Guideline

UI GreenMetric
World University
Rankings 2018

"Universities, Impacts, and Sustainable Development Goals (SDGs)"

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1. What is UI GreenMetric World University Rankings?

Universitas Indonesia (UI) initiated a world university rankings in 2010, later known as UI GreenMetric World University Rankings, to measure campus sustainability efforts. It was intended to create an online survey to portray sustainability policies programs and in universities around the world.

We based the rankings broadly on the conceptual framework of Environment, Economy, and Equity. The ranking indicators and categories are intended to be relevant to all. We have designed the indicators and weightings to be as free of bias as possible. The work of collecting and submitting data is relatively straightforward and requires reasonable staff time. Ninety five universities from 35 countries took part in the 2010 version of Green Metric: 18 from the Americas, 35 from Europe, 40 from Asia and 2 from Australia. In 2017 the ranking ranked 619 universities from 76 countries around the world. This shows that UI GreenMetric has been recognized as the first and only world university rankings on sustainability.

Our theme this year is "Universities, Impacts and Sustainable Development Goals (SDGs)". We would like to focus on universities' effort to work together with their partners in sustainable issues. We look into details of universities' effort and impacts to improve campus sustainability and Sustainability Development Goals.

2. What are the objectives?

The rankings aim to:
- Contribute to academic discourses on sustainability in education and the greening of campuses;
- Promote university-led social change with regard to sustainability goals.
- be a tool for self-assessment on campus sustainability for higher education institutions (HEIs) around the globe.
- Inform governments, international and local environmental agencies, and the society about sustainability programs on campus.

3. Who can participate?

All universities in the world with strong commitment to sustainability issues can participate in the annual UI GreenMetric World University Rankings.

4. What are the benefits?

Universities participate in UI GreenMetric by submitting their data to be included in the ranking can expect to enjoy a number of benefits, they are: internationalization and recognition, awareness rising of sustainability issues, social change and action, and networking. Register is free of charge.

a. Internationalization and recognition
Participation in UI GreenMetric can help the university's efforts in internationalization and recognition by getting its sustainability efforts on the global map. Participation in UI GreenMetric can result in an increase of hits to the university website, more mentions of the institution connected with the issue of sustainability on web pages, and more correspondence with institutions interested in your university.

b. Increasing awareness of sustainability issues

Participation can help to raise awareness in the university and beyond about the importance of sustainability issues. The world faces unprecedented global challenges such as population trends, global warming, over exploitation of natural resources, oil-dependent energy, water and food shortages and sustainability. We realize that higher education has a crucial role to play in addressing these challenges. UI GreenMetric leverages the crucial role that HEIs can play in raising awareness by doing assessment and comparing efforts in education for sustainable development, sustainability research, campus greening, and social outreach.

c. Social change and action

UI GreenMetric is primarily about awareness raising, but in the future it will be adapted to encourage real change. Understanding needs to shift to action, going to address emerging global challenges, is crucial.

d. Networking

All participants of UI GreenMetric are automatically members of UI GreenMetric World University Rankings Network (UIGWURN). In this network, participants can share their best practices in sustainability program(s) as well as networking with other participants worldwide by attending the annual UI GreenMetric International Workshop and regional/national workshops hosted by approved host universities. Participants can also arrange technical workshops on UI GreenMetric at their respective universities.

As a platform to turn sustainability issues into action, the network is managed by UI GreenMetric as the secretariat. Programs and directions are proposed and decided by the steering committee comprising the UI GreenMetric secretariat, regional, and national coordinators.

Currently, the network comprises 619 participating universities located in the dynamic and diverse Asia, Europe, Africa, Australia, America and Oceania, 1,693,974 faculty members, 21,499,456 students, with more than US$ 9,906,897,311.27 total research funds on environment and sustainability.

5. How can universities participate?

To participate in the ranking is simple. The sustainability director or other person in charge can visit www.greenmetric.ui.ac.id to learn about the ranking and if interested can e-mail the UI GreenMetric secretariat (greenmetric@ui.ac.id) to get an invitation letter and access to the system. If you have already participated in the rankings, we will send you an invitation to participate. If you decide not to participate due to particular reasons, we would appreciate if you inform us. Of course, you can join our survey again in the future. It is always useful if your university appoints a person in charge as a contact person. You are welcome to contact us for any inquiries regarding the survey.

6. How was UI GreenMetric World University Ranking developed?

The decision to establish UI GreenMetric was influenced by a number of factors:

a. *Idealism*

Future challenges to civilization include population pressure, climate change, energy security, environmental degradation, water and food security and sustainable development. Despite many scientific researches and public discussions, governments around the world have yet to commit to a sustainable agenda. Concerned

people at Universitas Indonesia perceive that universities have a privilege to help develop a consensus on key areas for action. This includes such concepts as the Triple Bottom Line, the 3 Es: Equity, Economy, Environment, Green Building, and Education for Sustainable Development (ESD).

UI GreenMetric World University Rankings serves as a tool for universities to deal with sustainability challenges our world is facing. Universities can work together to reduce negative environmental impacts. UI GreenMetric is a non-profit institution; therefore, many universities can participate for free.

b. *UI GreenMetric World University Rankings model*

Although UI GreenMetric was not based on any existing ranking system, it was developed with an awareness of a number of existing sustainability assessment systems and academic university rankings. Sustainability systems that were referred to during the design phase of UI GreenMetric included the Holcim Sustainability Awards, GREENSHIP (the rating system recently developed by the Green Building Council of Indonesia which itself was based on the Leadership in Energy and Environmental Design (LEED) system used in the U.S. and elsewhere), the Sustainability, Tracking, Assessment and Rating System (STARS) and the College Sustainability Report Card (also known as the Green Report Card).

In general, the instrument adopts environmental sustainability concept that has three elements, i.e. environmental, economic, and social (Figure 1). The environmental aspect includes natural resource use, environmental management, and pollution prevention, whereas the economic aspect includes profit and cost saving. The social aspect includes education, community, and social involvement. These three aspects are captured in the UI GreenMetric criteria.
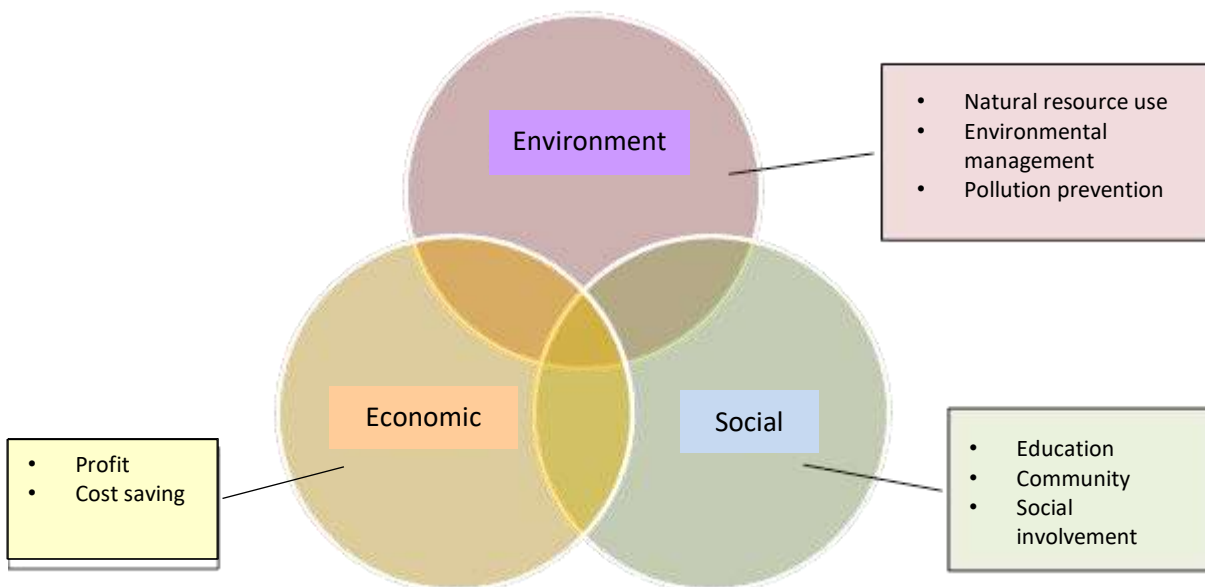
In addition, university academic ranking systems that were studied during the design phase of UI GreenMetric included: the *Times Higher Education World University Rankings* (THE) sponsored by Thompson Reuters, the *QS World University Rankings*, the *Academic Ranking of World Universities* (ARWU) published by Shanghai Jiao Tong University (SJTU), and the *Webometrics Ranking of World Universities* (Webometrics), published by

Cybermetrics Lab, CINDOC-CSIC in Spain. UI has been one of the members of International Ranking Expert Group (IREG) Observatory since 2011.

During the early stages of the design of UI GreenMetric we sought assistance on the issues from experts in both ranking and in sustainability. These included the holding of a conference on university ranking and video conferences as well as expert meetings on sustainability and green building. The latest expert workshop on UI GreenMetric was held on 9 April 2018, in which rectors and representatives from the following universities shared their experiences, i.e Universitas Diponegoro - Indonesia, Universidade do Minho – Portugal, University of Sao Paulo (USP) - Brazil, Universiti Putra Malaysia – Malaysia, North Carolina Agricultural & Technical State University – USA, Universiti Teknologi Malaysia (UTM) – Malaysia, Minin University – Russia, Chaoyang University of Technology – Taiwan, University of Bologna – Italy, University of Bahrain – Bahrain, Siam University – Thailand, Institut Teknologi Sepuluh Nopember (ITS) – Indonesia, Universidade Federal de Lavras – Brazil, National Chi Nan University – Taiwan, Bogor Agricultural University – Indonesia, Universitas Negeri Semarang – Indonesia, University of Limerick – Ireland, Universitas Padjadjaran – Indonesia, Universitas Sebelas Maret - Indonesia, Shandong Normal University - Lishan College – China, University of Kashan - Iran, Chulalongkorn University - Thailand, University of Szeged – Hungary, Universiti Malaysia Sabah – Malaysia, University of Milano-Bicocca – Italy, Ton Duc Thang University – Vietnam, Universidad Autonoma de Occidente – Colombia, Ozyegin University – Turkey, Pontificia Universidad Javeriana – Colombia, National University of Colombia – Colombia, National Pingtung University of Science and Technology – Taiwan, Tra Vinh University – Vietnam, Dublin City University – Ireland, University of Malaya – Malaysia, Peoples' Friendship University of Russia (RUDN) – Russia, Universiti Tun Hussein Onn Malaysia – Malaysia, Riga Technical University – Latvia, and University of Zanjan – Iran

In 2010, 23 indicators were used within the five categories to calculate the ranking scores. In 2011, 34 indicators were used. Then in 2012 we removed the indicator of "smoke free and drug free campus environment" and used 33 indicators to evaluate the green campus. In 2012, we also categorized the indicators into 6 categories including the education criteria. One change being considered is the formation of a new category for sustainability education and research. In 2015, the theme was carbon footprint. We add two questions related to this issue in the energy and climate change section. We also improved our methodology by adding a few sub-indicators that is related to water and transportation in the 2015 ranking. A major change in methodology was done in 2017 by considering new trends in sustainability issues. In 2018, the theme is Universities, Impacts, and Sustainable Development Goals (SDGs). We add detailed answer option on total area on campus covered in forest, planted vegetation, water absorption besides forest and planted vegetation, Energy efficient appliances usage, Smart Building implementation, Ratio of renewable energy produce/production towards total energy usage per year, Elements of green building implementation, Greenhouse gas emission reduction program, all of waste and water criteria, Ratio of parking area to total campus area, Transportation initiatives to decrease private vehicles on campus, Transportation program designed to limit or decrease the parking area on campus, Shuttle services, Zero Emission Vehicles and pedestrian policy on campus, and the Existence of a university-run sustainability website. We also add a new question on Education Criteria, i.e Existence of published sustainability report. We change the question of bicycle into Zero Emission Vehicles by considering the green transportation related the University in the worldwide. Therefore in 2018 there are 39 indicators within the 6 categories.

c. *Realities and challenges*

The goal of creating a world university sustainability ranking was done with an understanding that the diversity of types of universities, their missions and their contexts would pose problems for the methodology. In particular, we are fully aware of the fact that universities differ with regard to their levels of awareness and commitment to sustainability, their budgets, the amount of green cover on their campuses and many other dimensions. These issues are complex, but UI GreenMetric is committed to continually improving the ranking so that it will be both useful and fair for all.

7. Who is the team?

UI GreenMetric World University Rankings is managed by a team under the Rector of Universitas Indonesia. The team members come from different academic backgrounds and experiences, such as Environmental Sciences, Engineering, Architecture and Urban Design, Computer Engineering, Dentistry, Public Health, Statistics, Chemistry, Physics, Linguistics and Cultural Studies.

8. What is the methodology?

a. The criteria

This year's categories and weighting of points are shown as follows.

Table 1 Categories used in the ranking and their weighting

No	Category	Percentage of Total Points (%)
1	Setting and Infrastructure (SI)	15
2	Energy and Climate Change (EC)	21
3	Waste (WS)	18
4	Water (WR)	10
5	Transportation (TR)	18
6	Education (ED)	18
	TOTAL	**100**

The specific indicators and their points awarded are shown in Table 2. Each indicator has been uniquely identified by a category code and a number (e.g. SI 5).

Table 2 Indicators and categories suggested for use in the 2016 ranking

No	Categories and Indicators	Points	Weighting
1	**Setting and Infrastructure (SI)**		**15%**
SI 1	The ratio of open space area towards total area	300	
SI 2	Area on campus covered in forest	300	
SI 3	Area on campus covered in planted vegetation	300	
SI 4	Area on campus for water absorbance	200	
SI 5	The ratio of open space area divided campus population	200	
SI 6	University budget for sustainability effort	200	
	Total	1500	
	Energy and Climate Change (EC)		**21%**
EC 1	Energy efficient appliances usage	200	

No	Categories and Indicators	Points	Weighting
EC 2	Smart building program implementation	300	
EC 3	Number of renewable energy source in campus	300	
EC 4	The total electricity usage divided by total campus population	300	
EC 5	The ratio of renewable energy production towards total energy usage per year	200	
EC 6	Element of green building implementation	300	
EC 7	Greenhouse gas emission reduction program	200	
EC 8	The ratio of total carbon footprint divided campus population	300	
	Total	2100	
	Waste (WS)		**18%**
WS 1	Recycling program for university waste	300	
WS 2	Program to reduce the use of paper and plastic in campus	300	
WS 3	Organic waste treatment	300	
WS 4	Inorganic waste treatment	300	
WS 5	Toxic waste treatment	300	
WS 6	Sewerage disposal	300	
	Total	1800	
	Water (WR)		**10%**
WR 1	Water conservation program implementation	300	
WR 2	Water recycling program implementation	300	
WR 3	The use of water efficient appliances	200	
WR 4	Treated water consumed	200	
	Total	1000	
	Transportation (TR)		**18%**
TR 1	The ratio of total vehicles (cars and motorcycles) divided by total campus population	200	
TR 2	Shuttle services	200	
TR 3	Zero Emission Vehicles (ZEV) policy on campus	200	
TR 4	The ratio of Zero Emission Vehicles (ZEV) divided by total campus population	200	
TR 5	Ratio of parking area to total campus area	200	
TR 6	Transportation program designed to limit or decrease the parking area on campus for the last 3 years (from 2015 to 2017)	200	
TR 7	Number of transportation initiatives to decrease private vehicles on campus	300	
TR 8	Pedestrian policy on campus	300	
	Total	1800	
6	**Education and Research (ED)**		**18%**
ED 1	The ratio of sustainability courses towards total courses/subjects	300	

No	Categories and Indicators	Points	Weighting
ED 2	The ratio of sustainability research funding towards total research funding	300	
ED 3	Sustainability publications	300	
ED 4	Sustainability events	300	
ED 5	Sustainability student organizations	300	
ED 6	Sustainability website	200	
ED 7	Sustainability report	100	
	Total	**1800**	

b. Scoring

Scoring for each item will be numeric so that our data can be processed statistically. Scores will be simple counts of things, or responses on a scale of some sort. Details of the scoring can be found in **Appendix 1**.

c. The weighting of criteria

Each of the criteria will be categorized in a general class of information and when the results are processed the results, the raw scores will be weighted to give a final calculation.

d. Refining and improving the research instrument

While we have put every effort into the design and implementation of the questionnaire, we realize that this third year-round is bound to have shortcomings. Therefore, we will be reviewing the criteria and the weightings continuously to accommodate input from participants and state of the art developments in the field. We welcome your comments and input.

e. Data submission

Data from the universities should be submitted through an online system between 18 May – 15 October 2018.
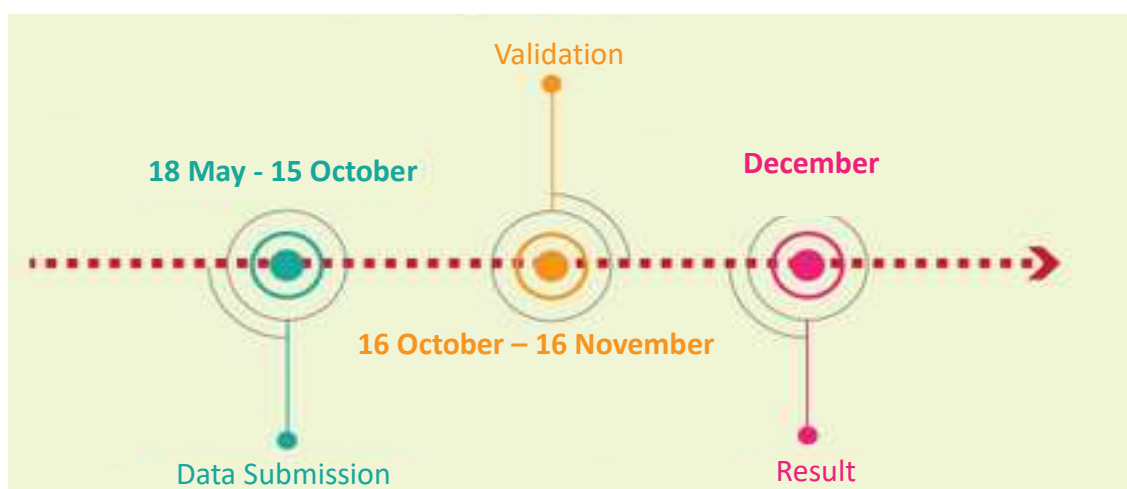
You could also email us some reports such as University Sustainability Tracking, Assessment and Rating System (STARS) report, if you have one. We welcome any e-mail or hardcopy of your university sustainability evaluation and report as well as evidence on sustainability activities in your university.

f. Results

The preliminary results of the metrics are expected to be submitted in October 2018, and the final complete result will be released in early December 2018.

UI GREENMETRIC PARTICIPANTS

■ Universities ■ Country

Year	Universities	Country
2010	95	35
2011	178	42
2012	215	49
2013	301	61
2014	360	62
2015	407	65
2016	515	75
2017	619	76
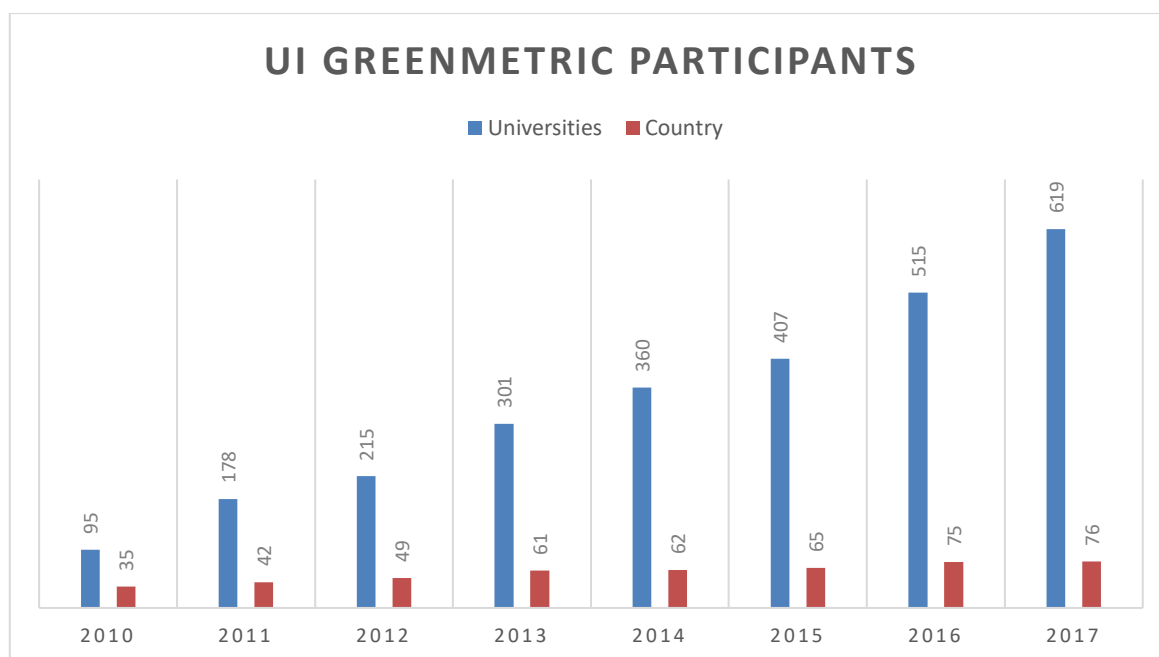
The basic ranking results (overall rankings 2017, rankings by campus setting, rankings by country, and rankings by region) and the detailed scores can be accessed via: http://greenmetric.ui.ac.id/ranking-archive-2017/

9. Who are our networks?

This idealism surrounding awareness of sustainability issues is now generating a network of likeminded organizations. UI is a member of the International Ranking Experts Group (IREG) and a signatory to UN Commitments such as that on Sustainable Practices of Higher Education Institutions for the Rio 2012 Conference on Sustainable Development. We have also presented our progress at the International Sustainable Campus Network (ISCN) – GULF-WEF Symposium 2012, together with other Data Monitoring and Evaluation of Sustainability in Higher Education Report such as the College Sustainability Green Report Card and GRI. UI GreenMetric has also been presented at the Quality Education Conference in Universidad Autónoma de Nuevo Leon, Mexico, on October 2013 and the Sustainability, University Ranking Conference at the Università Ca' Foscari Venezia, Italy, in November 2013. Various articles, magazines, journal papers, university and institution web pages cited and referred to UI GreenMetric evaluation and results. In 2014,

III Asian Universities Forum organized by Al-Farabi Kazakh National University, in Astana & Almaty, endorsed UI GreenMetric to be used as a tool to evaluate university sustainability achievement.

10. What are the future plans?

A new version of UI GreenMetric should be developed to take into consideration how to better achieve its own goals, how to learn from constructive criticism about rankings and the advancement of ESD, and how to learn from the diverse experience of participants with different goals and in different settings. Among the ideas under consideration for possible future innovations in the ranking are:

- Better university profiling: universities create a profile based on their unique missions, objectives, typological features and contexts.
- Category focused results: scores are provided not just as a single aggregate but separately for the main ranking categories and indicators.

11. How to contact us?

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Questionnaire (Criteria and Indicators)

There are six main categories in the questionnaire which consist of setting and infrastructure (SI), energy and climate change (EC), waste (WS), water (WR), transportation (TR) and education (ED). These categories are divided into several sections and the detailed explanations of the questions are as follow:

1. **Setting and Infrastructure (SI)**
   The campus setting and infrastructure information will provide the basic information of the university consideration towards green environment. This indicator also shows whether the campus deserves to be called a Green Campus. The aim is to trigger the participating universities to provide more spaces for greenery and to safe guard the environment, as well as development of sustainable energy.

   1.1. Types of higher education institutions
   Please select one of the following options:
   [1]   Comprehensive
   [2]   Specialized higher education institution

   1.2. Climate
   Please select one of the following options that clearly describes the climate in your region:
   [1]   Tropical wet
   [2]   Tropical wet and dry
   [3]   Semiarid
   [4]   Arid
   [5]   Mediterranean
   [6]   Humid subtropical
   [7]   Marine west coast
   [8]   Humid continental
   [9]   Subarctic

   1.3. Number of campus sites
   Please state the number of separate locations in which your university runs academic purposes. For example, if your university has some campuses in different districts, towns or cities which are separated from the main campus, please state the total number of university locations.
   To answer questions below please note that if you have more than one campus sites, please select an option that best describes the main campus.
   Evidence is required

   1.4. Main Campus Setting
   Please select one of the following options:
   [1]   Rural
   [2]   Suburban
   [3]   Urban
   [4]   In city center
   [5]   High rise building area
   Evidence is required.

1.5. Total main campus area (m²)

Please state the total areas of your main campus(es) (in square meters). It is expected that the total area counted are only those in which academic activities are conducted (Administration building, rectorate, student and staff activity building). Forest and fields and other areas can only be counted if they are used for academic purposes.
Evidence is required.

1.6. Total main campus ground floor area of buildings (m²)

Please provide information of the area occupied by buildings, by providing the total area of the ground floor part of your university buildings in your main campus.

1.7. Total main campus buildings area (m²)

Please provide information of the area occupied by buildings, by providing the total floor area (all floors) including ground floor and other floors of your university buildings in your main campus.

1.8. The ratio of open space area towards total area (SI.1)

Please provide percentage of open space area on campus.
Formula: ((1.5-1.6/1.5)*100%)
Please select one of the following options:
[1] < 1%
[2] 1% - 70%
[3] > 70% - 85%
[4] > 85% - 92%
[5] > 92%

1.9. Total area on campus covered in forest vegetation. (SI.2)

Please provide the percentage of area on campus covered in vegetation in the form of forest (an area covered mainly with big-trees and its biodiversity; a large number or dense mass of vertical, and undergrowth for conservation purposes), owned by the university, to the total campus area.
Please select one of the following options:
[1] < 1%   (provide total area in meter square)
[2] 1 - 2%   (provide total area in meter square)
[3] > 2 - 9%   (provide total area in meter square)
[4] > 9 - 22%   (provide total area in meter square)
[5] > 22%   (provide total area in meter square)
Evidence is required

1.10. Total area on campus covered in planted vegetation. (SI.3)

Please provide the percentage of the area on campus covered in planted vegetation **excluding** forest (including lawns, gardens, green roofs, internal planting, vertical garden can be counted; for vegetation purposes) to the total campus area.
Please select one of the following options:
[1] < 1%   (provide total area in meter square)

[2] 1% - 9%   (provide total area in meter square)
[3] > 9% - 19%   (provide total area in meter square)
[4] > 19% - 34%   (provide total area in meter square)
[5] > 34%   (provide total area in meter square)

1.11. Total area on campus for water absorption besides forest and planted vegetation (SI.4)

Please provide the percentage of surfaces (eg. earth, grass, concrete block, etc.) on your campus for water absorption as a percentage to the total site area. A larger water absorption area is desirable.
Please select one of the following options:
[1] < 1%   (provide total area in meter square)
[2] 1% - 2%   (provide total area in meter square)
[3] > 2% - 14%   (provide total area in meter square)
[4] > 14% - 29%   (provide total area in meter square)
[5] > 29%   (provide total area in meter square)

1.12. Total Number of Regular Students

The total number of registered students (full time and part time) at your university. If your university has calculated the Effective Full Time Students (EFTS) number, please submit this number.
Regular student is defined as registered and active student at one semester, not include foreign exchange student (summer course).

1.13. Total Number of Online Students

The total number of students registered as online students only, at your university.

1.14. Total Number of academic and administrative staff

Please state the total number of academic staff (lecturers, professors, and researchers) and administrative staff working in your university.

1.15.   The total open space area divided by total campus population. (SI.5)

Please provide the total open space area per campus population.
Formula: ((1.5-1.6)/(1.12+1.14))
Please select one of the following options:
[1] < 1 m^2
[2] 1 – 3 m^2
[3] > 3 - 27 m^2
[4] > 27 – 83 m^2
[5] > 83 m^2

1.16. Total University budget (in US Dollars)

Please provide the average of university budget per annum over the last 3 years in US Dollars.

1.17. University budget for sustainability effort (in US Dollars)

Please provide the average of university budget for Infrastructure, facilities, personnel cost, and others related to the sustainability effort per annum over the last 3 years in US Dollars.

1.18. Percentage of University budget for sustainability effort within a year (SI.6)

Please provide the percentage calculation of sustainability budget (Infrastructure, facilities, personnel cost, and others related to the sustainability effort) to the total university budget.

Please select one of the following options:

[1] < 1%

[2] 1% - 3%

[3] > 3% - 5%

[4] > 5% - 10%

[5] > 10%

2. **Energy and Climate Change (EC)**

    The university's attention to the use of energy and climate change issues is the indicator with the highest weighting in this ranking. In our questionnaire we define several indicators for this particular area of concern, i.e. energy efficient appliances usage, the implementation of smart buildings/automation buildings/intelligent buildings, renewable energy usage policy, total electricity use, energy conservation programs, elements of green buildings, climate change adaptation and mitigation programs, greenhouse gas emission reductions policy and carbon footprint. Within these indicators, the university is expected to increase their efforts in energy efficiency in their buildings and to care more about nature and energy resources.

2.1. Energy efficient appliances usage (EC.1)

Energy efficient appliances usage includes the use of energy efficient appliances/lighting fixtures (e.g. the use of energy star-rating for electronic devices, LED light bulbs, etc). For example, the percentage of LED lamp used in the total building area.

Please select one of the following options:

[1] < 1%

[2] 1% - 25%

[3] > 25% - 50%

[4] > 50% - 75%

[5] > 75%

Evidence is required.

2.2. Total main campus smart building area (m²)

Please provide the information of the total area (including ground floor and other floors) of your university smart buildings in your main campus.. A smart building should be equipped with energy efficient tools. Smart building achievement is a measurement of useful building services which make occupants productive (e.g. illumination, low-power lighting, thermal comfort, air quality, physical security, presence sensors, video surveillance, sanitation, etc.). Smart buildings should be established to generate beneficial environmental impact over the building lifecycle.

2.3. Smart Building implementation (EC.2)

Please provide the stage of smart building implementation in your university (percentage of the total floor area of smart building to the total all floors building area (smart and non-smart buildings area)). Smart Buildings are buildings which integrate and account for intelligence, enterprise, control, and materials and construction as an entire building system, with adaptability, not reactivity, at the core, in order to meet the drivers for building progression: energy and efficiency, longevity, and comfort and satisfaction (Buckman at all, 2014).

Please select one of the following options:

[1] < 1%
[2] 1% - 25%
[3] > 25% - 50%
[4] > 50% - 75%
[5] > 75%

Evidence is required.

2.4. Number of renewable energy sources in campus (EC.3)

Please select the number of alternative energy sources used in your campus:

[1] 0
[2] 1 source
[3] 2 sources
[4] 3 sources
[5] > 3 sources

2.5. Please specify renewable energy sources in campus and provide capacity produced in kilo watt hour

Please select one or more of the following alternative energy sources used in your campus and please provide the capacity of the energy produced in Kilo Watt hour:

[1] Not applicable
[2] Bio Diesel   (provide capacity in Kilo Watt hour)
[3] Clean Biomass   (provide capacity in Kilo Watt hour)
[4] Solar Power   (provide capacity in Kilo Watt hour)
[5] Geothermal   (provide capacity in Kilo Watt hour)
[6] Wind Power   (provide capacity in Kilo Watt hour)
[7] Hydropower   (provide capacity in Kilo Watt hour)
[8] Combine Heat and Power   (provide capacity in Kilo Watt hour)

Evidence is required.

2.6. Electricity usage per year (in kilo watt hour)

Please provide the total energy used in the last 12 months in your entire university (in Kilo Watt Hour or Kwh) for all purposes such as lighting, heating, cooling, running university laboratories, etc.
Evidence is required.

2.7. The total electricity usage divided by total campus population (kWh per person) (EC.4)

Please provide the total electricity usage divided by total campus population.

Formula: (2.6)/(1.12+1.14)

[1] > 2424 kWh
[2] > 1535 - 2424 kWh
[3] > 633 - 1535 kWh
[4] 279 - 633 kWh
[5] < 279 kWh

2.8. Ratio of renewable energy production divided by total energy usage per year (EC.5)

Please provide the ratio of renewable energy production divided by total energy usage per year.

Please select one of the following options:

[1] < 1%
[2] 1% - 25%
[3] > 25% - 50%
[4] > 50% - 75%
[5] > 75%

2.9. Elements of green building implementation as reflected in all construction and renovation policies (EC.6)

Please provide information on the elements of green building implementation as reflected in the construction and renovation policies in your university (e.g. natural ventilation, full natural day-lighting, existence of building energy manager, and existence of Green Building, etc.).

Please select one or more that apply from the following list:

[1] None. Please select this option if there is no green building implementation in your university.
[2] 1 element.
[3] 2 elements.
[4] 3 elements.
[5] > 3 elements.

Evidence is required.

2.10. Greenhouse gas emission reduction program (EC.7)

Please select a condition which reflects the current condition of your university in providing formal programs (from any source) to reduce greenhouse gas emissions.

Please select from the following options:

[1] None. Please select this option if reduction program is needed, but nothing has been done

[2] Program in preparation (e.g. feasibility study and promotion)

[3] Program(s) aims to reduce one out of three sources emissions (Scope 1 or 2 or 3)

[4] Program(s) aims to reduce two out of three sources emissions (Scope 1 and 2 or Scope 1 and 3 or Scope 2 and 3)

[5] Program(s) aims to reduce all three sources emissions (Scope 1, 2 and 3)

Table 3. List of greenhouse gas emission sources (Woo, Jeongho., et al, 2013)

	Emission data	Definition
Scope 1	Stationary combustion	Stationary combustion refers to the burning of fuels to produce electricity, steam and heat in a fixed location such as boilers, burners, heaters, kilns, and engines.
	Mobile combustion	Burning of fuels by institution-owned transportation devices.
	Process emissions	Direct greenhouse gas (GHG) emissions from physical or chemical processes rather than from fuel combustion.
	Fugitive emissions	Hydrofluorocarbon releases during the use of refrigeration and air conditioning equipment and methane leakage from natural gas transport.
Scope 2	Purchased electricity	Indirect GHG emissions resulting from the generation of electricity purchased and used by institution
Scope 3	Waste	Indirect GHG emissions resulting from the incineration or landfill of institution's solid waste
	Purchased water	Indirect GHG emissions resulting from the generation of water supply purchased and used by institution.
	Commuting	Indirect GHG emissions resulting from regular commuting to and from institutions by students and employees
	Air travel	Indirect GHG emissions resulting from air travels paid by institutions.

2.11. Please provide total carbon footprint (CO_2 emission in the last 12 months, in metric tons)

Please provide the total carbon footprint of your university. Please exclude carbon footprint from flights and secondary carbon sources such as dishes and clothes. You can use the carbon footprint calculator from www.carbonfootprint.com as the standard for carbon footprint calculation, please visit the website to see elements of carbon footprint that you can count.

Evidence is required.

For an example of how to calculate your university carbon footprint please refer to the **Appendix 2**.

2.12. The total carbon footprint divided by total campus population (metric ton per person) (EC.8)

Please provide the ratio of total carbon footprint divided by total campus population.

Formula: (2.11)/(1.12+1.14)

Please select one of the following options:

[1]   > 2.05 metric ton

[2]   > 1.11 – 2.05 metric ton

[3]   > 0.42 – 1.11 metric ton

[4]   0.10 – 0.42 metric ton

[5]   < 0.10 metric ton

3. **Waste (WS)**

Waste treatment and recycling activities are major factors in creating a sustainable environment. The activities of university staff and students on campus will produce a lot of waste; therefore, some recycling and waste treatments programs should be among the concern of the university, i.e. recycling program, toxic waste recycling, organic waste treatment, inorganic waste treatment, sewerage disposal, policies to reduce the use of paper and plastic on campus.

3.1. Recycling program for university waste (WS.1)

Please select a condition which reflects the current condition of your university efforts to encourage staff and students to recycle waste, from the following options:

[1] Not applicable

[2] Partial (1% - 25% of waste)

[3] Partial (>25% - 50% of waste)

[4] Partial (>50% - 75% of waste)

[5] Extensive (> 75% of waste)

Evidence is required.

3.2. Program to reduce the use of paper and plastic in campus (WS.2)

Please select one or more which best reflects the current condition of your university in establishing formal policy to reduce the use of paper and plastic (e. g Double sided-printing policy program, the use of tumbler, the use of reusable bag, print when necessary, free water distribution, policies for dematerialization of administrative procedures, etc.) from the following options:

[1] Not applicable. Please select this option if there is no program in your university.

[2] 1 program

[3] 2 programs

[4] 3 programs

[5] More than 3 programs

Evidence is required.

3.3. Organic waste treatment (WS.3)

The method of organic waste (e.g. garbage, discarded vegetable and plant matter) treatment in your university.

Please select an option that best describes your university's overall treatment of the bulk of organic waste:

[1] Open dumping

[2] Partial (1% - 25% treated)

[3] Partial (> 25% - 50% treated)

[4] Partial (> 50% - 75% treated)

[5] Extensive (> 75% treated and recycled)

Evidence is required.

3.4. Inorganic waste treatment (WS.4)

Please describe the method of inorganic waste (e.g. rubbish, trash, discarded paper, plastic, metal, etc.) treatment in your university.

Please select an option that best describes your university's overall treatment of the bulk of the inorganic waste:

[1]   Burned in open
[2]   Partial (1% - 25% treated)
[3]   Partial (> 25% - 50% treated)
[4]   Partial (> 50% - 75% treated)
[5]   Extensive (> 75% treated and recycled)

Evidence is required.

3.5.   Toxic waste treatment (WS.5)

Please select a condition which reflects the current condition of how your university handles toxic wastes. The handling process includes whether toxic wastes are dealt separately, for example, by classifying and handling them over to a third party or certified handling companies.

Please select one of the following options:

[1]   Not managed
[2]   Partial (1% - 25% treated)
[3]   Partial (> 25% - 50% treated)
[4]   Partial (> 50% - 75% treated)
[5]   Extensive (> 75% treated and recycled)

Evidence is required

3.6.   Sewerage disposal (WS.6)

Please describe the primary method of sewerage treatment in your university.

Please select an option that best describes how the bulk of the sewerage is disposed:

[1]   Untreated into waterways
[2]   Treated conventionally
[3]   Treated technically
[4]   Treatment for down cycling
[5]   Treatment for up cycling

Evidence is required.

4.   Water (WR)

Water use in campus is another important indicator in the UI GreenMetric. The aim is to encourage universities to decrease water usage, increase conservation programs, and protect the habitats. Water conservation programs, water recycling programs, water efficient appliances usage, and treated water usage are among the criteria.

4.1.   Water conservation program implementation (WR.1)

Please select a condition describing your current stage in the program, which has a systematic and formalized program that supports a water conservation program (e.g. for lakes and lake management systems, rain harvesting systems, water tanks) in your university, from the following options:

[1]   None. Please select this option if conservation program is needed, but nothing has been done

[2]   1% - 25%. Program in preparation (e.g. Feasibility Study and promotion)

[3]   > 25% - 50%. Implemented at early stage (e.g. measurement of potential surface runoff volume)

[4]   > 50% - 75% water conserved

[5]   > 75% water conserved

Evidence is required.

4.2.   Water recycling program implementation (WR.2)

Please select a condition which reflects the current condition of your university in establishing formal policies for water recycling programs (e.g. the use of recycled water for toilet flushing, car washing, watering plants, etc).

Please select an option that describes the current stage of your program:

[1]   None. Please select this option if water recycling program is needed, but nothing has been done

[2]   1% - 25%. Program in preparation (e.g. Feasibility Study and promotion)

[3]   > 25% - 50%. Implemented at early stage (e.g. measurement of waste water)

[4]   > 50% - 75% water recycled

[5]   > 75% water recycled

Evidence is required.

4.3.   Water efficient appliance usage (WR.3)

Water efficient appliance usages are replacing conventional appliances. This also includes the use of water efficient appliances (e.g. using censored/automated hand washing taps, high efficient toilet flush, etc).

Please select one of the following options:

[1]   None. Water efficient appliance is needed, but nothing has been done

[2]   1% - 25%. Program in preparation (e.g. Feasibility Study and promotion)

[3]   > 25% - 50% of water efficient appliance installed

[4]   > 50% - 75% of water efficient appliance installed

[5]   > 75% of water efficient appliance installed

Evidence is required.

4.4.   Treated water consumed (WR.4)

Please indicate the percentage of treated water consumed from water system treatment compared to all water sources (e.g. rain water tank source, ground water, surface water, etc.) in your university. The water source can be from the treated water installation inside and/or outside your University. Please select one of the following options:

[1]   None

[2]   1% - 25% treated water consumed

[3]   > 25% - 50% treated water consumed

[4]   > 50% - 75% treated water consumed

[5]   > 75% treated water consumed

5.   Transportation (TR)

Transportation systems play an important role in the carbon emission and pollutant levels in universities. Transportation policies to limit the number of motor vehicles on campus, the use of campus buses, and bicycles will encourage a healthier environment. The pedestrian policy will encourage students and staff to walk around campus and avoid using private vehicles. The use of environmentally friendly public transportation will decrease the carbon footprint around campus.

5.1. Number of cars actively used and managed by University
Please indicate the number of cars operated in campus which is owned and managed by university (including outsourcing from private company).

5.2. Number of cars entering the university daily
Please indicate the average number of cars that enter your university daily based on a balanced sample, taking term and holiday periods in consideration.

5.3. Number of motorcycles entering the university daily
Please indicate the average number of motorcycles that enter your university daily based on a balanced sample, taking term and holiday periods in consideration.

5.4 The ratio of total vehicles (cars and motorcycles) divided by total campus population (TR.1)
Please provide the ratio of total vehicles divided by total campus population.
Formula: (5.1+5.2+5.3)/(1.12+1.14)
Please select one of the following options:
[1] >=1 (one vehicle serves for one person)
[2] >=0.5 to < 1 (one vehicle serves for two people)
[3] >=0.125 to 0.5 (one vehicle serves for three to eight people)
[4] >=0.045 to < 0.125 (one vehicle serves for nine to twenty-two people)
[5] < 0.045 (one vehicle serves for more than twenty-two people)

5.5. Shuttle service (TR.2)
Please describe the condition of the availability of shuttles for journeys within the campus and whether the ride is free or charged.
Please select an option from the following options:
[1] Shuttle service is possible but not provided by University
[2] Shuttle service is available and the University contributes some parts of its costs.
    For examples the shuttle service is provided by other parties, and University contributes for the ticket fee.
[3] Shuttle service is provided by University and regular but not free
[4] Shuttle service is provided by University, regular, and free
[5] Shuttle service is provided by University, regular, free, and zero emission. Or shuttle use is not possible (not applicable)
Evidence is required.

5.6. Number of shuttles operated in your university

Please indicate the number of campus shuttles operating in your university. The campus shuttle can be in the form of buses, MPV cars or mini vans which are operated inside the campus.

5.7.   Average number of passengers of each shuttle

Please indicate the average number of passengers of each shuttle on one trip. You can estimate from the seat availability of the shuttle.

5.8.   Total trips of shuttle services each day

Please indicate the total number of each shuttle service trips per day.

5.9.   Zero Emission Vehicles (ZEV) policy on campus (TR.3)

Please describe the extent to which the use of Zero Emission Vehicles (e.g. bicycles, canoe, snowboard, electric car, etc.) is supported.

Please select an option from the following list that applies to your campus:

[1]   Zero Emission Vehicles are not available

[2]   Zero Emission Vehicles use is not possible or practical

[3]   Zero Emission Vehicles are available, but not provided by university

[4]   Zero Emission Vehicles are available, and provided by university and charged

[5]   Zero Emission Vehicles are available, and provided by university for free

Evidence is required.

5.10. Average number of Zero Emission Vehicles (ZEV) on campus per day

Please indicate the average number of Zero Emission Vehicles (e.g. bicycles, canoe, snowboard, electric car, etc.) on campus daily which include both those owned by the university and privately owned.

5.11   The ratio of Zero Emission Vehicles (ZEV) divided by total campus population (TR.4)

Please provide the ratio of Zero Emission Vehicles (ZEV) divided by total campus population.

Formula: (5.10)/(1.12+1.14)

Please select one of the following options:

[1]   <= 0.002 (one vehicle serves for one person)

[2]   >0.002 to <= 0.004 (one vehicle serves for two people)

[3]   >0.004 to <=0.008 (one vehicle serves for three to eight people)

[4]   >0.008 to <=0.02 (one vehicle serves for nine to twenty-two people)

[5]   > 0.02 (one vehicle serves for more than twenty-two people)

5.12. Total parking area (m²)

Please provide the information of the total parking area in your university. You can estimate or validate this area by using google maps feature.

5.13. Ratio of parking area to total campus area (TR.5)

Please select a ratio of parking area to total campus area of your university.

Formula: ((5.12/1.5)*100%)

Please select one of the following options:

[1] > 8%

[2] > 6% - 8%

[3] > 4% - 6%

[4] 1% - 4%

[5] < 1%

Evidence is required.

5.14. Transportation program designed to limit or decrease parking area on campus over the last 3 years (from 2015 to 2017) (TR.6)

Please select a condition which reflects current university program on transportation designed to limit or decrease the parking area on campus. Please select an option that best describes your university from the following options:

[1] Not applicable

[2] Program in preparation (e.g. feasibility study and promotion)

[3] Program resulting in less than 10% decrease in parking

[4] Program resulting in between 10% - 30% decrease in parking

[5] Program resulting in more than 30% decrease in parking or parking is restricted

5.15. Number of transportation initiatives to decrease private vehicles on campus (TR.7)

Please select a condition which reflects your university's current initiatives on the availability of transportation to limit or decrease the number of private vehicles on campus (e.g. car sharing, charging high parking fees, metro/tram/bus services, bike sharing, low fare subscriptions, etc). Please select an option that best describes your university from the following:

[1] Not applicable

[2] 1 initiative

[3] 2 initiatives

[4] 3 initiatives

[5] > 3 initiatives

5.16. Pedestrian path policy on campus (TR.8)

Please describe the extent to which the use of Pedestrian path is supported.

Please select an option from the following list that applies to your campus:

[1] Pedestrian paths are not applicable

[2] Pedestrian paths are available

[3] Pedestrian paths are available, and design for safety

[4] Pedestrian paths are available, design for safety and convenient

[5] Pedestrian paths are available, design for safety, convenient, and in some part disabled-friendly features.

Evidence is required.

Note:

- **Safety:** equipped with enough lighting, separator between road for vehicle and pedestrian path, and some hand rail.
- **Convenient:** Level difference with a mild slant for walking alongside the pavement, some area covered, using soft (rubber, woods, etc.) material, availability of location information and directions
- **Disabled-friendly:** ramps and guiding blocks which have suitable design for pedestrian having physical disabilities.

5.17. Approximate daily travel distance of a vehicle inside campus only (in Kilometers)

Please provide the approximate daily travel distance of a vehicle (e.g. bus, car, motorcycle) inside campus only in kilometers.

6. Education and Research (ED)

6.1. Number of courses/subjects related to sustainability offered

The number of courses/subjects whose contents are related to sustainability offered at your university. Some universities have already tracked on how many courses/subjects available for this. The definition of the extent to which a course can be stated to be related to sustainability (environment, social, economic) or both, can be defined according to your university's situation. If a course/subject contributes in more than a minor or passing way to increasing awareness, knowledge, or action related to sustainability, then it counts. The number of courses/subjects can be counted by specifying related sustainability keywords used in the subjects. For example: environmental chemistry is the subjects for the study program of chemistry.
Evidence is required.

6.2. Total number of courses/subjects offered

The total number of all courses/ subjects provided at your university yearly. This information will be used to calculate to what extend environment and sustainability education has been defined in your university teaching and learning.
Evidence is required.

6.3. The ratio of sustainability courses divided bt total courses/subjects (ED.1)

Please select a ratio of sustainability courses divided total courses/subjects your university.
Formula: ((6.1/6.2) *100%)
Please select one of the following options:
[1]   < 1%
[2]   1% - 3%
[3]   > 3% - 8%
[4]   > 8% - 17%
[5]   > 17%

6.4. Total research funds dedicated to sustainability research (in US Dollars)

Please provide the average funding for research on sustainability per annum over the last 3 years.
Evidence is required.

6.5. Total research funds (in US Dollars)

The average total research funds per annum over the last 3 years. This information will be used to calculate the percentage of environment and sustainability research funding to the overall research funding.

Evidence is required.

6.6 The ratio of sustainability research funding divided by total research funding (ED.2)

Please select a ratio of sustainability research funding towards total research funding your university.

Formula: ((6.4/6.5)*100%)

Please select one of the following options:

[1]   < 1%

[2]   1% - 7%

[3]   > 7% - 14%

[4]   > 14% - 30%

[5]   > 30%

6.7. Number of scholarly publications on sustainability published (ED.3)

Please provide the average number of indexed publications (Google scholar) on environment and sustainability published annually over the last 3 years.

Please select one of the following options:

[1]   0

[2]   1 - 20

[3]   21 - 83

[4]   83 - 300

[5]   > 300

6.8. Number of events related to sustainability (ED.4)

Please provide the number of events (e.g. conferences, workshops, awareness raising, practical training, etc.) related to environment and sustainability <u>hosted or organized</u> by your university (average per annum over the last 3 years).

Please select one of the following options:

[1] 0

[2] 1 - 4

[3] 5 - 17

[4] 18 - 47

[5] > 47

Evidence is required.

6.9. Number of student organizations related to sustainability (ED.5)

Please provide the total number of student organizations at faculty and university level. For example, a student association on green campus in the Faculty of Humanities can be considered as an organization.

Please select one of the following options:

[1] 0

[2] 1 - 2
[3] 3 - 4
[4] 5 - 10
[5] > 10

6.10. Existence of a university-run sustainability website (ED.6)

If your university has a sustainability website, please provide the address of the web. Some detailed information of a university website to educate students and staff as well as providing information of their latest involvement on green campus, environment and sustainability programs will be very useful.
Please select the following options:
[1] Not available
[2] Website in progress or under construction
[3] Website is available and accessible
[4] Website is available, accessible, and updated occasionally
[5] Website is available, accessible, and updated regularly

6.11. Sustainability website address if available

Please provide your university sustainability link/website

6.12. Existence of a published sustainability report (ED.7)

If your university has a sustainability report. Please select the following options:
[1] Not available
[2] Sustainability report is in preparation
[3] Sustainability report is available
[4] Sustainability report is available and updated annually
[5] Sustainability report is available, accessible, and updated annually

Data submission
1. Please submit the latest yearly (annual) data that you have according to your 12 months data gathering schedule (e.g. for Questions 2.6, 2.8) unless otherwise requested. Please check questions 1.16, 1.17, 1.18, 6.3, 6.4, 6.5, 6.7, and 6.8.
2. Please notice that the scale of answer options in question number 1.6, 1.10, 1.11, 1.12, 1.15, 1.16, 2.4, 2.5, 2.8, 5.4, 5.11, 5.12, 6.3, 6.6, 6.7, 6.8, and 6.9 are determined based on 2017 data submitted by Universities.

Evidence Guideline
This is the second year we request evidence for the questionnaire. The purpose of the evidence is to support your University submission to be reviewed by our validators. For this purpose, please observe the following guidance:
1. Evidence is mandatory
2. Lack of evidence may result in your score

3. All evidence should comply with the template provided in the website link: http://greenmetric.ui.ac.id/wp-content/uploads/2015/07/UIGM_template_evidence_2018.pdf
4. Evidence should be written in English
5. The form of the evidence can be picture, graph, table, data, etc.
6. Please provide explanation in description section for the pictures submitted. Maximum file size is limited to 2 MB (.doc/.docx/.pdf) for each question

Reference

[1] A.H. Buckman M. Mayfield Stephen B.M. Beck, (2014),"What is a Smart Building?", Smart and Sustainable Built Environment, Vol. 3 Iss 2 pp. 92 – 109

[2] Woo Jeongho and Choi Kyoung-Sik, (2013), "Analysis of Potential Reductions of Greenhouse Gas Emissions on the College Campus through the Energy Saving Action Programs", Environmental Engineering Research, 18(3) : 191-197

[3] Rafael Silveira, (2015), "Recycling – Upcycling, Repurpose or Downcycling", https://tudelft.openresearch.net/page/13094/recycling-upcycling-repurpose-or-downcycling

Related Papers and Publications about UI GreenMetric

[1] Evaluating UI GreenMetric as a tool to Support Green Universities Development: Assessment of the Year 2011 Ranking by Dr. Nyoman Suwartha and Prof. Riri Fitri Sari, Journal of Cleaner Production, Volume 61, Pages 46–53 (2013)

[2] Critical review of a global campus sustainability ranking: GreenMetric by Allan Lauder, Riri Fitri Sari, Nyoman Suwartha, and Gunawan Tjahjono, Journal of Cleaner Production, Volume 108, Part A, Pages 852–863 (2015)

[3] University contributions to environmental sustainability: challenges and opportunities from the Lithuanian case by Renata Dagiliut and Genovaite Liobikien, Journal of Cleaner Production, Volume 108, Part A, Pages 891–899 (2014)

[4] Opening up the Pandora's box of sustainability league tables of universities: a Kafkaesque perspective by David R. Jones, Studies in Higher Education, Volume 40, Pages 480-503 (2015)

[5] Sustainable Universities – From Declarations on Sustainability in Higher Education to National Law by Thomas Skou Grindsted, Journal of Environmental Economics and Management, Volume 2 (2011)

[6] Moving Toward Socially and Environmentally Responsible Management Education—A Case Study of Mumbai by Ela Goyal and Mahendra Gupta, Journal Applied Environmental Education & Communication, volume 13, Pages 146-161 (2014)

[7] The comprehensiveness of competing higher education sustainability assessments by Graham Bullock and Nicholas Wilder, International Journal of Sustainability in Higher Education, Volume 17, Pages 282-304 (2016)

[8] Green Campus initiative and its impacts on quality of life of stakeholders in Green and Non-Green Campus universities by Ronnachai Tiyarattanachai and Nicholas M. Hollmann, SpringerPlus, Volume 5, no info pages (2016)

[9] Environmental management and sustainability in higher education: The case of Spanish Universities by Yolanda León-Fernández and Eugenio Domínguez-Vilches, International Journal of Sustainability in Higher Education, Volume 16, Pages 440-455 (2015)

[10] Getting an empirical hold of the sustainable university: a comparative analysis of evaluation frameworks across 12 contemporary sustainability assessment tools by Daniel Fischer, Silke Jenssen and Valentin Tappeser, Journal Assessment & Evaluation in Higher Education, Volume 40, Pages 785-800 (2015)

[11] Environmental sustainability practices in South Asian university campuses: an exploratory study on Bangladeshi universities by Asadul Hoque, Amelia Clarke, and Tunazzina Sultana, Springer Nature, Volume 19, Issue 6, pp 2163–2180 (2017)

[12] Principles, Implementation and Results of the New Assessment and Accreditation System "Engineering Education for Sustainable Industries" (QUESTE-SI) by Jurgis K. Staniškis and Eglė

Katiliūtė, Springer Nature, New Developments in Engineering Education for Sustainable Development pp 283-294 (2016)

[13] Promotion of Sustainable Development at Universities: The Adoption of Green Campus Strategies at the University of Southern Santa Catarina, Brazil by João Marcelo Pereira Ribeiro, Samuel Borges Barbosa, Jacir Leonir Casagrande, Simone Sehnem, Issa Ibrahim Berchin, Camilla Gomes da Silva, Ana Clara Medeiros da Silveira, Gabriel Alfredo Alves Zimmer, Rafael Ávila Faraco, and José Baltazar Salgueirinho Osório de Andrade Guerra, Springer Nature, Handbook of Theory and Practice of Sustainable Development in Higher Education pp 471-486 (2017)

[14] The Need to Go Beyond "Green University" Ideas to Involve the Community at Naresuan University, Thailand by Gwyntorn Satean, Springer Nature, Sustainability Through Innovation in Product Life Cycle Design pp 841-857 (2017)

[15] Environmental sustainability of universities: critical analysis of a green ranking by Marco Ragazzi and Francesca Ghidini, Elsevier, Energy Procedia, Volume 119, July 2017, Pages 111-120 (2017)

Appendix 1

Details of the scoring are described as follows:

No	Categories and Indicators	Points	Score	Weighting
1	**Setting and Infrastructure (SI)**			**15%**
	The ratio of open space area towards total area	**300**		
	< 1%		0	
	1% - 70%		0.25×300	
SI 1	> 70% - 85%		0.50×300	
	> 85% - 92%		0.75×300	
	> 92%		1.00×300	
	Area on campus covered in forest	**200**		
	< 1 %		0	
	1% - 2%		0.25×200	
SI 2	> 2% - 9%		0.50×200	
	> 9% - 22%		0.75×200	
	> 22%		1.00×200	
	Area on campus covered in planted vegetation	**300**		
	< 1%		0	
	1% - 9%		0.25×300	
SI 3	> 9% - 19%		0.50×300	
	> 19% - 34%		0.75×300	
	> 34%		1.00×300	
	Area on campus for water absorbance	**200**		
	< 1%		0	
	1% - 2%		0.25×200	
SI 4	> 2% - 14%		0.50×200	
	> 14% - 29%		0.75×200	
	>29 %		1.00×200	
	The total open space area divided by total campus population	**300**		
	< 1 m^2		0	
	1 − 3 m^2		0.25×300	
SI 5	> 3 − 27 m^2		0.50×300	
	> 27 − 83 m^2		0.75×300	
	> 83 m^2		1.00×300	
SI 6	**University budget for sustainable effort**	**200**		
	< 1%		0	

	1% - 3%		0.25×200	
	> 3% - 5%		0.50×200	
	> 5% - 10%		0.75×200	
	>10%		1.00×200	
Total		**1500**		
Energy and Climate Change (EC)				**21%**
EC 1	**Energy efficient appliances usage**	**200**		
	< 1%		0	
	1% - 25%		0.25×200	
	> 25% - 50%		0.50×200	
	> 50% - 75%		0.75×200	
	> 75%		1.00×200	
EC 2	**Smart building implementation**	**300**		
	< 1%		0	
	1% - 25%		0.25×300	
	> 25% - 50%		0.50×300	
	> 50% - 75%		0.75×300	
	> 75%		1.00×300	
EC 3	**Number of renewable energy sources in campus**	**300**		
	0		0	
	1 source		0.25×300	
	2 sources		0.50×300	
	3 sources		0.75×300	
	> 3 sources		1.00×300	
EC 4	**The total electricity usage divided by total campus population (kWh per person)**	**300**		
	> 2424 kWh		0	
	> 1535 - 2424 kWh		0.25×300	
	> 633 - 1535 kWh		0.50×300	
	279 - 633 kWh		0.75×300	
	< 279 kWh		1.00×300	
EC 5	**The ratio of renewable energy produced towards energy usage**	**200**		
	< 1%		0	
	1% - 25%		0.25×200	
	> 25% - 50%		0.50×200	
	> 50% - 75%		0.75×200	
	> 75%		1.00×200	

EC 6	**Element of green building implementation**	300		
	None		0	
	1 element		0.25×300	
	2 elements		0.50×300	
	3 elements		0.75×300	
	> 3 elements		1.00×300	
EC 7	**Greenhouse gas emission reduction program**	200		
	None. Please select this option if reduction program is needed, but nothing has been done		0	
	Program in preparation (e.g. feasibility study and promotion)		0.25×200	
	Program(s) aims to reduce one out of three sources emissions (Scope 1 or 2 or 3)		0.50×200	
	Program(s) aims to reduce two out of three sources emissions (Scope 1 and 2 or Scope 1 and 3 or Scope 2 and 3)		0.75×200	
	Program(s) aims to reduce all three sources emissions (Scope 1, 2 and 3)		1.00×200	
EC 8	**The ratio of total carbon footprint divided campus population**	300		
	> 2.05 metric ton		0	
	> 1.11 – 2.05 metric ton		0.25×200	
	> 0.42 – 1.11 metric ton		0.50×200	
	0.10 – 0.42 metric ton		0.75×200	
	< 0.10 metric ton		1.00×200	
	Total	**2100**		
	Waste (WS)			**18%**
WS 1	**Recycling program for university waste**	300		
	Not applicable		0	
	Partial (1% - 25% of waste)		0.25×300	
	Partial (> 25% - 50% of waste)		0.50×300	
	Partial (> 50% - 75% of waste)		0.75×300	
	Extensive (>75% waste free)		1.00×300	
WS 2	**Program to reduce the use of paper and plastic in campus**	300		
	Not applicable		0	
	1 Program		0.25×300	
	2 Programs		0.50×300	
	3 Programs		0.75×300	

	More than 3 Programs		1.00×300	
WS 3	**Organic waste treatment**	**300**		
	Open dumping		0	
	Partial (1% - 25% treated)		0.25×300	
	Partial (> 25% - 50% treated)		0.50×300	
	Partial (> 50% - 75% treated)		0.75×300	
	Extensive (>75% treated and recycled)		1.00×300	
WS 4	**Inorganic waste treatment**	**300**		
	Burned in open area		0	
	Partial (1% - 25% treated)		0.25×300	
	Partial (> 25% - 50% treated)		0.50×300	
	Partial (> 50% - 75% treated)		0.75×300	
	Extensive (>75% treated and recycled)		1.00×300	
WS 5	**Toxic waste treatment**	**300**		
	Not managed		0	
	Partial (1% - 25% treated)		0.25×300	
	Partial (> 25% - 50% treated)		0.50×300	
	Partial (> 50% - 75% treated)		0.75×300	
	Extensive (>75% treated and recycled)		1.00×300	
WS 6	**Sewerage disposal**	**300**		
	Untreated into waterways		0	
	Treated conventionally		0.25×300	
	Treated technically		0.50×300	
	Treatment for down cycling		0.75×300	
	Treatment for up cycling		1.00×300	
	Total	**1800**		
	Water (WR)			**10%**
WR 1	**Water conservation program implementation**	**300**		
	None (Conservation program is needed, but nothing has been done)		0	
	1% - 25 % : Program in preparation (e.g. feasibility study and promotion)		0.25×300	
	> 25% - 50%: Implemented at early stage (e.g. measurement of potential surface runoff volume)		0.50×300	
	> 50% - 75% water conserved		0.75×300	
	>75% water conserved		1.00×300	
WR 2	**Water recycling program implementation**	**300**		
	None (Water recycling program is needed, but nothing has been done)		0	

	1% - 25 % : Program in preparation (e.g. feasibility study and promotion)		0.25×300	
	> 25% - 50%: Implemented at early stage (e.g. measurement of potential surface runoff volume)		0.50×300	
	> 50% - 75% water recycled		0.75×300	
	> 75% water recycled		1.00×300	
WR 3	**The use of water efficient appliances**	**200**		
	None (Water efficient appliances is needed, but nothing has been done)		0	
	1%-25 % : Program in preparation (e.g. feasibility study and promotion)		0.25×200	
	> 25%- 50% of water efficient appliances installed		0.50×200	
	> 50% - 75% of water efficient appliances installed		0.75×200	
	> 75% of water efficient appliances installed		1.00×200	
WR 4	**Treated water consumed**	**200**		
	None		0	
	1% - 25% treated water consumed		0.25×200	
	> 25% - 50% treated water consumed		0.50×200	
	> 50% - 75% treated water consumed		0.75×200	
	> 75% treated water consumed		1.00×200	
	Total	**1000**		
	Transportation (TR)			**18%**
TR 1	**The Ratio of total vehicles (cars and motorcycles) divided by total campus population**	**200**		
	>=1		0	
	>=0.5 to < 1		0.25×200	
	>=0.125 to 0.5		0.50×200	
	>=0.045 to < 0.125		0.75×200	
	< 0.045		1.00×200	
TR 2	**Shuttle services**	**300**		
	Shuttle service is possible but not provided by University		0	
	Shuttle service is available and the University contributes some parts of its costs		0.25×300	
	Shuttle service is provided by University and regular but not free		0.50×300	
	Shuttle service is provided by University, regular, and free		0.75×300	
	Shuttle service is provided by University, regular, free, and zero emission. Or shuttle use is not possible (not applicable)		1.00×300	

	Zero Emission Vehicles (ZEV) policy on campus	**200**		
TR 3	Zero Emission Vehicles are not available		0	
	Zero Emission Vehicles use is not possible or practical		0.25×200	
	Zero Emission Vehicles are available, but not provided by university		0.50×200	
	Zero Emission Vehicles are available, and provided by university and charged		0.75×200	
	Zero Emission Vehicles are available, and provided by university for free		1.00×200	
TR 4	**The ratio of Zero Emission Vehicles (ZEV) divided by total campus population**	**200**		
	<= 0.002		0	
	>0.002 to <= 0.004		0.25×200	
	>0.004 to <=0.008		0.50×200	
	>0.008 to <=0.02		0.75×200	
	> 0.02		1.00×200	
TR 5	**Ratio of parking area to total campus area**	**200**		
	More than 8%		0	
	> 6% - 8%		0.25×200	
	> 4% - 6%		0.50×200	
	1% - 4%		0.75×200	
	< 1%		1.00×200	
TR 6	**Transportation program designed to limit or decrease the parking area on campus for the last 3 years (from 2015 to 2017)**	**200**		
	Not applicable		0	
	Program in preparation (e.g. feasibility study and promotion)		0.25×200	
	Program resulting in less than 10% decrease		0.50×200	
	Program resulting in between 10% - 30% decrease		0.75×200	
	Program resulting in more than 30% decrease /or parking is restricted		1.00x200	
TR 7	**Number of transportation initiatives to decrease private vehicles on campus**	**200**		
	Not applicable		0	
	1 initiative		0.25×200	
	2 initiatives		0.50×200	
	3 initiatives		0.75×200	
	> 3 initiatives		1.00×200	

	Pedestrian path policy on campus	**300**		
TR 8	Pedestrian path are not applicable		0	
	Pedestrian paths are available		0.25×300	
	Pedestrian paths are available, and design for safety.		0.50×300	
	Pedestrian paths are available, design for safety and convenient		0.75×300	
	Pedestrian paths are available, design for safety, convenient, and in some part disabled-friendly features.		1.00×300	
	Total	**1800**		
6	**Education and Research (ED)**			**18%**
ED 1	**The ratio of sustainability courses towards total courses/subjects**	**300**		
	> 1%		0	
	1% - 3%		0.25×300	
	> 3% - 8%		0.50×300	
	> 8% - 17%		0.75×300	
	> 17%		1.00×300	
ED 2	**The ratio of sustainability research funding towards total research funding**	**300**		
	< 1%		0	
	1% - 7%		0.25×300	
	> 7% - 14%		0.50×300	
	> 14% - 30%		0.75×300	
	> 30%		1.00×300	
ED 3	**Number of sustainability publications (average annually for the past 3 years)**	**300**		
	0		0	
	1 - 20		0.25×300	
	21 - 83		0.50×300	
	83 - 299		0.75×300	
	> 300		1.00×300	
ED 4	**Number of sustainability events (average annually for the past 3 years)**	**300**		
	0		0	
	1 - 4		0.25×300	
	5 - 17		0.50×300	

	18 - 47			0.75×300	
	> 47			1.00×300	
ED 5	**Sustainability student organizations**	**300**			
	0			0	
	1 - 2			0.25×300	
	3 - 4			0.50×300	
	5 - 9			0.75×300	
	> 10			1.00×300	
ED 6	**Existence of a university-run sustainability website**	**200**			
	Not available			0	
	Website in progress or under construction			0.25×200	
	Website is available and accessible			0.50×200	
	Website is available, accessible, and updated occasionally			0.75×200	
	Website is available, accessible, and updated regularly			1.00x200	
ED 7	**Existence of published sustainability report**	**100**			
	Not available			0	
	Sustainability report is in preparation			0.25×100	
	Sustainability report is available			0.50×100	
	Sustainability report is available and updated annually			0.75×100	
	Sustainability report is available, accessible, and updated annually			1.00x100	
	Total	**1800**			
	TOTAL	**10000**			

Appendix 2

Calculation of Carbon Footprint

The Carbon footprint calculation can be conducted based on the stage of calculation as stated in https://www.carbonfootprint.com, which is the sum of electricity usage per year and transportation per year.

- **Carbon Footprint Per Year**

Total emissions divided by open space area per total people

Notes:

Total emissions come from:

o Electricity usage per year

o Transportation per year: Bus, Car, Motorcycle

Example of calculation:

o Open space area = total campus area – total ground floor area of building

o Total people = number of students including part- and full- time students + number of academic and administrative staff

- **Electricity Usage Per Year**

CO2 emission from electricity

= (electricity usage per year in KwH / 1000) x 0.84

= (1633286 KwH/1000) x 0.84

= 1371.96 metric ton

Notes:

Electricity usage per year in UI = 1633286 KwH

0.84 is the coefficient to convert KwH to Metric ton (source: www.carbonfootprint.com)

- **Transportation Per Year (Bus)**

= (Number of shuttle bus in your University * total trips for shuttle bus service each day * approximate travel distance of a vehicle each day inside campus only (in kilometers) * 240/100) * 0.01

= ((15 x 150 x 5 x 240)/100)) x 0.01

= 270 metric ton

Notes :

240 is number of working days per year

0.01 is the coefficient (source: www.carbonfootprint.com) to calculate the emission in metric ton per 100 km for bus

- **Transportation Per Year (Car)**

= (Number of cars entering your University * 2 * approximate travel distance of a vehicle each day inside campus only (in kilometers) * 240/100) * 0.02

= ((2000 x 2 x 5 x 240)/100)) x 0.02

= 960 metric ton

Notes :

240 is number of working days per year

0.02 is the coefficient (source : www.carbonfootprint.com) to calculate the emission in metric ton per 100 km car

- **Transportation Per Year (Motorcycle)**

= (Number of motorcycle entering your University * 2 * approximate travel distance of a vehicle each day inside campus only (in kilometers) * 240/100)* 0.01

= ((4000 x 2 x 5 x 240)/100)) x 0.01

= 960 metric ton

Notes :

240 is number of working days per year

0.01 is the coefficient (source: www.carbonfootprint.com) to calculate the emission in metric ton per 100 km for motorcycle

- **Total Emission Per Year**

    = total emission from electricity usage + transportation (bus, car, motorcycle)

    = 1371.96 + (270 + 960 + 960)

    = 3561.96 Metric ton

Attachment

Record of revision ed. 1.8 (ver. 27072018)

Rev 1.1 ---
- ✓ **Page 22, 23, 34 and 35**
    - Update option in question number 5.4. The ratio of total vehicles (cars and motorcycles) divided by total campus population (TR.1) and 5.11. The ratio of Zero Emission Vehicles (ZEV) divided by total campus population (TR.4)

Rev 1.2 ---
- ✓ **Page 13**
    - Added all floors in question number 1.7
- ✓ **Page 28**
    - Add some references

Rev 1.3 ---
- ✓ **Page 21**
    - Question no .4.4 doesn't need an evidence
- ✓ **Page 25**
    - Add some explanation about question 6.1

Rev 1.4---
- ✓ **Page 07**
    - Fix scoring for SI3 and SI4

Rev 1.5 ---
- ✓ **Page 15**
    - Change total smart building area to total all floors building area (smart and non-smart buildings area)

Rev 1.6 ---
- ✓ **Page 27**
    - Fix data submission for yearly annual data, **September 2017 to September 2018** into **according to your 12 months data gathering schedule**
    - Fix template evidence link **(http://greenmetric.ui.ac.id/wp-content/uploads/2015/07/UIGM_ template_evidence_2018.pdf)**
- ✓ **Page 38**
    - Fix carbon footprint link from www.carbonfootprint.org to www.carbonfootprint.com

Rev 1.7 ---
- ✓ **Page 31**
    - Fix explanation about question 3.1, delete policy led
- ✓ **Page 17 and 32**
    - Update option in question number 2.10. Greenhouse gas emission reduction program

Rev 1.8 ---
- ✓ **Page 10**
    - Update the UI GreenMetric Agenda in 2018
- ✓ **Page 12**
    - Update some explanation about question 1.3
- ✓ **Page 13**
    - Update some explanation about questions 1.5, 1.6, and 1.9

- ✓ **Page 15**
  - Update some explanation about question 2.2
- ✓ **Page 19**
  - Update some explanation about question 3.1
- ✓ **Page 20**
  - Update explanation about water

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