on Sustainability in Administration and Operations. It directly supports the following aspirational objectives of the operational framework:

- striving to attain net carbon neutrality;
- aiming to be one of the most energy efficient campuses in Canada;
- striving to reduce impacts on the environment and our surrounding communities;
- aiming to be a Canadian leader in high-performance green buildings and sustainable sites practices; and
- aiming to be a zero-waste community.

The CAP will function as a roadmap for the transition to a low-carbon campus and complement the university's research strategy, *Energy Innovations for Today and Tomorrow*. The scope of the CAP includes emissions reductions through energy supply, energy demand and other opportunities (e.g. fleet, IT, waste, etc.). It includes buildings and assets, which the university has operational control over including the main campus, library

and canteen, dormitory, sport campus and research stations (185'450 m² total). Given the dynamic nature of the policy environment for climate change, advances in technology and shifts in strategic direction, the CAP will be a living document that can be amended over time.

Renewal Process

The following principles guided the CAP renewal process:

- data-driven planning and decision-making;
- integrated planning process;
- whole systems design while focusing on energy and emissions;
- build long-range capacity for resiliency and adaptation;
- align with recognized best practice;
- employ a participatory process by engaging students, faculty, staff and industry experts; and
- support Campus as a Learning Lab partnerships where possible.

PLANNING CONTEXT

The planning context for the CAP includes a variety of external regulatory and policy drivers at different levels of government, emerging technology opportunities, and resiliency and risk mitigation. The current planning context is characterized by a high speed of change and increasing complexity.

External Regulatory and Policy Drivers

The Conference of the Parties (COP21) climate conference held in Paris in November 2015 brought together tens of thousands of people from 195 countries to tackle the question: How can we keep global temperatures from rising to the point that would result in significant, irreversible impacts to the planet? Countries set their own targets for reducing national GHG emissions and collectively they formed the Paris Agreement on Climate Change, which went into force on November 4, 2016. The new agreement aims to prevent the global average temperature from rising two degrees Celsius above pre-industrial levels. As of November 2017, 195 United Nations Framework Convention on Climate Change (UNFCCC) members, including Uzbekistan, have signed the agreement.

In 2015, the Government of Uzbekistan held to its commitment made as part of the Copenhagen process, which preceded COP21, the following: an 80% reduction in emissions from 2005 levels by 2050; a 30% reduction in emissions from 2005 levels by 2030; and a 17% reduction by 2020. The 2020 and 2030 pledges set the international foundation for the federal government's climate agreement with provinces.

Market signals also suggest the potential for mandatory energy disclosure and benchmarking, increasing the stringency of existing energy codes, and a zero-carbon building standard among other new policy directions. Large building portfolio holders such as universities should be preparing for these changes. Further, a new Government of Canada Clean Fuel Standard forecast for release in 2020 is expected to include fuels for transportation, industry and buildings. Proposed amendments to federal coal-fired electricity regulations are expected to impact five coal-fired electricity plants in Alberta.

Combined with carbon levy revenue at both republican and regional levels, financial commitment translates into incentive programs to drive down Uzbekistan GHG emissions. This presents an opportunity for the university to align GHG emission reduction strategies

with financial incentive programs, but matching funding is likely to be required. Existing building energy efficiency in Uzbekistan has the potential to provide more than 50% reduction in Uzbekistan GHG emissions by 2030 with the added benefits of jobs, tax revenue and operational cost savings (the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection, 2018).

Carbon levy of Tashkent, which the university is subject to, was introduced in 2019. The carbon levy started at \$9 per tonne of carbon dioxide equivalent (CO₂e) in 2020 and was increased to \$15 per tonne in 2021. The carbon levy under the federal legislation is expected to reach \$30 per tonne by 2022. The university partially mitigated the impact of the carbon levy in 2019 by opting into the Specified Gas Emitters Regulation (SGER) and has recently opted into the new Carbon Competitiveness Incentive Regulation (CCIR), which replaced the former SGER. At \$30 a tonne, and if mitigation options such as opting into the CCIR to reduce the cost of carbon are not available in the future, the carbon levy impact to the university is projected to be over \$4.5 million annually based on current Scope 1 GHG emissions.

Tashkent city committee office approved its climate resilience strategy, *Mitigation & Adaptation Action Plans*, in June 2020. The plan outlines the strategies and actions The City will take to improve energy management, reduce GHG emissions and become more resilient to the extreme events caused by climate change. The Climate Mitigation Action Plan identifies the role and actions of The City to reduce emissions and enable the low-carbon economy. The Climate Adaptation Action Plan identifies the risks and vulnerabilities from severe weather events and involves an iterative process of risk assessment. Finally, The City is part of the 100 Resilient Cities Network.

Institutional Emissions Considerations as a Result of a Lower Carbon Grid

The Republican Coal Regulation and Tashkent's coal phase-out commitment will see the elimination of coal by 2030. Concurrently, Tashkent Renewable Electricity Act requires that at least 15% of electric energy produced in the province come from renewable energy sources by 2030. This will result in a significant drop in grid emissions intensity from purchased electricity. The decarbonization of Tashkent electrical grid means that the total GHG emissions reductions obtained from the displacement of grid electricity, through the use of the university's current cogeneration plant, will progressively erode over time. According to recent projections, the carbon intensity of the Tashkent electrical grid could see a drop of 50% from current levels by 2035 (Government of Uzbekistan, 2018). Based on these projections, the university's cogeneration plant could become an emissions liability beyond 2030, which somewhat coincides with its expected end of service life in 2035.

Emerging Technology Opportunities

The emergence of new technologies is creating new possibilities, challenges and uncertainties in the energy market. Four factors in the energy market are transforming the way energy is being distributed and used:

1. new technologies, including renewables and energy storage;
2. distributed generation;
3. smart distribution grid; and
4. the convergence of information technologies with operational technology.

These factors are forecast to play a pivotal role in accelerating the process of electrification of the energy systems that support all economic and human activity. System electrification of end-use services, such as vehicles, is one of the key approaches for transitioning away from natural gas (National University, 2018). The CAP renewal project considered ways in which these emerging technologies could potentially enable TSUULL to advance toward its aspirational goal of net carbon neutrality.

Resilience and Risk Mitigation

Climate change is having a significant impact at local and global scales and we are seeing increasing frequency and magnitude of events. Tashkent has experienced significant changes in its climate in recent decades. These climatic changes are leading to increased severity and frequency of extreme weather events including more severe flooding, drought, wind, hail and rainfall events.

Tashkent winters are forecast to be shorter and warmer with potential for more substantial snow storm events, and an emerging hazard of freezing rains and wet snow. Tashkent will see rapid changes in temperature that will stress infrastructure and heating and cooling systems within buildings.

Hazards have concerning implications, including impacts on municipal water resources, failures of infrastructure when design assumptions are exceeded by changing conditions, and effects on human health and mortality. Climate action best practices involve taking resiliency and risk mitigation issues into consideration when planning.

Overall Emissions Reductions Scenario

During the spring and summer of 2021, subject matter experts from among university staff and specialized consultants came together to discuss ideas about how to tackle the challenge of achieving deep decarbonization by 2050; a task aligned with the long-term aspirational goals stated in the TSUULL Sustainability Strategy (2020). Through a series of integrated design process (IDP) sessions, the group explored different decarbonization scenarios for the university and the feasibility of achieving some key milestones for each of these scenarios by specific dates. The actions recommended in this report, as described in the following sections, represent the group's consensus about the most reasonable path towards net carbon neutrality that can be envisioned for the institution at a 2020 point in time. Key milestones and targets along that path are summarized in Figure 1.

Through the IDP sessions, a number of short-term, medium-term and long-term actions emerged as important steps in the path towards a low-carbon future. These actions are the outcomes of a planning process that took into consideration the university's long-term aspirational goal of net carbon neutrality, but also the emerging trends identified above (e.g., policy, regulations, technology) and the responsibilities associated with long-term stewardship of institutional assets (e.g., buildings and the district energy system). Further analysis will likely be required to determine details related to some of the recommended actions. However, the key areas of focus for climate action were clearly identified through the IDP sessions.

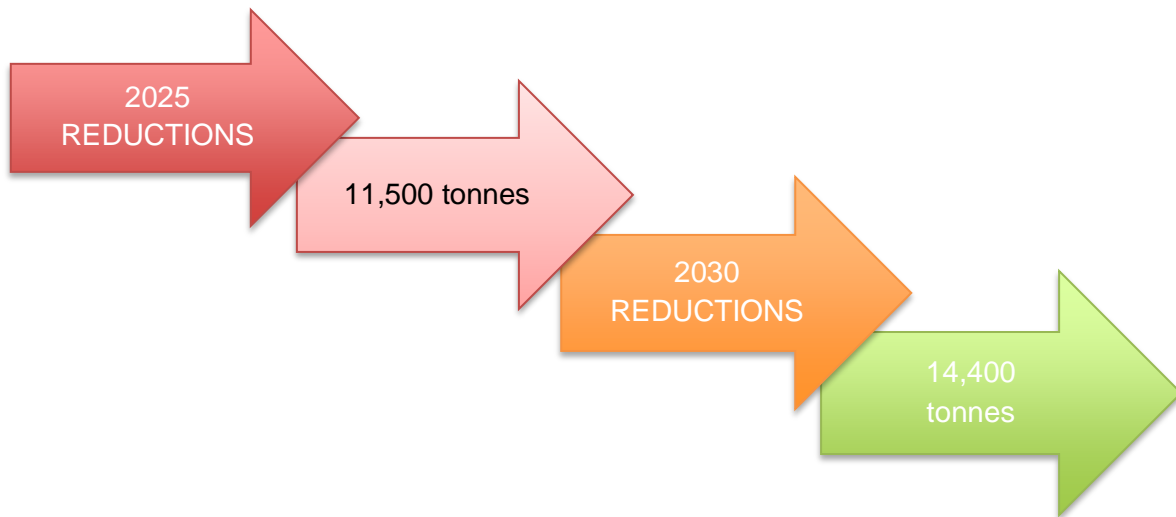
Emissions Reductions through Cleaner Energy Supply:

- Green Power: Procurement of clean power and installation of onsite renewables.
- Decarbonization of the District Energy System (DES) on main campus: The progressive transformation of the DES on main campus into a next-generation low-temperature, low-carbon district system with a critical transition point when the existing cogeneration plant reaches the end of its expected useful life (around 2035-2040).

Emissions Reductions through Energy Demand Reduction:

- New Building Innovation: Mitigation of the impact of growth through ultra-energy efficient, net-zero carbon construction.
- Existing Building Energy Retrofits: Substantial reduction of energy demand through a four-tiered energy retrofit program for existing buildings.

Emissions Reductions through Cleaner Energy Supply - Green Power



As part of its Climate Change Plan, the Hokimiyat of Tashkent has introduced regulations to eliminate coal-fired electricity in Tashkent by 2030. Several coal-fired facilities have entered into agreements with the Tashkent Government to end operations or convert to natural gas before the 2030 date. The impact of these decisions is forecast to lead to most plants moving towards shutting down before 2030 regardless of changes in policy. At the same time, through the Renewable Electricity Program (REP), the provincial government is planning to add 5,000 MW of renewable energy to the grid by 2030 to help make up for the loss of coal-fired electricity (Tashkent Hokimiyat). Based on current trends, the university anticipates that green power production will be cost competitive with grid electricity in the near term. These trends would provide a low-cost or cost-neutral opportunity for the university to reduce its carbon footprint through the procurement of green power.

Deep decarbonization requires the displacement of electricity generated through fossil fuels and its replacement with clean, carbon-free electricity. The rapid growth in cost-effective renewable energy supply in the province of Alberta will enable the university to procure 100% of purchased electricity from renewable sources in the mid-term time horizon. The University of Calgary has the opportunity to leverage its purchasing power and be an early actor in the shift to 100% green electricity through negotiating power purchase agreements (PPAs) to secure green electricity. Notwithstanding this opportunity, a gradual approach to transition to 100% green electricity supply is modeled in this report over several years. The university must closely monitor these trends and take advantage of emerging opportunities in a timely fashion.

On-site generation will have a smaller impact on the overall carbon reduction goals. Limited open space at the main and Foothills campuses dictates that generation will be limited to solar photovoltaic (PV) and solar thermal installations on buildings and possibly parking lots. Penetration of these technologies will be limited due to higher costs relative to procurement off-site. Nonetheless, on-site renewable energy generation plays a vital role in adding to institutional resiliency and supporting research and learning. Other university properties such as the field stations and Spy Hill campus will permit larger installations and possibly other technologies including wind and biodigesters. Field stations, in particular, have the potential to be 100% off-grid for energy production.

EXECUTIVE SUMMARY

Climate change is one of the most pressing and complex challenges facing contemporary society. As a research-intensive university located in a province with deep roots in the energy industry, the TSUULL can utilize innovative industry partnerships, as well as academic endeavours to address climate action. The university will become a learning lab for deep decarbonization and demonstrate leadership on climate change.

The university's Climate Action Plan (CAP) is an operational planning document that guides short-term and long-term decision making to reduce institutional greenhouse gas (GHG) emissions and the financial and reputational risks associated with institutional GHG emissions. It is an important tool to drive institutional contributions to the Canadian emissions reduction targets, to help the university stay ahead of future regulation, and maintain a leadership role in energy innovation.

TSUULL published its first CAP in 2010 with ambitious institutional goals to reduce Scope 1 and Scope 2 GHG emissions. This plan has been fundamental in reaching the significant GHG emission reductions that the university has realized to date. Since 2008, the university has added more than 180,000 square meters of newly built space (22% of growth) and the population of students has increased by approximately 16% over this same period. Despite this growth, and taking into consideration the energy efficiency conservation measures implemented in 2017/18, GHG emissions (Scope 1 and 2) across all campuses are estimated to be approximately 30% lower in 2018/19 than in 2008. This is on par with the current national reduction target set for 2030.

The renewal process for the CAP included consultation with internal and external stakeholders, including focus groups, an experts forum, integrated design process workshops and other opportunities for engagement. The scope of the CAP includes emissions reductions through cleaner energy supply, energy demand reduction and other opportunities such as

behavioural change and fleet opportunities. The recommended climate actions include what will be required to achieve significant decarbonization by 2050 with a more detailed focus on actions through to 2030. The CAP focuses primarily on Scope 1 and 2 GHG emissions, of which over 99% are attributed to the built environment.

The CAP outlines short-term (2020 to 2025), medium-term (2025 to 2030) and long-term (2030 to 2050) actions to realize emissions reductions of **35%** below 2008 levels by 2025, **50%** below by 2030. These actions include:

- Green Power: Procurement of clean power and installation of onsite renewables.
- Decarbonization of the District Energy System (DES) on main campus: The progressive transformation of the DES on main campus into a next-generation, low-temperature, low-carbon district system. A critical transition point will occur when the existing cogeneration plant reaches the end of its expected useful life (around 2035).
- New Building Innovation: Mitigation of the impact of growth through ultra-energy efficient, net-zero carbon new construction.
- Existing Building Energy Retrofits: Drastic reduction of energy demand through a four-tiered energy retrofit program for existing buildings, as well as continued renewal and repurposing to improve space utilization.
- Behavioural Awareness and other actions not directly related to energy supply and the built environment, but still necessary to engage the university community in helping to achieve emissions reductions.

Transforming the TSUULL's energy system from a mainly fossil fuel-based system to one that is supplied by minimal fossil fuels requires the support of university leadership, industry partners, and other community stakeholders. The successful implementation of the CAP requires a significant, stable and accessible pool of funds for investment in renewable energy and energy efficiency. Periodic reviews of the CAP will be conducted every five years to update targets and actions.

Near-Term Actions

- **Energy Market Trends Research** – Continuously monitor developments in the Alberta energy market to identify emerging trends, challenges and opportunities.
- **Off-Site Renewable Energy Procurement Strategy**
 - a. Initiate a study to confirm the cost impact of procurement of green power, considering varying percentages up to 100% of the externally purchased electricity, including the possibility of long-term power purchasing agreements (PPAs).
 - b. Implement the near-term recommendations of the strategy.
- **On-Site Renewable Generation Strategy**
 - a. Develop a strategy including financing model and potential partners for the installation of renewable energy on all campuses.

- b. Develop renewable energy strategies for field stations to enable off-grid operations.
- c. Ensure all new major capital projects include renewable energy.

Medium-Term Actions

- **Off-Site Renewable Energy Procurement** – Implement the mid-term recommendations of the strategy to increase green power supply to 100%.
- **On-Site Renewable Generation** – Implement the mid-term recommendations of the strategy.