# GREEN TRANSITION IN UKRAINIAN UNIVERSITIES

# EVALUATION REPORT ON GREEN STANDARDS

2023

# Content

## Introduction

This evaluation report is produced within the framework of the NAWA project "Green Transition of Ukrainian Universities" (GTUA) and is based on both qualitative and quantitative indicators. The evaluation is resulted from expert panel evaluation of 7 Ukrainian universities' self-assessment reports reflecting their performance towards green standards in research, education and campus as well as overall green transition dimensions. Green Standards are based on the tasks of higher education stated in the Rome Ministerial Communique 2020 (chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ehea.info/Upload/Rome_Ministerial_Communique.pdf) and the principles of the 17 Sustainable Development Goals, which are an urgent call for action by all countries and universities.

Expert panel includes 7 experts representatives of each GTUA project partner University and 3 student experts. The expert panel is grouped in 4 sub-panels evaluating each part of Green Standards:

- Sub-Panel Green Research: Olha Pavlova, Vira Liubchenko, Vladislav Piven
- Sub-Panel Green Education: Nataliia Koretska, Nikita Zdoryk, Viktoriia Dolynkevych
- Sub-Panel Green Campus: Khrystyna Myroniuk, Maryna Lytvyn, Valeria Shvaiko
- Sub-Panel Green Transition Dimentions: Denys Smolennikov

These experts were selected out of 20 nominated considering their experience in green standards and quality assurance including participation in National Agency for Higher Education Quality Assurance (NAQA) trainings and accreditation procedures.

The expert panel was supported by consultancy panel:

- Mariusz Mazurkiewicz, Wroclaw University of Science and Technology Poland
- Anna Maria Kamińska, Wroclaw University of Science and Technology Poland
- Nataliia Stukalo, NAQA Ukraine

The evaluation process and report is based on the following principles and approaches:

- Stakeholders engagement: three sub-panels include student experts and consultancy panel includes international experts and NAQA representative;
- Avoiding of conflict of interest: composition of expert panel considers that maximum one representative of the University is included, evaluation is conducted under observation by NAQA and WP representatives;
- All experts are experienced in green transition, relevant standards as well as in higher education quality assurance;
- Evaluation includes identification and analysis of both strength and weaknesses of the Universities performance;
- Evaluation process is evidence-based;
- Evaluation report reflects identifies best practices and presents recommendations for further improvement.

Abbreviations will apply in this report:

- Sumy State University - SumDU
- Dnipro University of Technology - DniproTech
- Odesa Polytechnic National University - OPNU
- Khmelnytskyi National University - KhmNU
- Lutsk National Technical University- LNTU
- Lviv Polytechnic National University - LPNU
- Kharkiv National University of Radio Electronics – NURE

# Part 1 Green Research

Green research in universities is of paramount importance as it contributes to fostering environmental sustainability and addressing pressing global challenges. Universities play a pivotal role in shaping the future by generating knowledge and innovative solutions that promote eco-friendly practices and technologies. By prioritizing green research, universities not only fulfill their social responsibility but also empower the next generation of leaders and professionals to navigate a sustainable and resilient future.

## 1.1 Sustainability and green transition planning and action in research activities

Generalizing the information from the seven universities, it's evident that each institution has distinct approaches and initiatives related to sustainability, green transition, and the integration of Sustainable Development Goals (SDGs) into research activities. Here are some key points:

DniproTech:

- Actively engaged in the UNDP/EU project, focusing on promoting the Global 17 SDGs by 2030.
- Initiatives include Sustainable Development Weeks, student debates, summer schools, regional competitions, sociological research, international conferences, seminars, and training on achieving SDGs.
- Development of the green community within the university through a business incubator and the Council of Young Scientists.
- Research activities in green transformation involve various centers and laboratories.

KhmNU:

- Research at the Department of Ecology and Biological Education focuses on improving the university territory, with projects like gardens on building roofs and solar panels.
- Existence of scientific clubs at the Ecology and Biology Department.

LNTU:

- A Scientific and Technical Council (STC) functions to manage scientific and technical activities, analyzing and coordinating research.
- Faculty-level science commissions determine prospective directions and assess the state of training.
- Annual approval of a Plan of specific target indicators for the development of scientific activity.

LPNU:

- The Scientific and Technical Council has approved a research plan for 2024-2025, including topics related to sustainability/green transition.
- Topics include phytomeliorative restoration, plastic waste disposal, wastewater treatment, and alternative solid fuel development.

NURE:

- The Charter and Strategy of NURE emphasize compliance with the goals of sustainable development in scientific activity.
- Focus on supporting ambitious research, developing scientific schools, and providing favorable conditions for young scientists.
- Prioritizing research environment investment, cooperation with businesses, and expanding innovative activities.

OPNU:

- Annual publication of articles and conference materials related to SDGs by university researchers.

SumDU:

- Active publication and research on SDGs, with over 200 articles and conference materials annually.
- Significant research fund dedicated to sustainability in 2022 and more than 100 research projects related to sustainable development in the 2022-2023 academic year.
- Examples of research projects include breakthrough technologies for social development, smart energy development, and monitoring groundwater conditions.

The universities demonstrate a diverse range of activities and commitments toward sustainability and green transition, including participation in international projects, research publications, and the integration of SDGs into their academic and research agendas.

### 1.2 Support for research initiatives regardless of the origin of the green transition strategy in research

Generalizing the information from the seven universities, we observe a range of approaches and activities related to sustainability, green transition, and the integration of Sustainable Development Goals (SDGs) into research. While some universities have specific projects and initiatives showcasing their commitment to sustainability and green transition, others face financial constraints or prioritize topics aligned with immediate national needs. The level of support and integration of sustainability goals into research activities varies among the universities.

Best practices:

- LPNU supported topics related to the post-war reconstruction of the country, in particular those related to the green transition strategy. For example: Development of energy supply, energy efficiency, and economic circularity in the context of European integration and post-war recovery of the national economy of Ukraine (Department of Foreign Economic and Customs Activities).
- NURE has the coordinator of such activities, it is carried out by a specialist in the benchmarking department, who has completed a series of trainings on green transformation
- SumDU established the Coordinating Council for the Development of Environmentally Oriented Interdisciplinary Scientific Research[1] The Academic Council of SumDU approved the environmental policy of the University, which, in particular, established obligations to take into account ecological aspects in scientific activities of Sumy State University.

### 1.3 Internal policies in place to monitor the alignment of the research strategy with specific Sustainable Development Goals and to assess progress

Based on the information provided from seven universities there is a varying degree of emphasis on sustainability, green transition, and integration of specific Sustainable Development Goals (SDGs) into research activities. While some universities, like DniproTech and NURE, demonstrate a strong commitment to sustainability in various aspects of their activities, others, such as KhmNU, LPNU, OPNU, and SumDU, do not have specific policies in place. LNTU shows a commitment to sustainable development goals through the approval of departmental plans.

Best practices:

[1] (https://news.sumdu.edu.ua/uk/news/8439-vchena-rada-sumdu-prinyala-rishennya-shchodo-osnovnikh-zavdan-rozvitku-naukovoji-diyalnosti-na-2017-rik.html)

- Energy saving and climate change mitigation programs of NURE[2] include of tasks in the field of scientific and technical activities
- NURE Environmental Policy[3] in point 2.2 envisages obligations in scientific activity: to develop existing and to initiate new areas of ecologically oriented scientific research and development, in particular, which are interdisciplinary and focused on the needs of society; take into account and minimize the negative environmental consequences that may be caused by conducting research and development, or using its results
- Regulation on the procedure for taking into account environmental consequences in the conduct of scientific, scientific-technical and innovative activities by Sumy State University and the implementation of their results[4].

### 1.4 Thematic communities (formal or informal) in areas related to the Sustainable Development Goals (priorities SDG7, SDG8, SDG9, SDG11, SDG12, SDG13, SDG15)

Considering the data extracted from reports submitted by seven universities, it is evident that, overall, the majority of these institutions host thematic communities dedicated to various aspects of the Sustainable Development Goals (SDGs). Many universities feature specialized departments, Scientific Societies for students, postgraduates, doctoral candidates, and young scientists, as well as scientific schools specifically focused on SDGs. Availability of thematic communities in areas related to Sustainable Development Goals (priorities SDG7, SDG8, SDG9, SDG11, SDG12, SDG13, SDG15) is presented in Table 1.

As can be seen from the Table 1, three of seven HEIs have thematic communities in areas related to all SDGs; two of seven HEIs have thematic communities in areas related to 4 SDGs, Odesa Polytechnic currently lacks a formal, thematic community directly associated with the Sustainable Development Goals, however this issue is constantly in the attention of the Society of Young Scientists.

*Table 1. Availability of thematic communities in areas related to Sustainable Development Goals*

| Higher Education Institution | Thematic communities in areas related to the SDGs | | | | | | |
|---|---|---|---|---|---|---|---|
| | SDG7 | SDG8 | SDG9 | SDG11 | SDG12 | SDG13 | SDG15 |
| DniproTech | + | + | + | + | + | + | + |
| LNTU | + | + | + | + | + | + | + |
| LPNU | + | - | + | - | - | + | + |
| NURE | + | - | + | + | + | + | + |
| SumDU | + | + | + | + | + | + | + |
| KhmNU | + | - | - | - | + | + | + |
| OPNU | - | - | - | - | - | - | - |

Best practices:

- DniproTech has Resource Centre for Sustainable Development[5];

2 https://nure.ua/en/conference-workshops/sustainable-development-goals-sdgs-the-objectives-of-nure-to-implement-the-sdgs/environmental-sustainability/energy-saving-and-climate-change-mitigation-programs

3 https://nure.ua/wp-content/uploads/2022/doc/241_26.12.2022.pdf

4 https://normative.sumdu.edu.ua/?task=getfile&tmpl=component&id=8aac7eae-c3f3-ec11-9630-d4856459ca35&kind=1

5 https://www.nmu.org.ua/ua/content/infrastructure/educational_centers/research_andtraining_centers/rcsd.php

- NURE has SYNERGY scientific park[6]; Participation of university staff in the Erasmus Jean Monnet Modules project "Ukraine-EU: circular economy solutions for smart and sustainable cities" (SDG 4,11,12,17)
- SumDU cultivates scientific research related to SDGs in the Scientific Center for Applied Environmental Research[7].

### 1.5 Departments that have been visibly successful in dealing with green transition issues in research and development activities

The reports showed that in each university on average there are from two to seven departments that have been visibly successful in dealing with green transition issues in research.

- In DniproTech there are 2 most prominent departments that have been visibly successful in green transition issues: Department of International Relations and Department of International Academic Mobility and International Projects.
- In KhmNU there are 2 departments that have been recently successful in green transition research and development activities: Department of Ecology and Biology Studies and Automation and Computer-Integrated Technology Department.
- LNTU has 4 departments that actively work on research in green transition direction: Department of Light Industry Technologies, Department of cars and transport technologies, Department of Agricultural Engineering and the ecological laboratory.
- In NURE 5 departments have been successful in green research, such as Departments of Biomedical Engineering, Departments of Artificial Intelligence, Departments of Computer-Integrated Technologies, Automation and Robotics, Departments of Occupational Safety and Research and development laboratory of electronic and non-traditional energy technologies of the Research and Development Center of Integrated Information Radio Electronic Systems and Technologies (RDC IIREST).
- In OPNU 3 departments showed progress in green transition direction research: Department of Thermal Power Plants and Energy Saving Technologies, Department of Nuclear Power Plants, Department of Theoretical, General and Non-Traditional Energy.
- In SumDU 7 departments are engaged in scientific activities related to green transition: Department of Ecology and Environmental Protection Technologies, Department of mechanical engineering technology, machine tools and tools, Department of Economics, Entrepreneurship and Business Administration, Department of Marketing, Research Institute of Energy-Efficient Technologies, Department of Information Technologies, Department of Electric Power Engineering.

In general, all universities have departments that show interest and have been visibly successful in dealing with green transition issues in research and development activities that can be considered as a good practice.

### 1.6 Results of Green Research Self-assessment

According to a self-assessment that has been conducted by 7 Ukrainian HEIs in the direction of green research and SDGs achievement. All 7 HEIs have planning and action in research activities related to green transition, all universities have departments and thematic communities that are engaged in green transition research. It is noticeable that all HEIs have the Society of Young Scientists that is involved in the green transition movement. The average numerical evaluation of each of 7 HEIs in Green research direction is presented on a diagram below.

6 https://nure.ua/nauka/populjarizacija-nauki/prirodnichi-nauki-ta-matematika/naukovij-park-sinergija

7 https://env.teset.sumdu.edu.ua/about-center/

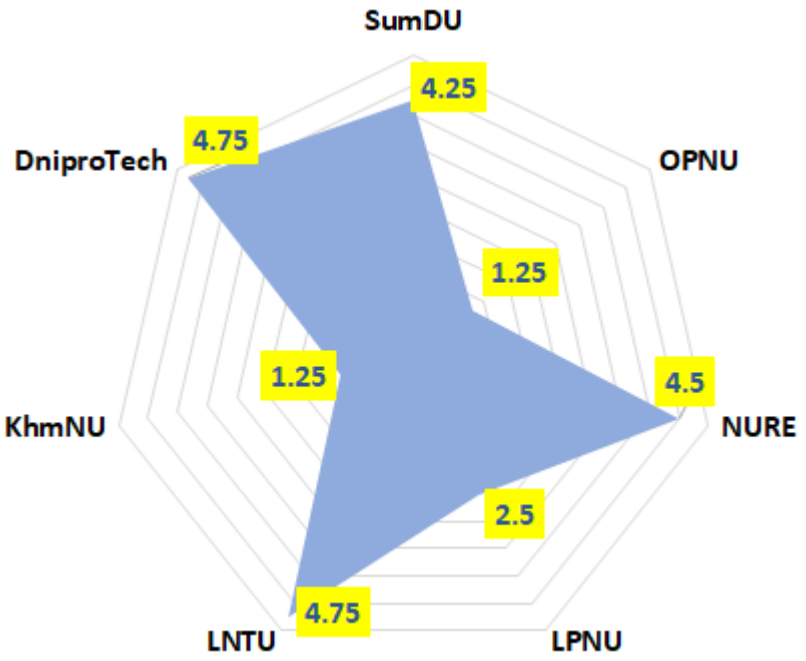


*Figure 1 Average estimates for 7 Ukrainian HEIs in Green Research Self-assessment*

## Strength and weaknesses on part 1 Green research

Strengths:

- Diversity of Initiatives. Each university demonstrates a diverse set of initiatives and activities related to sustainability and green transition. This diversity indicates a holistic approach to addressing green transformation challenges.
- Engagement in International Projects. Several universities participate in international projects. This engagement allows for the exchange of ideas, best practices, and a broader impact on global sustainability goals.
- Research Focus. The universities prioritize research activities related to sustainability, green transformation, and SDGs. This commitment to research indicates a dedication to generating knowledge and solutions for current environmental issues.
- Collaboration and Partnerships. There is evidence of collaboration with external entities, including businesses, in some universities. This collaboration enhances the potential for practical application and implementation of green transformation solutions.
- Publication Output. Several universities actively publish articles and conference materials on green transformation and SDGs, indicating a commitment to sharing knowledge and contributing to the academic discourse on sustainability.

Weaknesses:

- Localization of initiatives. Some universities described activities that are being implemented within individual departments or institutes. Expanding the coverage of such initiatives to the university level would help to promote and advance green transformations in science
- Limited Mention of Policy Influence: While focusing on university-level activities, there's limited information on the universities' influence on local or national sustainability policies. Assessing policy impact could provide a more comprehensive view of the universities' contributions.
- Need for Outcome Evaluation. While there is information on current activities, there is no explicit mention of outcome evaluation. Universities do not seek external evaluation of the effectiveness of their initiatives in the field of green transformation in research. Assessment of the impact and effectiveness of initiatives would provide a clearer understanding of the contribution of universities to sustainable development.

- Lack of Networking. Universities do not cooperate in the field of green transformation in research. Ensuring cooperation and complementarity can increase the overall impact of their efforts.
- Lack of Funding. According to the results of the self-analysis, there is a lack of funding for scientific research related to environmental initiatives and green transformation in all HEIs.

## Recommendations for improvements on Part 1 Green research

Overall Recommendations:

- Develop a comprehensive green research strategy. Work towards creating a comprehensive and cohesive green research strategy that aligns with the university's overall mission and values.
- Strengthen international collaboration. Leverage existing international partnerships and actively seek new collaborations to enhance the global impact of green research initiatives.
- Prioritize student involvement. Integrate sustainability education and research opportunities into the curriculum, encouraging student participation in green research initiatives.

Spreading the Knowledge:

- Recognize and reward success: Establish recognition programs or awards for departments that demonstrate excellence in green research, encouraging a culture of competition and continuous improvement.
- Promote knowledge-sharing: Facilitate platforms for successful departments to share their experiences, best practices, and challenges, fostering a collaborative environment.

Thematic Communities:

- Formalize existing communities. The thematic communities should be formalized to strengthen their impact and facilitate collaboration among researchers with common sustainability goals.
- Expand community engagement. Encourage participation from students, faculty, and external stakeholders in thematic communities, fostering a sense of shared responsibility for green transformation.

Support for Research Initiatives:

- Establish a dedicated fund. Create a sustainable funding mechanism to support research initiatives related to green transformation, irrespective of their alignment with immediate national needs.
- Encourage partnerships. Facilitate partnerships with external organizations, including government bodies, NGOs, and industry, to broaden the financial and resource base for green research.

Sustainability and Green Transition Planning:

- Encourage interdisciplinary collaboration. Foster collaboration among departments, centers, and laboratories to promote multidisciplinary research on green transition issues.
- Enhance visibility of research outcomes. Implement mechanisms to showcase and communicate the outcomes of green research, both within the university community and externally.

Internal Policies for Monitoring:

- Develop a comprehensive policy of green transformation. Formulate and implement internal policies that clearly articulate the university's commitment to green transformation and sustainability and outline specific measures for aligning research strategies with SDGs.
- Establish monitoring mechanisms. Implement systems to regularly monitor and assess the alignment of research activities with specific SDGs, in particular green transformation, ensuring continuous improvement.

## Part 2 Green Education

The mission of higher education institutions (HEIs) in Ukraine, (on the example of seven Ukrainian universities) is aimed at forming an educational space based on the goals of sustainable development (SDGs) in order to establish a balance between meeting the modern needs of humanity and protecting the interests of future generations, their safe and healthy environment, and equal coexistence. To complete this mission the educational activities of universities should contribute to the sustainable social, ecological and economic development of society, its integration into the world educational space. They should provide educational services focusing on achieving the goals of sustainable development, the realization of a multifaceted social goal. And it is up to university teams in partnership with other organizations, using their unique position in society, to find opportunities to help to guide, direct and support social centers in achieving SDGs on the maximal scale and introduce them into the mass consciousness of humanity by providing educational services (building competencies and achieving program goals and learning outcomes in the field of sustainable development; development of special study programs and introducing educational disciplines related to the SDGs, etc.) in the most convenient and understandable way.

### 2.1. Does more than one university unit (division, school, department, etc.) have specific responsibilities for green education?

Seven Ukrainian universities have divisions that carry out activities in the field of green education in order to achieve the SDGs:

- SumDU has two departments (Ecology and Environmental Technologies; Economics, Entrepreneurship and Business Administration); Scientific Research Laboratory of the Economy of Sustainable Development and Ecologically Balanced Usage of Natural Resources; library implementing the "Green Library" project under the "Green University" program with the support of the Goethe Institute (Germany)[8];

- OPNU: Department of Thermal Power Plants and Energy-Saving Technologies[9], its activity is related to solar heating and hot water supply systems; production and use of biofuel; wind power plants; photovoltaic power plants; energy saving, etc.;

- NURE: Research Center of Integrated Information Radio Electronic Systems and Technology; Special Educational and Rehabilitation Department for students with special educational needs; Center for collective use of scientific equipment "Research Center of Laser and Optoelectronic Technology"; Gender Education Center; Departments (Biomedical Engineering; Computer-Integrated Technologies, Automation and Robotics; Artificial Intelligence)[10];

- LPNU: 5 departments of the Vyacheslav Chornovol Institute of Sustainable Development (Civil Security; Tourism; Entrepreneurship and Environmental Expertise of Goods; Ecology and Balanced Usage of Natural Resources; Environmental Safety and Environmental Protection Activities)[11];

- LNTU: 10 departments (Digital Educational Technologies; Civil Safety; Ecology; Forestry; Agronomy; Agricultural Engineering named after Prof. G.A. Haylis; Technologies and Equipment of Processing Industries; Materials

[8] https://ecolog.sumdu.edu.ua/uk/;https://econ.biem.sumdu.edu.ua/;https://econ.biem.sumdu.edu.ua/problemna-naukovo-doslidna-laboratoriia-ekonomiky-staloho-rozvytku-ta-ekolohichno-zbalansovanoho-pryrodokorystuvannia;https://library.sumdu.edu.ua/uk/biblioteka/library-projects/zelena-biblioteka.html

[9] https://op.edu.ua/kaf-teset

[10] https://nure.ua/branch/naukovo-doslidna-chastina/struktura-ndch/naukovo-doslidnij-centr-integrovanih-informacijnih-radiolektronnih-sistem-i-tehnologij-ndc-iirest;https://nure.ua/mizhnarodnij-den-ljudej-z-invalidnistju-2;https://nure.ua/branch/naukovo-doslidna-chastina/struktura-ndch/centr-kolektivnogo-koristuvannja-naukovim-obladnannjam-ckkno-doslidnickij-centr-lazernih-ta-optoelektronnih-tehnologij;https://knmu.edu.ua/navchalno-naukovi-medychni-kompleksy-ta-czentry/czentr-gendernoyi-osvity/;https://nure.ua/department/kafedra-biomedichnoyi-inzheneriyi-bmi;https://nure.ua/department/kafedra-komp-yuterno-integrovanih-tehnologiy-avtomatizatsiyi-ta-mehatroniki-kitam;https://nure.ua/department/kafedra-shtuchnogo-intelektu

[11] https://lpnu.ua/tsb;https://lpnu.ua/tur;https://lpnu.ua/peet;https://lpnu.ua/ezp;https://lpnu.ua/ebpd;

Science; Automation and Computer-Integrated Technologies; Electrical Engineering)[12];

- KhmNU: Department of Ecology and Biological Education[13];

- DniproTech: Resource Center for Sustainable Development; Business Incubator; 2 departments (Marketing; Economic Theory and International Economic Relations)[14].

Summing up, the organization of educational activities related to the achievement of sustainable development in the seven universities and the achievement of the SDGs in general is implemented through the providing of appropriate powers to those who are in charge at different management levels.

## 2.2. Is «green transition» as subject, topic, option, etc. taught in any non-engineering or engineering departments or faculties?

Seven Ukrainian universities have developed and introduced to their curriculars special educational disciplines which content is aimed at building competences and achievement of program learning outcomes in the field of green transformation, or topics/issues of other educational disciplines that complement knowledge about green transformations and sustainable development of society:

- SumDU: about 150 academic disciplines are taught[15];

- OPNU: all students can study discipline Fundamentals of Ecology (as an elective course)[16];

- NURE: the discipline Environmental safety is taught for students of all study programs, students also offered elective courses[17];

- LPNU: students can choose elective courses[18];

- LNTU: academic discipline Life safety and labor protection is taught on the majority of technical study programs, students are also offered elective courses[19];

- KhmNU: students study disciplines Human Ecology and Environmental Safety and Strategy of Sustainable Development[20];

- DniproTech: students study disciplines Global Challenges of Sustainable Development, Consumer Behavior, Marketing of an Industrial Enterprise, Environmental Marketing and Marketing of Sustainable Development[21].

12 https://lntu.edu.ua/uk/struktura/cafedries/kafedra-tsyfrovykh-osvitnikh-tekhnolohiy;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-tsyvilnoyi-bezpeky;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-ekolohiyi;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-lisovoho-hospodarstva;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-agronomyyi;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-agrarnoyi-inzheneriyi;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-tekhnolohiy-i-obladnannya-pererobnykh-vyrobnytstv;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-materialoznavstva;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-avtomatizaciyi-ta-kompyuterno-integrovanih-tehnologiy;https://lntu.edu.ua/uk/struktura/cafedries/kafedra-elektrychnoyi-inzheneriyi

13 http://ecolog.khnu.km.ua/

14 https://www.nmu.org.ua/ua/content/infrastructure/educational_centers/research_and_training_centers/rcsd.php;https://bi.nmu.org.ua/ua/;https://mk.nmu.org.ua/ua/;https://etop.nmu.org.ua/ua/

15 https://pg.cabinet.sumdu.edu.ua/catalog

16 https://op.edu.ua/studies/selected?field_op_spec_tid=All&field_op_institute_nid=All

17 https://nure.ua/zagalnij-katalog-vibirkovih-navchalnih-disciplin;https://nure.ua/zagalnij-katalog-vibirkovih-navchalnih-disciplin/merezha-kafedralnih-katalogiv-vibirkovih-navchalnih-disciplin

18 https://directory2023.lpnu.ua/selective_subjects

19 https://drive.google.com/file/d/1Kw6PT2nZ4m4qIxbs009iD_FrjBXjWYlb/view;https://drive.google.com/file/d/1ftuKKlte0PQa-3dgqhFaMezpwki5b6VA/view

20 https://ecobio.khmnu.edu.ua/vybirkovi-dysczypliny/

21 https://mk.nmu.org.ua/ua/disciplini_viboru/Vibir_bacalavriv2324.php ; https://mk.nmu.org.ua/ua/disciplini_viboru/Vibir_magistriv_2324.php

These courses contribute to providing students with knowledge and skills related to green transformations and sustainable development, fostering a comprehensive understanding of environmental challenges and strategies for a sustainable future.

### 2.3. Are there approved regulations/mechanisms/procedures in the University with recommendations on the need to reflect the selected GSDs in the objectives, orientation, and main focus of the study program?

Seven Ukrainian universities do not have a system of documents (regulations/mechanisms/procedures) with recommendations for systematic achievement of the SDGs in all areas of educational activity. However:

- the SumDU: issued the methodological guidelines "General requirements for the structure, content, and design of the work program of an educational component"[22], according to the guidelines, the contents of disciplines in study programs should ensure the formation of interdisciplinary skills and "key competencies" related to the implementation of SDGs;

- the NURE: formed "The Strategy and perspective directions for the development of educational, scientific and innovative activities of NURE"[23]; "The quality assurance system for educational activities"[24], containing procedures with recommendations on the need to take into account the SDGs in sections 2 "The development and approval of study programs", 9 "Current monitoring of training programs" and 10 "The organisation of internal quality assurance of educational activities".

- LPNU: formed "Environmental policy of NU" Lviv Polytechnic[25], according to this policy, academic obligations are: the development of educational programs in the field of ecology, environmental protection, and sustainable nature management; promoting among students an environmentally conscious lifestyle and ideas of sustainable development through public lectures and practical events; offering selective disciplines on environmental safety and adaptation to climate change; the implementation of study programs in the field of ecology and environmental sustainability; advanced training of scientific and pedagogical workers in the field of ecology, environmental protection, and the rational use of natural resources;

At OPNU, LNTU, KhmNU, DniproTech completely lack approved regulations/mechanisms/procedures with recommendations for achieving SDGs in study programs. However, these universities, when developing and updating their educational programs, emphasise the following (in accordance with the objectives of a particular university): solving environmental problems at the local, regional and national levels; environmental monitoring, forecasting, management and administration; preventing or minimising the effects of negative anthropogenic impact on the environment; solving non-standard situations in the field of environmental safety; introducing energy-saving technologies for fertility restoration and technologies for processing and ensuring food quality and safety; ensuring industrial safety, etc.

### 2.4. How is green transition education delivered (in the form of elective courses, as a defined module or option, a degree program, or a mixture of formats)?

Seven Ukrainian universities have developed and implemented green study programs; they teach special disciplines, the contents of these disciplines are aimed at developing competences and achieving program learning outcomes in the field of green transformation, or topics/issues of other disciplines that address issues of the sustainable development of society. Thus, “green” study programs are being implemented:

22 https://normative.sumdu.edu.ua/?task=getfile&tmpl=component&id=b8ccf382-adfc-e911-b5f5-001a4be6d04a&kind=1&version=1699678004387

23 https://nure.ua/wp-content/uploads/Main_Docs_NURE/strategy_nure_2022.pdf

24 https://nure.ua/wp-content/uploads/Main_Docs_NURE/sistema-vnutr-zabezp-jakosti.pdf

25 https://lpnu.ua/environmental-policy

- SumDU: “Ecology and Environmental Protection” (Bachelor's degree); “Environmental Protection Technologies” (Bachelor's degree, Master's degree); Ecology (Master's degree); Economics and Business (Bachelor's degree); Entrepreneurship and Trade and Exchange Activities (Bachelor's degree); Management (Bachelor's degree);

- OPNU: “Environmental Safety” (Master's degree); "Renewable Energy Sources and Energy Complexes» (Bachelor's degree);

- NURE: “Biomedical Engineering” (Bachelor's degree, Master's degree); “Automation and Computer-Integrated Technologies” (Bachelor's degree, Master's degree);

- LPNU: “Sustainable Energy Systems” (Renewable Energy Sources and Electromobility) (Bachelor's degree); “Ecology” (Bachelor's degree); “Occupational Health and Safety” (Bachelor's degree); “Environmental Information Systems”(Bachelor's degree); “Tourism and Recreation” (Bachelor's degree); “Environmental Control and Audit” (Master's degree); “Ecology and Environmental Protection” (Bachelor's degree); “Applied Ecology and Sustainable Environmental Management” (Master's degree); “Industrial Safety and Occupational Health and Safety” (Master's degree); “Environmental Technologies” (Bachelor's degree); “Tourism Studies” (Master's degree).

- LNTU: “Vocational Education (Computer Technologies)” (Bachelor's degree, Master's degree); “Educational and Pedagogical Sciences” (Master's degree); “Ecology” (Bachelor's degree, Master's degree); “Agronomy” (Bachelor's degree, Master's degree); “Agroengineering” (Bachelor's degree, Master's degree); “Forestry” (Bachelor's degree, Master's degree); “Woodworking and Furniture Technologies” (Bachelor's degree); “Industrial Engineering and Management” (Bachelor's degree, Master's degree); “Food Technologies” (Bachelor's degree, Master's degree); “Food Technology and Restaurant Business” (Master's degree); “Craft Food Technology” (Master's degree); “Medical Devices and Systems” (Bachelor's degree); “Metrology and Information and Measuring Technology” (Bachelor's degree); “Electric Power Engineering, Electrical Engineering and Electromechanics” (Bachelor's degree, Master's degree); “Civil Security” (Bachelor's degree, Master's degree);

- KhmNU: “Ecology” (Bachelor's degree, Master's degree); “Secondary Education (Biology and Human Health) (Bachelor's degree, Master's degree);

- DniproTech: “Marketing” (Master's degree); «International Economic Relations» (Bachelor's degree, Master's degree).

However, it is worth noting that the content of most study programs addresses the relevant SDGs. In addition, to achieve the SDGs, Ukrainian universities teach certain academic disciplines within other study programs; curricula include disciplines the content of which is aimed at achieving the SDGs, in particular: 3; 4; 5; 7; 8; 9; 10; 11; 12; 13; 15; 16; 17; etc., elective courses for students are offered (some of them through the implementation of international grants, projects, International Schools, etc. [26, 27, 28, 29, 30, 31, 32,]) that develop additional knowledge and skills for a green transition; specific topics/issues in academic disciplines are studied; to maximise the delivery of information on SDGs to students, thematic open lectures and trainings for students and teachers are held, and visits to leading organisations operating in

[26] https://lpnu.ua/en/news/international-winter-school-environmental-%D0%B1%D0%B5%D0%B7%D0%BF%D0%B5%D0%BA%D0%B0-%D1%83%D0%BA%D1%80%D0%B0%D1%97%D0%BD%D0%B0-%D0%B2%D0%B8%D0%BA%D0%BB%D0%B8%D0%BA%D0%B8-%D0%B0%D0%B1%D0%BE-%D0%BC%D0%BE%D0%B6%D0%BB%D0%B8%D0%B2%D0%BE%D1%81%D1%82%D1%96

[27] https://erasmus-ukrenergy.unige.it/

[28] https://lpnu.ua/en/news/summer-school-technological-and-%D0%B5%D0%BA%D0%BE%D0%BD%D0%BE%D0%BC%D1%96%D1%87%D0%BD%D1%96%20%D0%B0%D1%81%D0%BF%D0%B5%D0%BA%D1%82%D0%B8%20%D0%B0%D0%B4%D0%B0%D0%BF%D1%82%D0%B0%D1%86%D1%96%D1%97%20%D0%B4%D0%BE%20%D0%B7%D0%BC%D1%96%D0%BD%D0%B8%20%D0%BA%D0%BB%D1%96%D0%BC%D0%B0%D1%82%D1%83

[29] https://lpnu.ua/uk/news/university-runs-international-summer-%D1%88%D0%BA%D1%96%D0%BB%D1%8C%D0%BD%D0%B8%D0%B9-%D1%82%D0%B5%D1%85%D0%BD%D0%BE%D0%BB%D0%BE%D0%B3%D1%96%D1%87%D0%BD%D0%B8%D0%B9-%D0%B5%D0%BA%D0%BE%D0%BD%D0%BE%D0%BC%D1%96%D1%87%D0%BD%D0%B8%D0%B9-%D0%B0%D1%81%D0%BF%D0%B5%D0%BA%D1%82%D0%B8-%D0%BA%D0%BB%D1%96%D0%BC%D0%B0%D1%82

[30] https://lpnu.ua/en/e-marketing

[31] https://lpnu.ua/en/news/green-school-within-project-e-marketing-jean-monnet-modules-erasmus

[32] https://lpnu.ua/uk/news/earth-day-2023-event-was-held-within-project-e-marketing-jean-monnet-modules-erasmus

line with SDGs are organised; implementing professional development programs for academic staff (for example, at SumDU - "Environmental aspects of educational and research activities"[33], which aims to ensure a balanced environmental development of society), conducting various optional courses as part of non-formal/informal education, etc.

## 2.5. Are the results of cooperation with employers and other stakeholders taken into account in new study programmes and modifying existing curricula to achieve the selected goals from the list of SDGs?

In Ukrainian universities, employers, as participants in the system of internal quality assurance of educational activities, participate in the development and updating of study programs during offline and online meetings, conferences, and round tables. They are involved in defining goals of the study programs, forming curricular and choosing the themes of educational disciplines for the purpose of forming competencies and achieving study program results (including study programs, the content of which contributes to the achievement of SDGs). In several universities Employers' Councils have been formed and relevant regulations have been developed[34]. In addition, after public discussions of study programs the following proposals have been made:

- OPNU: employers pointed out the need to direct the focus of study programs to green transformation, the formation of additional program learning outcomes in order to achieve the SDGs;

- NURE: the employer (Zaporizhska NPP) proposed to include the academic discipline Management, Control and Automation at Nuclear Power Plants in the University catalogue of elective courses; the employer (Ukrainian Institute of Prosthetics, Prosthetics and Rehabilitation and State University "Sytenka Institute of Spine and Joint Pathology of the National Academy of Sciences of Ukraine") offered to develop the academic disciplines Design of Biotechnical Systems and Devices and Systems for Replacing Lost Human Organs and Functions (for study program "Biomedical Engineering"). Also, employers jointly with the university implement educational projects: 1) "Creation of prosthetic and orthopedic education in Ukraine" (initiated by NATO with support and supply of the Agency, the Ministry of Social Policy of Ukraine and the Human Study School of Rehabilitation), within the framework of which scientific and pedagogical workers are trained in prosthetics and orthopedics according to modern international standards ISPO category II standards; 2) educational project funded by the German Academic Exchange Service DAAD "Ukraine digital: Ensuring academic success in times of crisis (2022). OER with Ukraine";

- LPNU: employers (Institute of Energy and Management Systems together with the Danish company Mita-Technik (currently absorbed by Emerson Electric Corporation) offered to develop study programs "Energy systems for sustainable development (Renewable energy and electromobility)" and "Renewable energy and electromobility"[35]; the employer (IEM) held a public lecture "The business of the future in the ECO style" within the Erasmus+ Jean Monnet module "Increasing the competitiveness of the EU: circular economy" (CirclE), and a lecture "Resource efficiency as an element of the circular economy"[36]; the Povtor project of a reusable online supermarket packaging was presented;

- LNTU: employers (International Holding "Modern-Expo"; PJSC "SKF Ukraine"; LLC "Kromberg & Schubert"; LLC "Tsunami"; LLC "Kronospan UA"; LLC "Ukraine"; LLC "Runa"[37]) emphasize the achievement of the goals of sustainable development in the field of greening and the determination of benchmarks for them and they themselves are an example of such practice;

33 https://crkp.sumdu.edu.ua/images/Profil_ecologia_2022.pdf

34 https://ifsk.sumdu.edu.ua/uk/pro-fakultet/rady-robotodavtsiv.html; https://nure.ua/polozhennja-pro-radu-robotodavciv; https://lpnu.ua/vpzv/spivpratsia-z-robotodavtsiamy; https://lntu.edu.ua/uk/informatsiya-pro-robotodavtsiv

35 https://lpnu.ua/news/zustrich-z-uspishnymy-vypusknykamy-kafedry-eks-iaki-pratsiuiut-u-kompanii-emerson-electric

36 https://lpnu.ua/en/news/open-lecture-resource-efficiency-took-place-ftc-department

37 https://modern-expo.eu/ua/sustainability ; https://www.skf.com/ua/organisation/sustainability ; https://kroschu.com.ua/lutsk/ ; https://www.zunami.com.ua/ ; https://uafm.com.ua/members/tov-kronospan-ua/ ; http://vmkukraine.com/ ; https://runa.ua/uk/pro-kompaniyu/istoriya/

- KhmNU: the employer (Department of Ecology) offered to develop new study programs in the direction of green transition and studying the features of the nature reserve fund and eco-network of the city of Khmelnytskyi;

- DniproTech: Brandenburg University of Technology Cottbus-Senftenberg (Germany), Mykolaiy University Copernicus in Toruń (Poland), Technical and Humanities Academy in Bielsko-Biała (Poland), State Higher Secondary School "KNEU named after V. Hetman", NTUU "KPI named after I. Sikorskyi" and others in cooperation created the Resource Center for Sustainable Development within the framework of the UNDP/EU project in order to spread the ideas of green transformation[38].

## 2.6. Are there transparent links to the selected goals from SDGs in the learning outcomes for the study programme?

In Ukrainian universities, the learning outcomes of all study programs are linked to at least one SDG:

- in the NURE, in accordance with the content of the above-mentioned study program "Automation and computer-integrated technologies", the following SDGs are achieved: 3 "Strong health"; 4 "Quality education"; 9 "Innovations and infrastructure"; 17 "Partnership for Sustainable Development";

- in the LPNU achieves the following SDGs in accordance with the content of the above-mentioned study programs: 7 "Renewable energy"; 13 "Combating climate change"; 15 "Preservation of terrestrial ecosystems";

- in the LNTU, in accordance with the content of the above-mentioned study programs, the following SDGs are achieved: 3 "Strong health"; 4 "Quality education"; 5 "Gender equality"; 7 "Renewable energy"; 8 "Decent work and economic growth"; 9 "Innovations and infrastructure"; 10 "Reduction of inequality"; 11 "Sustainable development of cities and communities"; 12 "Responsible consumption"; 13 "Combating climate change"; 15 "Preservation of terrestrial ecosystems"; 16 "Peace and justice"; 17 "Partnership for sustainable development".

In addition, in 2023, SumDU and OPNU updated document templates for the development of curricula of academic disciplines[39] with an emphasis on including topics and/or issues related to the SDGs in their content.

It is worth noting that all topics/questions of academic disciplines of the "green" direction (major and elective courses) highlight the SDGs.

## 2.7. Can students in any engineering degree program take elective courses related to green transition?

Seven Ukrainian universities do not restrict either teachers in developing and teaching green disciplines or students in their choice of studying them (students can choose from the catalogs of elective disciplines related to the green transition), for example: SumDU teaches the discipline Sustainable Development: Implementation of EU Policy in Ukrainian and English for all students; OPNU - Fundamentals of Ecology; NURE - Computer-integrated Industry 4.0 technologies; LPNU - by blocks Ecology and Environmental Protection and Environmental Control and Audit; LNTU: Digital Agriculture and Smart Farming; KhmNU - Environmental Safety and Sustainable Development Strategy; DniproTech - Global Challenges of Sustainable Development.

In seven Ukrainian universities, students of any study programme have a wide range of disciplines related to the green transition.

38 https://www.facebook.com/groups/1560122650696792/?hoisted_section_header_type=recently_seen&multi_permalinks=2405212971773609 8&locale=ms_MY

39 https://document.sumdu.edu.ua/

## 2.8. If you and your colleagues were just starting to develop the activities under review, what would you do differently?

Educational activities in the context of the transition to green transformation, according to the teams of seven Ukrainian universities, require the following improvements and transformations:

- SumDU: when updating educational programmes, their content should be considered through the prism of sustainable development, ensuring the achievement of specific goals and forming relevant topics;

- OPNU: it is advisable to take a more proactive approach to integrating the SDGs into the content of new educational programmes and, when updating existing ones, to introduce the principles of sustainable development into the content of various academic disciplines, which will provide students with a holistic understanding of the social and environmental impact of their activities;

- NURE: it is necessary to provide recommendations (based on the results of cooperation with stakeholders) on the availability of transparent references to specific SDGs; consideration of the issues of achieving selected goals from the list of SDGs; development of special educational programmes related to the SDGs; inclusion of sustainable development disciplines in the content of educational programmes to ensure a healthy life, safe, social and psychological state and promote well-being for all; taking into account the peculiarities of personnel training for the implementation of sustainable development objectives;

- LPNU: it is advisable to apply an integrated approach to the development and promotion of new educational programmes in cooperation with stakeholders, in particular, specialised industrial associations (participation in the development of educational programmes and their promotion on the labour market, teaching of individual modules or topics, development of dual education, creation of a joint training laboratory, access to technologies and equipment at work during internships, employment), which will ensure a holistic understanding and achievement of the SDGs;

- LNTU: it is advisable to include issues/topics/modules in all educational programmes that allow achieving programme learning outcomes related to the SDGs;

- KhmNU: it is advisable to develop a regulatory framework to ensure a holistic understanding of green education and the achievement of the SDGs.

- DniproTech: it is recommended to apply for an educational project under the Jean Monnet Erasmus+ grant programme of modules for the introduction of elective green transition courses for students of technical and economic specialities; to choose a specific example of an organization that will implement appropriate technological solutions obtained as a result of research in the field of green transformation, which will expand the list of practical works and cases to improve the efficiency of learning; expand the number of applicants who can participate in roundtables and trainings on green transformation; motivate students to apply for individual and collective grants funded by public and private institutions.

## 2.9 Brief evaluative summary of the green transition-related program(s) or offerings of your university; e.g., the strengths, accomplishments, limitations, and work in progress.

The analysis of Part 2 Green Education showed that seven Ukrainian universities are engaged in educational activities related to the green transition and are showing good results. There are strengths and achievements depending on the focus of a particular higher education institution.

*Table 2 Strengths and achievements associated with the transition to the green level*

| Institution of higher education | Thematic aspects related to the transition to green education | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | quantity of green transition study programs | availability of the Catalogues of elective courses with topics corresponding to green transition | availability and possibility of using the material base (including its own) | name of a student circle of «green» direction | student participation in international educational programs of green transition | involving stakeholders in discussing the content of educational activities aiming at green transition | involvement of teachers and students in educational projects on sustainable development or green transition | educational work is carried out with students with the aim of a green transition |
| SumDU | 4 | + | SumDU and Regional Office of Water Resources of the Sumy Region, Hetmansky National Nature Park, the State Environmental Inspection in the Sumy Region and other | Experiment in Ecology and Environmental Protection Technologies | «Green Transition for Ukrainian Students» | + | + | + |
| OPNU | 2 | + | * | + | «Green Transition for Ukrainian Students» | + | * | + |
| NURE | 4 | + | * | + | «Green Transition for Ukrainian Students» | + | + | + |
| LPNU | 11 | + | * | circle on research and development of the entire electrical system of a small electric truck | «Green Transition for Ukrainian Students» | + | + | + |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| LNTU | 24 | + | + | + | «Green Transition for Ukrainian Students» | + | + | + |
| KhmNU | 4 | + | * | Extracurricular student clubs of Ecology and Biology Department | «Green Transition for Ukrainian Students» | + | + | + |
| DniproTech | 2 | + | * | + | «Green Transition for Ukrainian Students» | + | + | + |

* - missing information

## 2.10 Self-Ratings in the Green Education

Seven Ukrainian universities conducted a self-assessment of their educational activities in the direction of their integration into the «green» educational space to achieve the SDGs. Self-assessment results showed that green strategies are anchored at the institutional level at SumDU, OPNU, NURE, LPNU, LNTU, KhmNU and DniproTech and they affect planning, implementation and the development of study programs and educational activities in general. Universities implement relevant study programs, offering catalogues of elective disciplines (microcredit) with themes corresponding to the green transition (however some universities offer an insufficient number of disciplines related to the topic).

Students and teachers participate in events on the topic of «green» transition. Universities cooperate with stakeholders in shaping the policy of green transformation in educational activities.

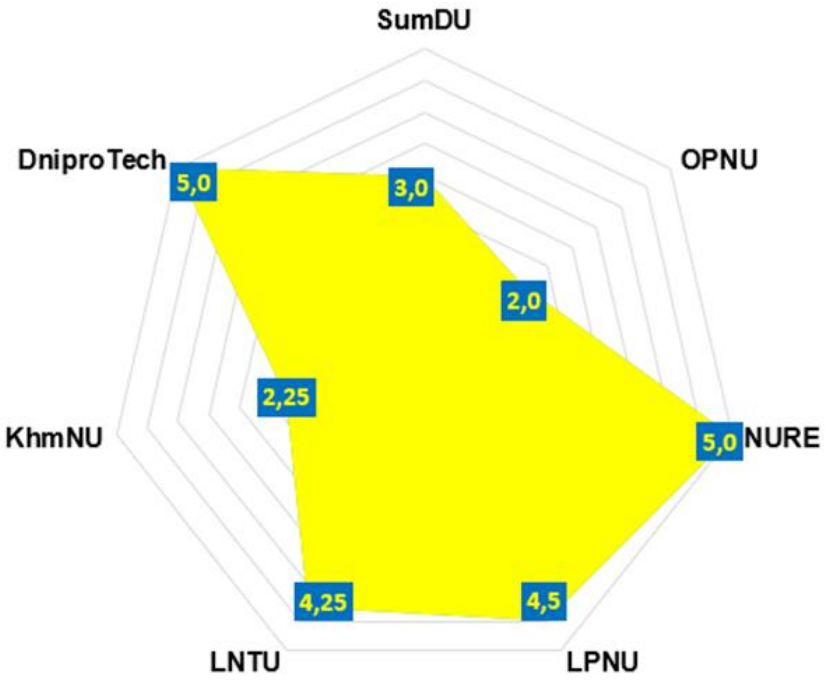


*Figure 2 Average estimates for self-analysis of seven Universities in Part 2 Green Education*

### Summary of strength and weaknesses on part 2 Green education

Strengths:

Each of the seven universities has study programs, realized over a long period, are in demand in the market of educational services and ensure the formation of students' complex knowledge, skills and practical skills in the following areas: 1) ecology, protection, protection and safety of the environment, sustainable and rational use of natural resources; 2) renewable energy, electricity production from alternative energy sources; 3) automation of production processes, development of new and improvement of existing automation systems using modern software and technical complexes; 4) providing psychological and pedagogical assistance to people with special educational needs; 5) introduction of innovative technologies for growing crops, restoration of soil fertility, introduction of biologization; 6) growing biologically sustainable forests in the face of global climate change, care and protection of forest plantations, harvesting and processing of wood; 5) introduction of innovative technologies for growing crops, restoration of soil fertility, introduction of biologisation; 6) cultivation of biologically sustainable forests in the context of global climate change, care and protection of forest plantations, harvesting and processing of wood; 7) introduction of environmental resource-saving technologies in the processing and food industry, methods of quality control and food safety, introduction of craft technologies and highly efficient technological equipment to ensure quality and safety of food products; 8) modelling the structure and function of the musculoskeletal system and designing artificial prostheses of its parts using the principles of engineering mechanics and biomaterials science; 8) formulating technical solutions taking into account social, environmental, ethical, economic aspects, occupational health and safety, industrial sanitation and fire safety requirements. Before updating and discussing the content of study programs and curricula in the context of the «green» transition stakeholders (students, graduates, academic community and employers) are actively involved. Ukrainian universities create and annually update catalogues of general university and professional elective courses (microcredits), many of which are in line with green standards and complement students' knowledge, skills and practical knowledge of the SDGs. Some universities have their own facilities or use specialised equipment from business entities (e.g., during internships). Students also join green transition clubs, participate in Ukrainian and international study programmes/projects, etc. They are also involved in educational activities aimed to achieve the SDGs.

Weaknesses:

Partial or complete lack of approved educational and methodical instructions/mechanisms/procedures with recommendations for achieving the SDGs; a small number of educational programs (in some universities) of the "green" direction; absence or obsolescence of the material and technical base for carrying out high-quality educational activities.

## Recommendations for improvements on Part 2 Green education

One of the most effective tools for implementing green standards is higher education, which contributes to the support and dissemination of technological, environmental, economic and socio-cultural innovations. Undoubtedly, quality education is a sustainable development advantage for citizens, society, and the country as a whole and an important means of supporting and promoting the implementation of the SDGs.

Despite the fact that education is the focus of only SDG 4 “Quality Education”, it is in fact closely linked to the other SDGs and is an important condition for their implementation.

Overall Recommendations: continue to improve the educational process at universities, using: 1) existing own learning and teaching opportunities ((in bachelor's, master's and doctoral degree study programmes; in professional training and advanced training courses; in conducting online courses, trainings, webinars); organization of thematic events and groups for students; participation in educational projects and grants, etc.; 2) the best international educational practices.

In general, according to the results of self-analysis of university teams and expert analysis formed such recommendations for the period up to 2030:

1. Regulatory regulation of the educational process in universities:

- due to the partial/complete absence of approved educational and methodological guidelines/mechanisms/procedures with recommendations for achieving the SDGs, it is necessary to develop a number of documents in the regulatory dimension that will regulate the orientation of the educational process at universities towards the implementation of the principles and SDGs.

2. Educational component of student preparation:

- to continue the work of the faculties/departments/divisions responsible for the organisation of the educational process and the quality of education in developing new (in accordance with the demand for the provision of such educational demand) and updating existing educational programmes by including green disciplines;

- filling existing disciplines with topics/issues that form certain knowledge of green standards. However, the partial inclusion of green topics/issues in various academic disciplines is mostly not systematic, but rather proactive and does not always provide a holistic view of the essence of the Concept of Green Transformation and the mechanisms for its implementation. Therefore, it is advisable to introduce a special discipline into the curricula at all levels of higher education as a compulsory or elective course (for consideration by university administrations and stakeholders);

- it is advisable to adapt the structure of academic disciplines to the introduction of real cases of enterprises/organisations/institutions focused on the SDGs, which, in turn, will enable students to act in close to real conditions and develop adaptive skills while working on cases;

- continue work on the annual update and approval of the Catalogues of general university and professional disciplines and the inclusion of "green" disciplines in their list;

- to plan and organise the educational process with the possibility of transferring theoretical knowledge into practical activities and creating a dual education system that will allow combining traditional classroom classes with

online lectures and practical work, adapting them to real conditions, taking into account different levels of complexity. This, in turn, implies close cooperation between universities and employers to discuss and create the necessary work format for students.

3. Extra-curricular work with students:

- organization clubs for students working on topics related to the SDGs.

4. Financial and economic management:

- attracting and directing investments to: 1) renovation of educational buildings, classrooms and laboratories at universities, which will significantly reduce heating and electricity costs and provide comfortable conditions for the educational process; 2) development of the material and technical, educational and research facilities of universities (purchase of modern high-tech educational and laboratory equipment, technical teaching aids, technology parks, training and geodetic training grounds, recreation centres, etc.).

5. Inclusive education:

- guarantee equality and access to study programmes for persons with disabilities, persons with reduced mobility and persons from vulnerable groups who, due to educational disadvantages caused by personal, social, military-political, gender, cultural or economic circumstances, require special support to realise their educational potential.

6. Internship programs and professional development:

- to organise training courses, workshops, seminars, roundtable discussions for teachers in the field of professional development (including the introduction of social inclusion) on "green" topics; to introduce self-education and adult lifelong learning approaches into the educational process of universities.

The joint work of university administrations, faculty, students, and stakeholders, and the focus on best international standards and practices in the field of green education, is extremely important not only for taking specific steps to achieve larger goals, but also for building trust and a sense of support in the process of integrating the green education principles and SDGs for the benefit of sustainable society.

# Part 3 Green Campus

As the global community increasingly recognizes the imperative of sustainability, universities play a pivotal role in fostering environmentally conscious practices and inclusive policies. This set of recommendations outlines a comprehensive approach for enhancing university sustainability across various domains. From water management and energy policies to waste initiatives, transportation, security measures, and inclusivity considerations, these recommendations aim to guide universities toward creating resilient and environmentally responsible campuses. By encouraging collaboration, emphasizing student engagement, and advocating for continuous evaluation, these suggestions offer a roadmap for universities to not only adopt sustainable practices but also actively contribute to a more environmentally conscious and inclusive future.

## 3.1 Campus description (university location (city center / rural / etc.), climate zone, total campus area, campus ground floor area of buildings, area on campus covered in vegetation, infrastructure solutions)

The analysis of the provided information leads to several conclusions:

Most universities are located in central parts of cities, except for LPNU, which stands out for having the largest area encompassing educational buildings, dormitories, and recreation centers located on the periphery. Only three universities (NURE, DniproTech, KhmNU) provided information about the climate zone, which can be a crucial aspect for students and faculty, especially for those considering the university as a place for long-term residence.

The absence of information on the ground floor area of buildings in three universities and the unspecified size of green areas on the campuses of the same institutions may complicate the assessment of the overall infrastructure of these universities.

Six universities did not provide information about their infrastructure solutions, indicating a need for additional research or clarification from these institutions regarding upgrades and technical provisions.

In summary, the data on various aspects of university campuses may be incomplete, highlighting the importance of further research or obtaining additional clarification to make a comprehensive comparison and determine the best fit for specific needs.

Universities should strive to provide comprehensive data on all aspects, including the ground floor area of buildings and the extent of green spaces on campuses. This information is crucial for prospective students, researchers, and faculty members. Establishing a standardized format for reporting campus-related details could facilitate easier comparison between universities and provide a clearer understanding of their offerings. Universities should enhance transparency by sharing information about their infrastructure solutions. This includes technological advances, sustainable practices, and any recent upgrades that contribute to the overall development of the campus. Improved university communication can help prospective students and stakeholders make informed decisions. This may involve regular updates on university websites or direct engagement with inquiries to ensure accurate and up-to-date information.

## 3.2 Campus Water Management Facilities

All universities track water usage, but only 2 universities (SumDU, LPNU) have water purification systems, and only one has water recycling infrastructure (SumDU). A water reuse policy exists in 4 universities (SumDU, NURE, LPNU, LNTU), but it is formally documented in only 3 of them (SumDU, NURE, LNTU). 5 universities undertake efforts to promote conscious water consumption (SumDU, NURE, LPNU, LNTU, DniproTech). Among them, 4 universities are at the "Strong" level, while one is at the "Minimal" level.

SumDU's practice regarding transparency of water use is interesting, namely the "Energy clock" device that is installed on the water collection node, which shows the consumer the amount of water used and its cost in real-time[40]. And NURE has a Comprehensive long-term energy saving program in NURE for the period 2020-2025[41]. Documented policies regarding Campus Water Management Facilities are present in 3 universities (SumDU, NURE, LNTU).

Universities lacking water purification and recycling systems should consider implementing such infrastructure to promote sustainable water management. Universities with existing water reuse policies should ensure their formal documentation. This enhances transparency and commitment to sustainable water practices. Universities, especially the ones at the "Minimal" level, should intensify efforts to systematically promote conscious water consumption. This could involve awareness campaigns, educational programs, and initiatives to reduce water wastage. All universities should strive to document their policies regarding Campus Water Management Facilities. This documentation serves as a reference point for stakeholders and reinforces the institution's commitment to sustainable water practices.

### 3.3 Energy and Climate Change Policies on Campus

Almost all universities have acknowledged efforts toward transitioning to the use of renewable energy sources. Wide application of automated control systems for heating is observed across the universities. Five out of seven universities are gradually implementing measures to reduce greenhouse gas emissions (SumDU[42], NURE[43], LPNU[44], LNTU[45], KhmNU). Despite active efforts in energy conservation and climate change prevention, formally documented policies specifically addressing Energy and Climate Change are present in only 3 universities (SumDU, NURE, LNTU).

Encourage all universities to formally document their policies on Energy and Climate Change. This not only provides a clear roadmap for sustainable practices but also demonstrates a commitment to transparency. Universities should continue and expand their initiatives to reduce greenhouse gas emissions. This could involve setting specific targets, investing in cleaner technologies, and regularly monitoring and reporting progress. Increase awareness among the university community about the importance of energy conservation and climate change mitigation. Encourage active engagement and participation from students, faculty, and staff in green initiatives. Facilitate benchmarking and collaboration among universities to share best practices and innovative solutions in the areas of renewable energy adoption, automated systems, and greenhouse gas reduction. This collaborative approach can accelerate progress towards sustainable and climate-friendly campus operations.

### 3.4 Waste management on campus

Some universities have special containers for sorting waste (paper, glass, plastic, and mixed waste), as well as container sites for collecting waste on the street, and special boxes for collecting used batteries are installed in academic buildings and dormitories (SumDU[46], LPNU[47]). Waste recycling programs have been implemented at the universities (SumDU[48],

40 https://innovation.sumdu.edu.ua/d19028/

41 https://nure.ua/wp-content/uploads/Benchmarking/obedinennaja-programma.pdf

42 https://sumdu.edu.ua/uk/about-sumdu/korysni-posylannia/green-university.html

43 https://nure.ua/khnure-pryiednavsia-do-initsiatyvy-race-to-zero

44 https://lpnu.ua/zvity-pro-vykydy-zabrudniuiuchykh-rechovyn-i-parnykovykh-haziv-v-atmosferne-povitria-vid

45 https://lntu.edu.ua/uk/media/dotsent-kafedry-ekolohiyi-otrymala-sertyfikat-eksperta-z-upravlinnya-vykydamy-vuhletsyu

46 https://normative.sumdu.edu.ua/?task=getfile&tmpl=component&id=aa256134-04a0-ea11-95da-d4856459ca35&kind=1

47 https://lpnu.ua/politecheko

48 https://normative.sumdu.edu.ua/?task=getfile&tmpl=component&id=cc14bd93-a280-ea11-a604-d4856459ca35&kind=1

LPNU[49]), which include paper reuse, recycling of paper and plastic, glass and scrap metal on a contractual basis, recycling of mercury lamps, oils, used car tires and batteries on a contractual basis; recycling of laboratory research products on a contractual basis. The Green Library project was implemented, which implements the concept of "pro Waste" and the 5Rs (REFUSE, REDUCE, REUSE, RECYCLE, ROT) rules: use reusable household items; use electronic document management; turn unnecessary items into original decor; sort waste and send it for recycling (SumDU[50]). Organic waste composting sites have been set up and are operating on the territory of universities (SumDU[51]). Some universities refuse to use plastic packaging bags with a wall thickness of up to 15 microns, replacing them with paper packaging bags (SumDU). DniproTech students take part in the campaign "Let's Make Ukraine Clean Together!"[52], united with the global cleaning campaign "World Cleanup Day", in the Weeks and Days of Sustainable Development.

The universities have an approved Environmental Policy that provides for a waste reduction and recycling program: reducing the use of paper, plastic, and disposable items; reducing waste generation and implementing effective waste management methods,implementing sustainable resource management methods based on reducing consumption, reuse, and recycling (NURE[53]). Some universities encourage environmental practices: solid waste management; liquid waste management; biological waste management; biomedical waste management; and e-waste management (LNTU[54]). The universities sign memorandum of cooperation and implement joint projects with local offices. For example, a memorandum was signed between KhmNU and the Smart Environment office, resulting in the implementing a joint project called Ecobus, aimed at combating hazardous waste. Every month, the Ecobus stops at the Khmelnytsky National University campus and collects used batteries, medicines, household chemicals, varnishes, and paints, as well as other used batteries, medicines, chemicals, varnishes, paints, and other hazardous waste from students and staff.

### 3.5 Campus transport policy

Most universities have equipped bicycle parking spaces and bicycle paths on their territory, which promotes a healthy and environmentally friendly lifestyle (DniproTech[55], SumDU[56], KhmNU). Some universities take measures to promote the use of alternative energy sources (DniproTech). Some universities develop and use "environmentally friendly" charging stations for electric vehicles. For example, such a station was created in cooperation with the DniproTech Faculty of Electrical Engineering and the EDS Energy Group with the support of the Ministry of Education and Culture as part of the development of the laboratory "Decentralised Electricity Supply and Diagnostics Systems for Electric Vehicles" at the Centre for Innovative Geoenergy (DniproTech)[57].

The universities are implementing initiatives to reduce the number of private cars on campus: car parks are equipped with barriers that restrict entry to the car park, entry is restricted by introducing a pass regime, and parking spaces have been provided for private bicycles. Some universities adopt environmental policies that support the use of sustainable transport at the university, namely, providing conditions for the use of bicycles and electric vehicles. vehicles (NURE). The universities have specially designated parking spaces on campus for disabled staff, students, and visitors (LNTU, LPNU).

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49 https://www.facebook.com/groups/2215182245475435

50 https://library.sumdu.edu.ua/uk/biblioteka/library-projects/zelena-biblioteka/nalahodzhennia sortuvannia-ta-utylizatsii-vidkhodiv.html

51 https://drive.google.com/drive/u/3/folders/1K1oIItUx4lzK30lE0gjvyay10H_-0oVT

52 https://www.instagram.com/p/CTwHy7rtKyg/?utm_source=ig_web_copy_link&igshid=MzRlODBiNWFlZA

53 https://nure.ua/wp-content/uploads/2022/doc/241_26.12.2022.pdf

54 https://www.facebook.com/groups/2215182245475435

55 https://www.facebook.com/plugins/post.php?href=https%3A%2F%2Fwww.facebook.com%2Fntudp%2Fposts%2Fpfbid0x9gdFJNxqjXug1AjbsNU2o7TywBaXeJ9yAtXS2bv9d3HZnhnzHwzkwUBtTChjs6wl&show_text=true&width=500

56 https://drive.google.com/drive/u/3/folders/1JXM4Qb_rNUVpYqoDxj7L-qq28e3vnWzc

57 https://www.nmu.org.ua/ua/content/news/?ELEMENT_ID=23948)

### 3.6 Health infrastructure facilities (medical care, sports facilities, healthy eating)

Most universities have their own sports complexes, which include gymnasiums, basketball halls, boxing rings, swimming pools, stadiums, football fields, halls for sports choreography, martial arts, table tennis, game and gym halls, shooting ranges, rowing and ski bases (DniproTech[58], SumDU[59], OPNU KhmNU, LNTU[60], NURE, LPNU). Most universities have sports and recreation centers, sanatoriums, and health and sports camps for health improvement, treatment, and preventive work (DniproTech[61], SumDU, OPNU, KhmNU, LNTU[62]). Some universities have their clinics (SumDU[63]), medical centers (NURE), and health posts (LNTU[64], LPNU) where highly qualified specialists - doctors and candidates of medical sciences, professors, associate professors, specialists widely known in Ukraine and abroad - provide medical care. Special dietary meals are offered in the universities' health resorts.The menu of university canteens includes, among other things, vegetarian dishes (OPNU).

Some universities have approved a policy of promoting healthy lifestyles and mental health, which is aimed at strengthening individual responsibility for maintaining and improving their health, increasing social inclusion, and developing preventive measures (NURE[65]). The universities support a smoke-free policy on their premises and take measures to overcome tobacco dependence, protect the public from tobacco through advertising and marketing, informing about the risks of smoking, disseminating evidence-based evidence to help those who want to quit, and creating a smoke-free generation (NURE[66]).

### 3.7 Security and Safety Facilities

The universities are equipped with cameras to monitor and record possible violations and intruders. The territories are fenced off from unauthorized people, and there are security checkpoints that record visitors and prevent unauthorized people from entering the HEI. Buildings and dormitories are equipped with fire alarms. Most universities have shelters on their campuses in case of air raids. However, not all universities have first aid kits in their classrooms. Also, some universities do not have shelters on their premises.

Training should be held for faculty and staff on first aid. Implement semesterly briefings with students and teachers of higher education institutions on the algorithm of actions and rules of behavior in dangerous situations. Ensure safety protocols regarding the rules and algorithm of actions in case of air raids. Demonstration of evacuation routes from the premises and the location of the nearest shelters on the territory of the university. Check evacuation exits and accessibility of shelters at any time of the day. Conducting training evacuations. Systematic checks of the serviceability of electricity, heat and water supply networks, ventilation systems, and the suitability of buildings and structures for operation.

### 3.8 Campus facilities for disabled people

Universities are equipped with the minimum necessary equipment for people with reduced mobility. There are ramps on the territory of HEI and rooms for hygiene procedures with special needs. A positive practice is the existence of

58 https://kfv.nmu.org.ua/ua/sport_health_work/abonement.php

59 https://sport.sumdu.edu.ua/index.php/ua/sportyvni-sporudy

60 https://lntu.edu.ua/uk/sportkompleks-lntu

61 https://kfv.nmu.org.ua/ua/tab_Girnyk/pro_tabir.php

62 https://lntu.edu.ua/uk/vidkryttya-onovlenoho-baseynu

63 https://clinic.health.sumdu.edu.ua/

64 https://lntu.edu.ua/uk/bazy-vidpochynku-orbitatekhnichnyy

65 https://nure.ua/konferencii-ta-workshops/seminar-cili-stalogo-rozvitku-zavdannja-hnure-shhodo-ih-realizacii/micne-zdorovja-i-blagopoluchchja

66 https://nure.ua/en/conference-workshops/sustainable-development-goals-sdgs-the-objectives-of-nure-to-implement-the-sdgs/good-healht-and-well-being/smoke-free-policy

special educational and rehabilitation centers for students with special needs, in particular at NURE[67], KhmNU[68] and LPNU[69]. A weakness is the lack of conditions in most universities to ensure the educational process for students with visual and hearing impairments.

It is necessary to provide conditions for the education of people with disabilities, including those with visual and hearing impairments. Install equipment for the educational process for students with visual and hearing impairments. For example, a keyboard with Braille, duplication of Braille signs in public areas, multimedia and subtitles to video materials for better perception for people with hearing impairments. Conduct briefings with faculty and staff of higher education institutions on the algorithm of actions in case of unforeseen situations, such as an epileptic seizure or asthma attack, etc.

### 3.9 Green community development

HEIs are actively working to disseminate and engage students in environmental issues. They facilitate the organization of lectures and roundtables with students on environmental problems and ways to solve them. Students also organize various green initiatives. A positive practice is the presence of green areas on the territory of universities, involvement in the collection of secondary resources for recycling and upcycling. It is nice to see that in addition to discussions, students and university staff are also actively involved in volunteer campaigns to clean up public places from litter. It is worth noting that some universities have environmental science clubs (KhNU)[70] and a Resource Center for Sustainable Development (DniproTech)[71].

To better engage and spread the idea of environmental awareness, it is necessary to promote cooperation with local organizations involved in environmental protection and ecology. To direct students to the scientific direction of solving environmental problems. Analyze the state of "greenness" of the university and find possible ways to improve it.

### 3.10 Self-Ratings in the Green Campus

Based on the analysis of self-ratings in the Green Campus, several conclusions can be drawn. Firstly, it is positive to note that a majority of universities (5 out of 7) declare their efforts in monitoring the level of climate neutrality (DniproTech, SumDU, LNTU, NURE, LPNU). However, there is a need for improvement as only 2 universities have set specific targets for achieving climate neutrality by a certain year (NURE, LNTU). This indicates a lack of commitment towards concrete actions.

Additionally, it is encouraging to see that most universities actively implement surveys and strive to make rational use of their premises. This demonstrates a recognition of the importance of efficient space utilization.

In terms of water and energy conservation, the average rating level is adequate (3). While this indicates a satisfactory performance, there is room for improvement in terms of implementing more energy-saving measures and promoting water conservation practices.

On the other hand, the level of vegetation coverage and renewable energy approaches is strong (4), which is commendable. However, it is concerning that despite these self-assessments, only 3 out of 7 universities have documented policies related to these measures (SumDU, LNTU, NURE). This suggests a lack of formal commitment and implementation of sustainable practices.

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67 https://nure.ua/branch/specialnij-navchalno-reabilitacijnij-viddil-suprovodu-studentiv-z-osoblivimi-osvitnimi-potrebami

68 https://fte.khmnu.edu.ua/laboratoriya-z-egroterapiyi/

69 https://test-new.lpnu.ua/en/no-limits

70 https://ecobio.khmnu.edu.ua/naukovi-gurtky/

71 https://www.facebook.com/groups/1560122650696792/?hoisted_section_header_type=recently_seen&

When it comes to greening the university and campus, universities rate themselves at an average of 4-5 points. This is good news as all universities promote greening and biodiversity.

Most universities rate themselves as a safe and inclusive educational environment. All of them are equipped with the necessary equipment for comfortable use by people with special needs. Also, universities have surveillance and security points for the safety of all participants. However, unfortunately, 4 out of 7 universities do not have a green building policy.

Based on these findings, it is recommended that universities prioritize setting specific targets for achieving climate neutrality and develop concrete action plans to reach these goals. Furthermore, universities should strengthen their policies and documentation related to water and energy conservation, as well as vegetation coverage and renewable energy initiatives. This will ensure a more comprehensive and effective approach towards sustainability in the campus environment.

*Table 3 Strengths and achievements associated with the transition to the green level*

| Aspect | DniproTech | SumDU | LPNU | KhmNU | NURE | LNTU | OPNU |
|---|---|---|---|---|---|---|---|
| Water Management | + | + | + | + | + | + | + |
| Energy and Climate Change Policies | - | + | - | - | + | + | - |
| Waste Management | - | + | + | - | - | - | - |
| Bicycle Infrastructure | + | + | + | + | + | + | - |
| Alternative Energy Promotion | + | + | + | + | + | + | - |
| Sports and Health Facilities | + | + | + | + | + | + | + |
| Health Services and Dietary Offerings | Clinics, Centers, Dietary Options | Clinics | Clinics | Clinics | Medical Centers, Health Posts, Dietary Options | Not Specified | Clinics, Health Posts, Dietary Options |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Promotion of Healthy Lifestyles | + | + | + | + | + | + | + |
| Security Measures | + | + | + | + | + | + | + |
| Accessibility Infrastructure - minimal level | + | + | + | + | + | + | + |
| Educational and Rehabilitation Centers | - | + | + | + | + | - | - |

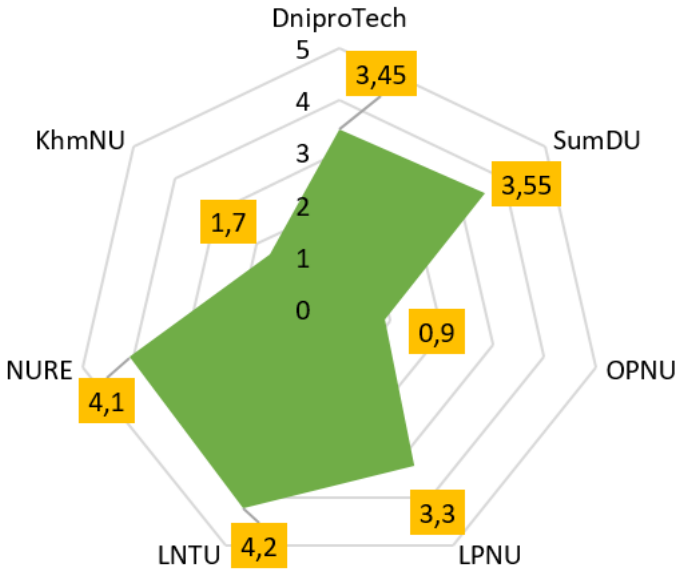


*Figure 3 Average estimates for self-analysis of 7 Universities in Part 3 Green Campus*

## Summary of strength and weaknesses on part 3 Green campus

Strengths:

- .On average, university campuses demonstrate consistent water management facilities, notably through the widespread installation of water metering devices.
- Regarding Energy and Climate change policies on campus - most universities take measures regarding the introduction of renewable sources and reduction of greenhouse emissions, however, approved documentation in 3 universities.

- The universities have implemented waste recycling programmes (SumDU, LPNU), installed special containers for sorting waste (paper, glass, plastic and mixed waste), installed special boxes for collecting used batteries in academic buildings and dormitories (SumDU, LPNU); organic waste composting sites have been set up and are operating on the territory of the Universities (SumDU). The universities refuse to use plastic packaging bags (SumDU); DniproTech students participate in Sustainable Development Weeks and Days (DniproTech). The universities are implementing joint projects with local offices aimed at combating hazardous waste (KhmNU).
- Availability of equipped bicycle parking spaces and bicycle lanes on the territory of the universities (DniproTech, SumDU, KhmNU). The universities take measures to promote the use of alternative energy sources (DniproTech), develop and use environmentally friendly charging stations for electric vehicles (DniproTech), and implement initiatives to reduce the number of private cars on campus (DniproTech, SumDU, LPNU). The universities approve environmental policies (NURE), have specially designated parking spaces on campus for people with disabilities (LNTU, LPNU).
- The universities have their own sports complexes, swimming pools, stadiums, football fields (DniproTech, SumDU, OPNU KhmNU, LNTU, NURE, LPNU), sports and recreation centres, health and sports camps (DniproTech, SumDU, OPNU, KhmNU, LNTU) for health improvement, treatment and preventive work. Some universities have their own clinics (SumDU), medical centers (NURE), health posts (LNTU, LPNU), special dietary meals are offered in the universities' sanatoriums, and the menu of university canteens includes, among other things, vegetarian dishes (OPNU). The universities have approved a policy of promoting healthy lifestyles and mental health (NURE), and some universities support a smoke-free policy and take measures to overcome tobacco addiction (NURE).
- The universities are equipped with cameras to monitor and record possible violations and intruders. The territories are fenced off from unauthorized people, and there are security checkpoints that record visitors and prevent unauthorized people from entering the HEI. Most universities have shelters on their campuses in case of air raids.
- The universities are equipped with the minimum necessary equipment for people with reduced mobility. There are ramps on the territory of HEI and rooms for hygiene procedures with special needs. A positive practice is the existence of special educational and rehabilitation centers for students with special needs, in particular at NURE, KhmNU and LPNU.
- HEIs are actively working to disseminate and engage students in environmental issues. A positive practice is the presence of green areas on the territory of universities, and involvement in the collection of secondary resources for recycling and upcycling.

Weaknesses:

- There are challenges in areas such as water reuse policy, wastewater management, and the systematic promotion of conscious water consumption practices. Measures related to water treatment and return water supply are rarely implemented across campuses. Additionally, only three universities have approved documentation addressing these water management aspects.
- Only 3 out of 7 universities have approved documentation on energy and climate change policies on their campuses.
- Low activity of some universities in the field of waste management.
- Some universities do not have a transport policy for the campus.
- Not all universities have first aid kits in their classrooms. Also, some universities do not have shelters on their premises.
- A weakness is the lack of conditions in most universities to ensure the educational process for students with visual and hearing impairments.

### Recommendations for improvements on Part 3 Green campus

- Promote cross-university collaboration to establish a platform for sharing best practices and innovative solutions across various sustainability domains. Encourage universities to work collectively on water

management, energy and climate change policies, waste management, transport policies, health infrastructure, security measures, accessibility, inclusivity, and environmental engagement initiatives.

- Encourage universities to develop and implement approved documentation addressing water management, waste management, energy and climate change policies, campus transport, health infrastructure, security, accessibility, and inclusivity. This documentation serves as a roadmap for sustainable practices and demonstrates a commitment to transparency.
- Raise awareness among the university community regarding the importance of sustainability in all aspects, including waste management, energy conservation, and health initiatives. Encourage active participation of students, faculty, and staff through green initiatives, Sustainable Development Weeks and Days, and other environmentally conscious activities. Highlight the positive impact of green areas on campus and the collection of secondary resources for recycling and upcycling.
- Advocate for regular monitoring and evaluation of sustainability initiatives on campus. Emphasize the importance of ongoing assessment to identify areas for improvement and ensure the effectiveness of implemented measures over time. Establish a culture of continuous improvement to adapt to evolving sustainability challenges and opportunities.

Water management:

- Universities should intensify efforts by enhancing water reuse policies, implementing measures for conscious water consumption, and advocating for widespread applications of water treatment and return water supply measures.
- To develop and implement approved documentation addressing water management aspects.
- Promote cooperation between universities to share best practices and innovative solutions in the areas of water management on campus.

Energy and climate change policies:

- To formalize approved documentation outlining their strategies.
- Increasing measures for the introduction of renewable sources and reducing greenhouse gas emissions across campuses.
- Promote cooperation between universities to share best practices and innovative solutions in the areas of energy and climate change policies on campus.

Waste management on campus:

- Waste management initiatives can be improved by encouraging universities to focus on. recycling programs, waste sorting containers, and composting sites for organic waste. Advocacy for adopting sustainable practices, such as refusing plastic packaging bags, is essential.
- Encourage all universities to formally document their waste management policies on campus. This will not only provide a clear roadmap for sustainable practices, but also demonstrate a commitment to transparency.
- Raising awareness of the importance of waste management on campus among the university community. Encourage active engagement and participation of students, faculty and staff in green initiatives.
- Promote cooperation between universities to share best practices and innovative solutions in the areas of waste management on campus.

Campus transport policy:

- Regarding transportation and campus infrastructure, universities should develop and implement transport policies, promote alternative transportation methods, and ensure the provision of adequate shelters and first aid kits on their premises.
- Creating conditions to ensure an inclusive educational process for students with visual and hearing impairments is also vital.
- Promote cooperation between universities to share best practices and innovative solutions in the field of campus transport policy. This collaborative approach can accelerate progress towards sustainable campuses.

Health infrastructure facilities:

- Facilitate cooperation between universities to share best practices and innovative solutions for health infrastructure facilities (medical care, sports facilities, healthy eating). This collaborative approach can accelerate progress towards sustainable campuses.

Security and safety:

- emphasize security measures such as monitoring, recording, and restricting unauthorized access.
- promoting safety measures, especially the establishment of shelters on university campuses, is imperative, particularly in regions susceptible to air raids. This proactive approach ensures the protection and well-being of the university community in the face of potential emergencies, contributing to a secure and resilient educational environment.

Accessibility and inclusivity:

- Encouraging universities to improve accessibility by ensuring necessary equipment for people with reduced mobility and installing ramps.
- The establishment of educational and rehabilitation centers for students with special needs should be promoted.

# Part 4 Green Transition Dimensions

This part of the report focuses on best practices in university management to ensure a green transition. For this purpose, the university's mission, strategic goals and policies, organizational structure, "green" approaches to staff hiring, available opportunities for personnel professional development, and implementation of best practices regarding sustainable development in the university's activities are analyzed.

### *Stated commitment to contribute to green transition as a matter of institutional identity and values*

Undoubtedly, all analyzed universities implement green transition projects and communicate this through their websites and social media pages. Also, some universities have "green" strategic goals for their activities, as stated in the relevant strategic documents. For example, DniproTech considers forming the personalities of its students through environmental education among the main tasks of an educational activity[72]. The fundamental thesis of the mission of LPNU is the university's sustainable development[73].

Successful examples exist of developing and implementing university environmental policies (NURE, LPNU, SumDU). Also, the listed universities annually publish a report on all[74] or individual Sustainable Development Goals[75].

There are also examples of universities in Ukraine that declare the goal of becoming carbon neutral by a particular year. The NURE signed the corresponding statement, defining 2035 as the target year[76].

The leadership of Ukrainian universities sets itself the task of expanding the scale of green transition of institutions shortly. In particular, the rector of the LNTU, in the course of the report on the implementation of the university's strategy in August 2023, names one of the critical tasks for the near future to clarify the directions of the university's strategic development under the Sustainable Development Goals[77].

### *Commitment to green transition by creating positions, competent committees, or by assigning responsibilities to existing personnel or governing bodies and committees*

The analysed universities cannot boast separate positions of vice-chancellors solely responsible for green transition and sustainable development. Usually, this direction is assigned to the vice-rector for administrative and economic work and infrastructural development. At the same time, specialised centres are successfully operating based on universities, which are engaged not only in research and educational activities in this direction but also help to develop and implement the environmental policy of the university: the Resource Centre for Sustainable Development (DniproTech), Viacheslav Chornovil Institute of Sustainable Development (LPNU), Scientific Center of Applied Ecological Research (SumDU), etc.

72 https://www.nmu.org.ua/ua/content/activity/us_documents/%D0%A1%D1%82%D0%B0%D1%82%D1%83%D1%82_%D0%94%D0%BD%D1%96%D0%BF%D1%80%D0%BE%D0%B2%D1%81%D1%8C%D0%BA%D0%B0%20%D0%BF%D0%BE%D0%BB%D1%96%D1%82%D0%B5%D1%85%D0%BD%D1%96%D0%BA%D0%B0_2021.pdf

73 https://lpnu.ua/en/lviv-polytechnic/strategy-internationalization-2025

74 https://env.teset.sumdu.edu.ua/zvit-pro-staly-rozvytok

75 https://nure.ua/en/conference-workshops/sustainable-development-goals-sdgs-the-objectives-of-nure-to-implement-the-sdgs

76 https://nure.ua/khnure-pryiednavsia-do-initsiatyvy-race-to-zero

77 https://lntu.edu.ua/uk/media/rektor-lntu-rozpovila-pro-khid-realizatsiyi-stratehiyi-rozvytku-universytetu

We recommend studying European universities' experience on this issue, for example, the University of Cologne or Tallinn University, which have the position of vice-rector for sustainable development.

*Published criteria for hiring, tenure, and promotion that recognize faculty members' contributions to green transition through institutional formal or informal support*

Currently, in none of the presented universities are there any requirements for the positions of scientific and pedagogical and other employees regarding their contribution to the green transition. Such a need does not exist in Ukraine at the state level. It would be appropriate to revise the procedures for competitive selection when filling vacant positions and to expand the list of personnel training programs further.

*Multidisciplinary and interdisciplinary structures for research, education, and policy development on green transition*

Based on the universities under consideration, interdisciplinary scientific centres, problem laboratories, and centres for collective use of equipment, whose activities aim to solve the problems of sustainable development and environmental sustainability, are successfully operating. Among them are the following: Centre for Joint Use of Scientific Equipment "Innovative geo-energy" (DniproTech), Student Design and Technical Bureau "Ecomonitoring" (LNTU), Research Institute of Energy-Efficient Technologies (SumDU) and many others.

*Institutional or unit-level documents clearly show that green strategies affect the planning, implementation, and realisation of operational objectives*

Energy efficiency, rational use of natural resources and other "green" topics are priorities in the scientific research of scientists at Ukrainian universities, which is confirmed by the corresponding approved plans[78]. There are good examples of developing long-term university programs to achieve sustainable development[79]. The issue of green transition in educational activity is reflected in the description of educational programs and syllabi of relevant courses.

We recommend applying a more systematic approach to developing such institutional documents, covering all areas of the university's activities.

*Integration of good practices in everyday green campus life and operational management*

Also, work on implementing the best practices of the green transition in the operational management of the university requires a systematic approach. SumDU, for example, considers the activities of each structural unit in achieving the Sustainable Development Goals when summing up the results of the ranking of faculties and departments annually (Indicator 10.8)[80]. Also successful is the practice of conducting various educational events on environmental topics[81] and on certain Sustainable Development Goals[82]. Energy-efficient technologies are being implemented on university campuses, and the number of renewable energy sources is increasing[83].

*Faculty and staff access to conferences, seminars, and lectures and continuing education on green transition issues*

78 https://lntu.edu.ua/uk/diyalnist/naukova

79 https://nure.ua/wp-content/uploads/Benchmarking/obedinennaja-programma.pdf

80 https://normative.sumdu.edu.ua/?task=getfile&tmpl=component&id=74e5b644-a2b2-e011-856b-001a4be6d04a&kind=1&version=1699685303122

81 https://lntu.edu.ua/uk/media/kolektyvom-sktb-art-fashion-studio-orhanizovano-zakhid-u-napryamu-eco-fashion-sustainable

82 https://nure.ua/konferencii-ta-workshops/seminar-cili-stalogo-rozvitku-zavdannja-hnure-shhodo-ih-realizacii/micne-zdorov-ja-i-blagopoluchchja/2023-2

83 https://nure.ua/u-khnure-rozpochavsia-etap-vprovadzhennia-zelenykh-tekhnolohij-v-osvitnij-protses

Most of the universities under review annually report dozens of conferences and seminars that were either held on campus or attended by university employees. There is a practice of improving the qualifications of personnel on the subject of sustainable development, both through third-party and in-house programs (for example, at LPNU[84], NURE[85]). Professional development program "Ecological aspects of teaching and scientific activity" was implemented in SumDU[86]. The ongoing seminar at NURE, "Sustainable Development Goals", is also successful[87]. Thus, the topic of green transition is gaining more and more popularity both among university administrations and among various categories of their employees.

### Results of Green Transition dimensions Self-assessment

Below is a chart for a comparative analysis of the universities' green transition based solely on self-assessment results.

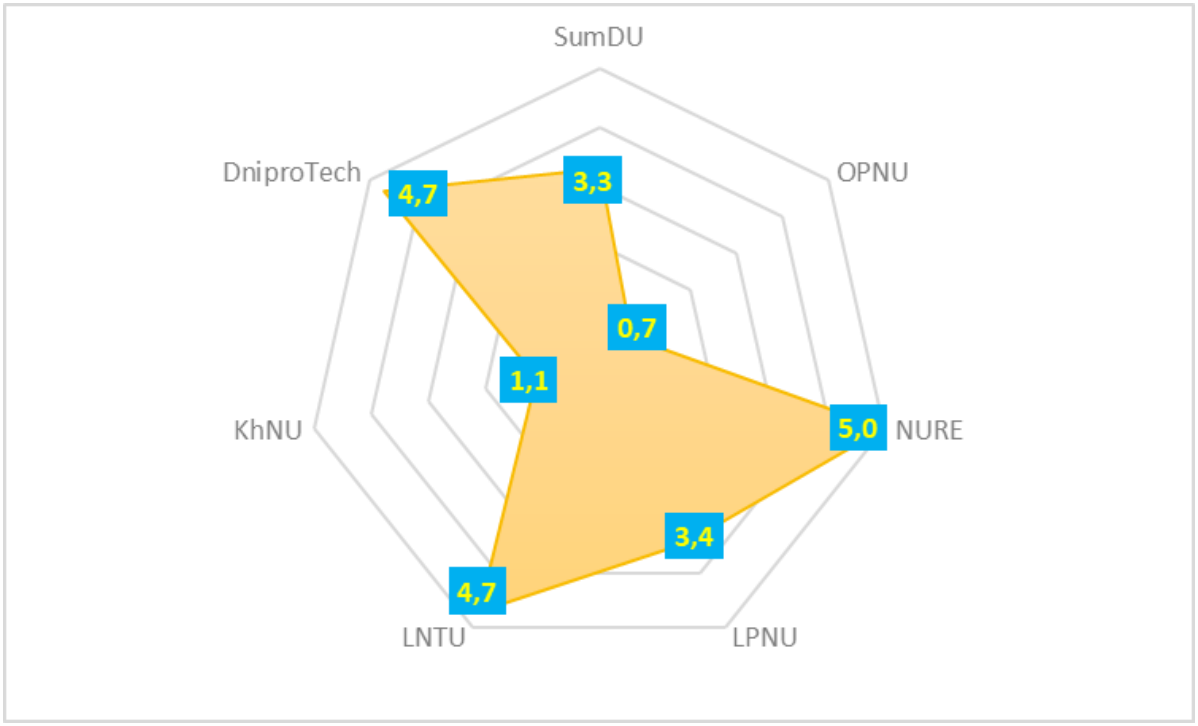


*Figure 4 Average estimates for self-analysis of 7 Universities in Part 4 Green Transition Dimensions*

The universities under analysis are currently at various stages of green transition, which is particularly proved by the relatively high positions in the international "green" rankings (UI GreenMetric, THE Impact Rankings, QS Sustainability) of some institutions (NURE, LPNU, SumDU) and the lack of such experience in others. The self-assessment scores of universities also differ significantly: according to some positions, universities with high success in green transition rate themselves quite modestly (1-3 points out of a possible 5). That means, first of all, the readiness of these universities for further green transition and achievement of the Sustainable Development Goals.

84 https://lpnu.ua/news/ekovykhovannia-politekhnikiv-predstavnyky-dyrektsii-instytutiv-proishly-treninh-iz-sortuvannia

85 https://nure.ua/en/conference-workshops/sustainable-development-goals-sdgs-the-objectives-of-nure-to-implement-the-sdgs/certification-of-specialists

86 https://crkp.sumdu.edu.ua/images/Profil_ecologia_2022.pdf

87 https://nure.ua/konferencii-ta-workshops/seminar-cili-stalogo-rozvitku-zavdannja-hnure-shhodo-ih-realizacii/postijno-dijuchij-seminar-cili-stalogo-rozvitku