



NAZARBAYEV
UNIVERSITY

Green Campus



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Nazarbayev University *(established in 2010)*



GREEN
CAMPUS

NAZARBAYEV
UNIVERSITY

Schools:

- School of Engineering and Digital Sciences
- School of Medicine
- School of Mining and Geosciences
- School of Social Sciences and Humanities
- Graduate School of Business
- Graduate School of Education
- Graduate School of Public Policy

Research capacity:

- Center for Life Sciences
- Center for Energy and Advanced Material Sciences

Innovation:

NURIS: Incubation, Acceleration, FabLab, Commercialization



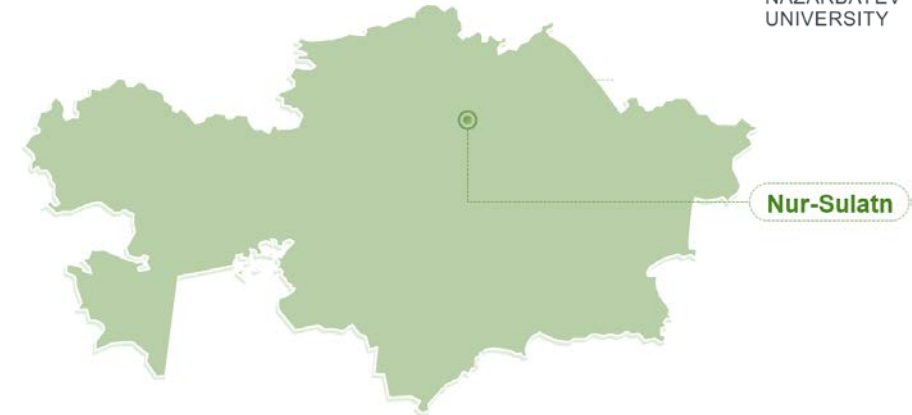
4663 students



2750 employees

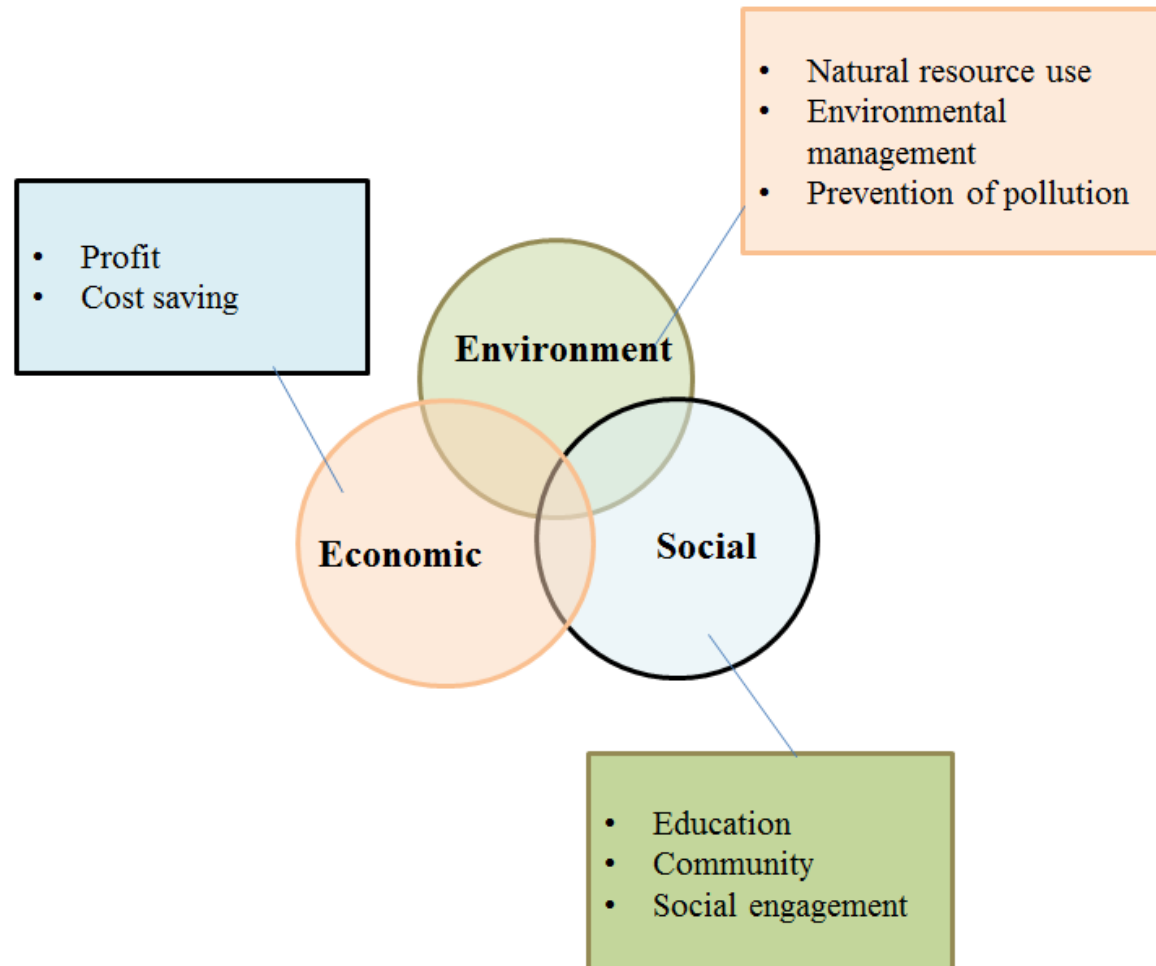


100 hectares



The Green Campus (GC) initiative

The **GC Concept** is based on principles of the Sustainable Development concept: environmental, economic and social aspects.



Green Campus – is an initiative of the NU in order to make our University sustainable and green


Main environmental areas:

- Reduction of GHG emissions (Scope 1,2)
- Improvement of waste management process

Integration of the University's core mission:

- education
- research
- innovation

9 key areas for campus sustainability (IARU)

- **Sustainable campus organization** 
 - Defining key targets, priorities and strategy
 - Human resource, budget allocation
- **Campus-wide operations** 
 - Optimization of operational services on campus land, water, energy and waste management
- **Buildings** 
 - Designing and construction of green buildings / making current buildings greener (LCC analysis, LCA analysis, Eco-Charettes (expert group on energy efficiency))
- **Transport** 
 - Optimization of staff and students commuting and staff business travel
 - Alternative sources of transport / greening the fleet
- **Laboratories** 
 - Making laboratories greener: waste management for laboratory waste, measures for efficient use of equipment
- **Communications** 
 - Reaching community through regular communication: web-site, social platforms: Facebook, VK, Twitter, regular reports on progress
- **Green procurement** 
 - Developing sustainable procurement procedures and practices
- **Employee and student engagement** 
 - Community engagement through trainings, competitions, cultural events
- **University as a catalyst for society** 
 - Supporting students and faculty projects (Living Lab)
 - Participating in joint project with city/region



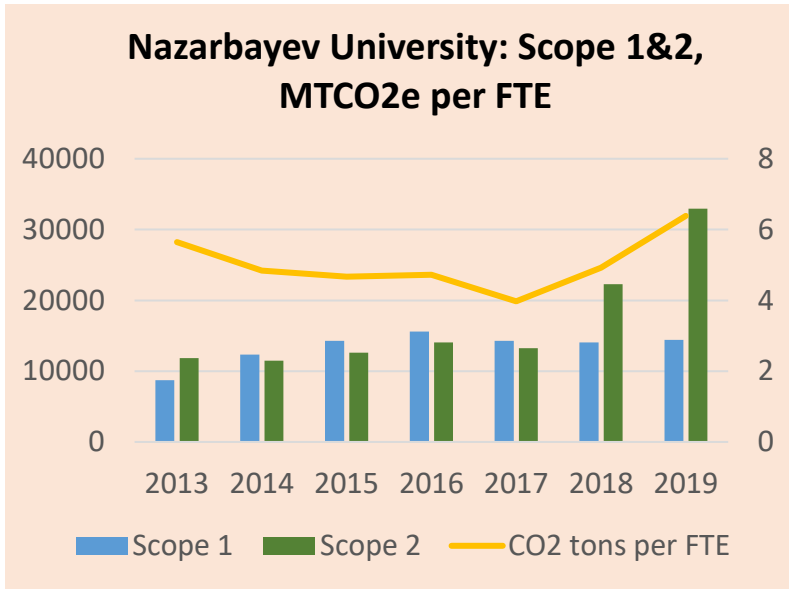
Summary of NU's environmental performance result

Emissions summary (in metric tons of CO ₂ e)	2013	2014	2015	2016	2017	2018	2019
Scope 1 - total	8 737	12 358	14 332	15 610	14 294	14 078	14 405
Heating - diesel	8 312	11 928	14 020	15 098	8 345	-	-
Heating – natural gas	-	-	-	-	5 405	13 508	13 785
Vehicle fleet	425	407	312	512	544	570	620
Scope 2 - total	11 834	11 491	12 610	14 055	13 249	22 289	32 946
Electricity – thermal power plant	11 834	11 491	12 610	14 055	13 249	22 289	32 946
Scope 3 - total	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Business travel, commuting, waste, water, procurement	-	-	-	-	-	-	-
Total emissions Scope 1&2	20 572	23 849	26 942	29 666	27 543	36 367	47 351

CO ₂ emissions per 1 FTE	2013	2014	2015	2016	2017	2018	2019
Total carbon emissions (scope 1&2 per FTE)	5.65	4.84	4.67	4.72	3.97	4.92	6.65

- **Diesel for heating** – supplied through boiler house of the University. Calculation was made according to the coefficients from IPCC
- **Natural gas for heating** – replaced diesel fuel for heating. Calculation was made according to the fuel's passport
- **Diesel for transport** – buses and engineering machines, designed to serve the campus infrastructure. (coefficients from IPCC)
- **Gasoline for transport** – cars and minibuses (coefficients from IPCC)
- **Electricity** – is supplied through city distribution grid from thermal power plants. Calculation was made according to localized emissions factors (kg CO₂e per kWh)

Comparison



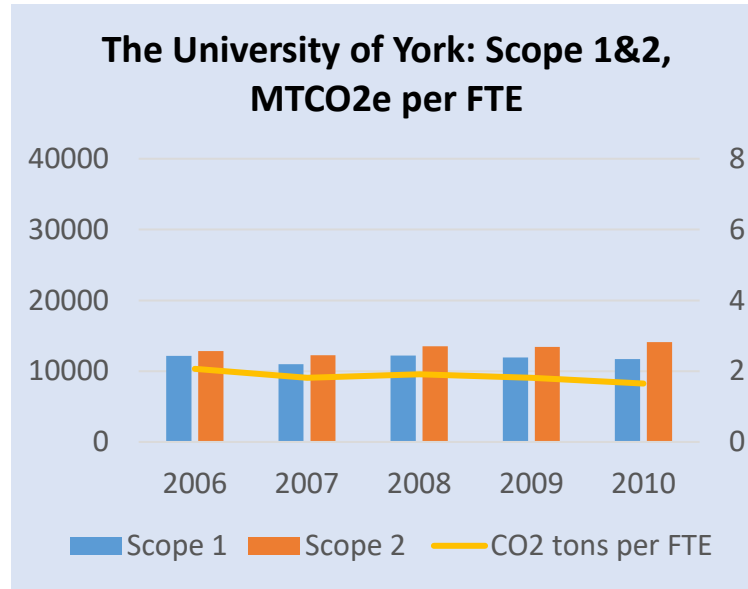
Total FTE: ~7,400 (2019)

Campus territory: 100 ha

Focus:

Efficient energy use (->reduce energy use)

Alternative low/zero carbon sources of energy

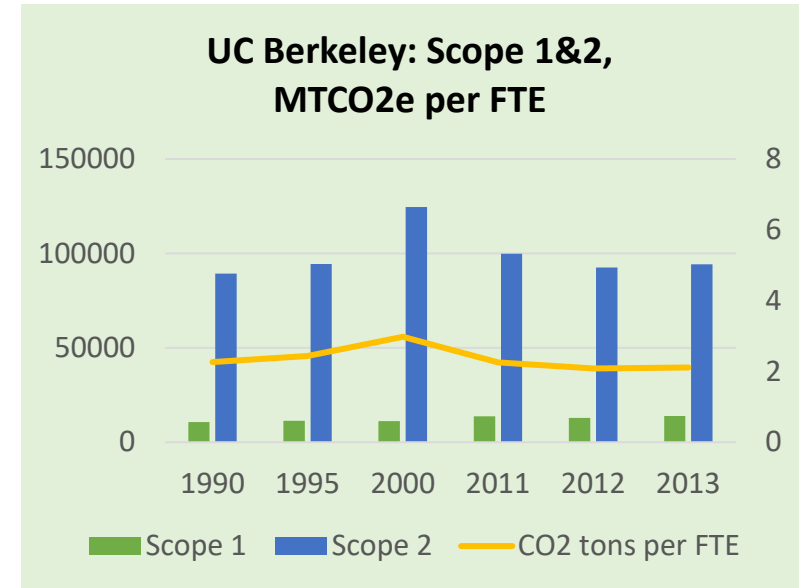


Total FTE: ~ 15,600 (2010)

Campus territory: ~ 200 ha

Goal: reduce Scope 1&2 emissions by 48% by 2020

Actions: Improving the energy performance of buildings: smart building technology options, replacement and retrofitting of luminaries, i.e. LED lamps, replace boilers with more efficient ones, etc. new low carbon sources of energy: wind turbines, biomass boilers



Total FTE: ~ 51,000 (2013)

Campus territory: ~ 2,700 ha

Goal: Carbon neutrality for Scope 1&2 sources by 2025, for Scope 3 by 2050

Actions: Installing solar panels with a focus on new buildings and those under renovation; substituting carbon-free biogas for natural gas use; finding additional opportunities for constructing and renovating to maximize energy savings

Ongoing green projects



Solar collectors

67 town houses at campus equipped with solar collectors, that provides heating energy. Capacity of one collector is 4,26 kW. Commissioning date – 2018.



BG yurt

passive house with energy efficient windows, Polyurethane-based insulation, the shape for handling wind and snow loads with minimal construction materials. Heating system consist of: Solar thermal collectors (30 vacuum tubes), heat pump (6 kW)



Solar pumps

photo-electric water-elevators equipped to the benches supplies underground water to the reservoir, which has the 'NU' form



On-site electricity generation

50 kW on grid system integrated into Technopark. Building of Technopark consumed 159,52 MWh of energy in 2017, where the 50kW on grid system generated approximately 44 MWh of energy in 2017 (it is rough estimation, the meters have installed recently)



Gasification of campus

Shifting from diesel fuel to gas for heating system gives financial savings (KZT 100 mln in 2017) and CO2 reduction by 20%

View Building Data

What is the energy use intensity of your building?

The circle around the buildings represents the energy use intensity, and the color the building category.

$$\text{Energy use Intensity} = \frac{\text{annual energy use (kWh)}}{\text{building square area (m}^2\text{)}}$$

Choose the building by name:

(All) ▾

Choose the building type:

- (All)
- Community
- Office
- Research
- Residential
- Schools



Waste management



- * Paper
- * Plastic
- * Glass
- * Metal
- * Batteries
- * LED lamps
- * Composting



Tree planting



The Office initiated planting of more than 1000 trees during 2018-2020

Sustainability Living Lab

Sustainability Living Lab program intends to promote sustainability within the University where

- campus facilities becomes as a test-bed;
- students and faculty implements 'green' research and innovative projects;

What we offer for participants:

- Financial support
- University facilities;
- Fablab, DC Lab, Machine Shop, Co-working areas;
- Consultations from experts;


Opportunities for projects:

- ABC Incubation
- ABC quick start
- Climate Launchpad
- Climathon



Outcomes of proposal call

- Two proposal calls were organized (May, September 2019)
- Around 40 projects were submitted, 10 projects were selected and being implemented
- Around 50 students, 15 faculty members participates in implementation of projects
- All projects are self-sustainable, 80% have commercial potential





**SUSTAINABILITY
LIVING
LAB**

Dear students and colleagues!

We are glad to announce the start of the **Sustainability Living Lab** program at Nazarbayev University. The program aims to study and improve the environmental performance of the campus. The program is supported by the **Chevron** company.

You should apply for the Sustainability Living Lab program if:

 **You want to examine the environmental performance of NU** that may, for example, include conducting of an energy audit or investigating indoor air quality, conducting LCA* analysis for the building, conducting waste audit;

 **You have ideas on how to improve the quality of life on campus and make the campus environmentally more sustainable.** It may be an implementation or a test of existing solutions and technologies on campus. It may also be a commercial innovative solution.

Energy efficient greenhouse



✓ Fresh, organic, zero waste vegetables on campus

Proposed solutions:

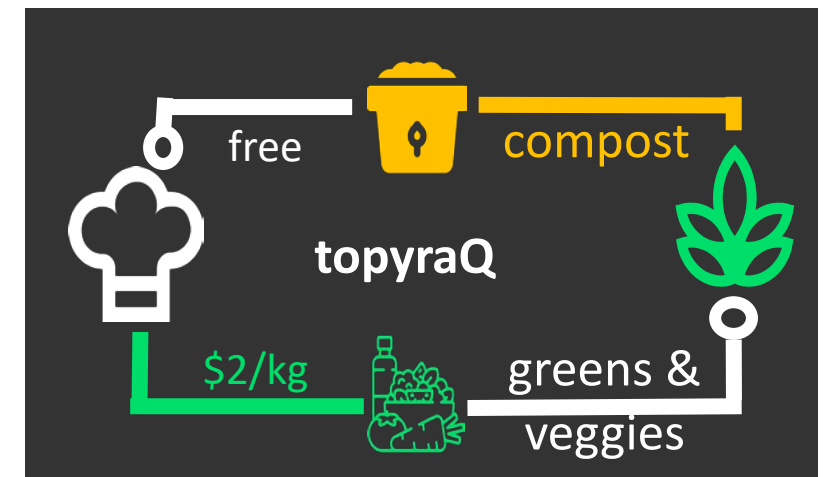
- 250 square meter greenhouse: re-purposing an old oil storage unit at NU
- Use of renewable energy sources on campus
- Feeding canteens, cafes of NU
- Educational sessions

Vermicomposting

✓ Self sustainable solution for food waste problem on campus

Proposed solution:

- Composting of organic food waste from canteens and cafes of NU
- Growing of greens and vegetables on that compost and selling them back at a lower price.



MARKET
PLACE
public catering

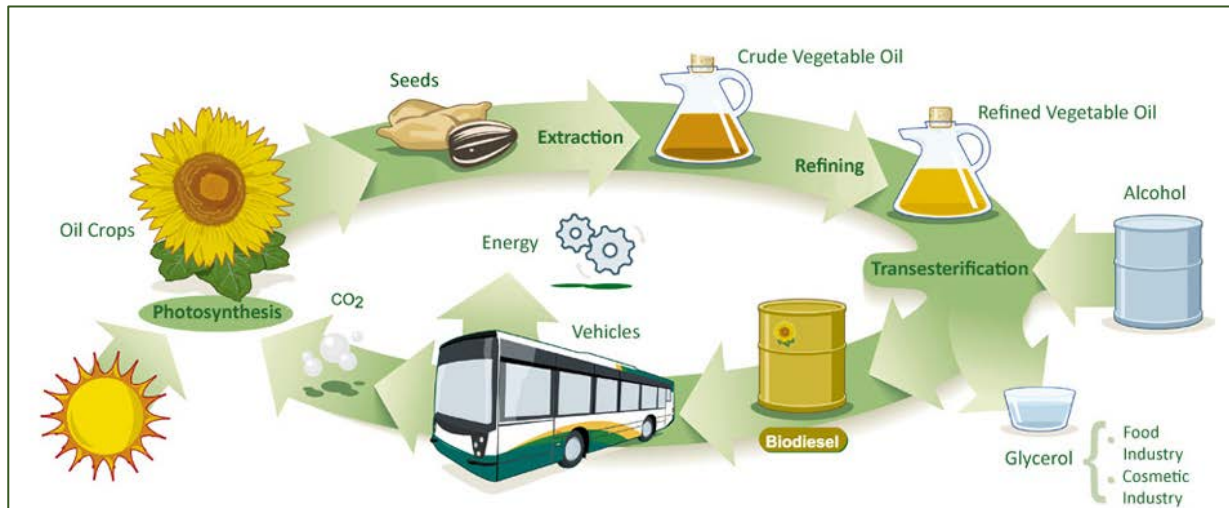
Biodiesel from cooking oil



- ✓ On campus Biodiesel production from used cooking oil for NU transportation service

Proposed solution:

- waste management in the sense of utilization of used cooking oil from canteens and cafes located on campus
- reduction of carbon footprint of the campus transportation working on diesel fuel (~ 25 tons CO₂e annually)



• Engine Emissions:

- lower carbon monoxide (CO)
- lower particulate (PM)
- lower unburned hydrocarbons (HC)

Precious Plastic Kazakhstan



✓ Precious Plastic – is the worldwide movement which is aimed to promote plastic recycling. It helps to turn plastic waste into valuable things.

Proposed solution:

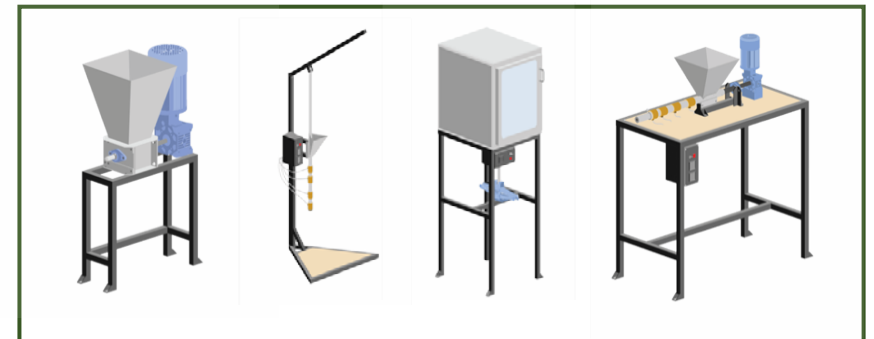
- Improvement of plastic waste management on campus (more than 100 kg of plastic waste per month)
- Raising of awareness of community

Products:



Project life-cycle:

Collect -> Wash -> Sort -> Recycle -> Reuse



Growing vegan-meat in the lab

- ✓ Replacement of meat by vegetarian option and triggering community to switch to a healthier and more eco-friendly lifestyle.

Proposed solution:

- Production of meat substitute-protein paste from funghi that can be used as a stuffing for cooking various ready-to-cook vegetarian products or dishes
- Business model: B&B (cafes, restaurants), B&C (adherents of a healthy lifestyle)



	Nutritiousness	Taste	Organic?	Storage
Soy and vegetables		+	+	
Mushrooms	+	+	+	
Spirulina algae			+	+
Mycoprotein	+	+	+	+

NU Community Garden for local residents





Climate Launchpad

Nazarbayev University is the national partner of the Climate Launchpad Competition.

- 55 countries
- Training sessions: boot camp, follow-up
- Climate KIC Acceleration program
- Global Final 2019: Amsterdam
- Two national finalists: Hydroplat (NU) and dECO (Hailey Bury)



Outreach

- Joint events with other universities, schools, kindergartens (e.g. Climate Week, Green Week, field trips, conferences, seminars)
- Joint research projects with universities
- Joint events with city authority and municipalities (e.g. Climathon)



Future perspectives

- Sustainability Living Lab: Creativity and Academia
- Carbon Management Plan
- Climathon, Climate Launchpad
- Educational sessions for all
- Strengthen research and innovation
- Outreach: sharing experience with other universities

Thank you!