

# Assessing Campus Sustainability Attributes Of Islamic University Of Technology (IUT)

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**Abstract**— Earth's natural resources and environmental conditions are degrading day by day and this adverse impacts can't be reduced overnight. To ensure environmental sustainability, creating sustainable cities and communities are imperative. Whereas sustainable campus can be a trigger point to achieve a sustainable environment. This research carries out a study to assess the sustainability attributes of Islamic University of Technology (IUT) campus using 'The Sustainability Tracking, Assessment & Rating System' (STARS) Manual. The main objective was to find out the scopes of improvement after the assessment is done and also to suggest important initiatives to upgrade the score for the campus. From the investigation it has been found that the campus of IUT, which represents the lion's share of the campuses in Bangladesh, is far from the best possible condition in terms of sustainability as it places in the Bronze category achieving 27 points. The results of the study are highly beneficial for the campus authority to recognize the sectors where the campus is lagging behind in terms of sustainability and improve those criteria for the overall development of the university.

**Keywords**—Campus Sustainability, Higher Education, Sustainability Assessment, Sustainable Environment, STARS, Education, Campus Environment.

## 1. INTRODUCTION

Among the many ways that sustainability has been defined, the simplest and most fundamental is: "the ability to sustain" or, put another way, "the capacity to endure" [1]. Now about campus sustainability, there is no formally accepted definition of campus sustainability yet. Generally a sustainable campus is one that develops process or management systems that help create a vibrant campus economy and high quality of life while respecting the need to sustain natural resources and protect the environment[2].

Campus sustainability has become an issue of global concern for university policy makers and planners as result of the realization of the impacts the activities and operations of universities have on the environment. The issue has also been intensified by the pressure from government environmental protection agencies, sustainability movements, university stakeholders as well as the momentum of other forces including student activism and NGOs. For example, in 2000 the US Environmental Protection Agency (EPA) issued an enforcement alert which explained that the agency was now holding colleges and universities to the same standards as industry with regards to the issues of human health and environment. Some universities have also voluntarily signed some declarations to indicate their commitments to sustainability and the number of those universities is increasing [3].

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The Stockholm Declaration of 1972 was the first to make reference to sustainability in higher education and has recognized the interdependency between the humanity and the environment and suggests several ways of achieving environmental

sustainability [4]. Sustainability is a term that has grown rapidly in popularity in recent years. At an institution of higher education, the concept of sustainability can be applied to education, research, and learning as well as the physical imprint of the campus itself on the natural environment. Through green building and strategic planning and design of campus facilities and systems, a university can greatly reduce its impact on the natural environment while also serving as a living laboratory for the advancement and education of sustainability [5].

The Sustainability Tracking, Assessment & Rating System (STARS) is a voluntary, self-reporting framework for helping colleges and universities to track and measure their sustainability progress. It is designed to: a) provide a framework for understanding sustainability in all sectors of higher education, b) enable meaningful comparisons over time and across institutions using a common set of measurements developed with broad participation from the campus sustainability community, c) create incentives for continual improvement toward sustainability, d) facilitate information sharing about higher education sustainability practices and performance and e) build a stronger, more diverse campus sustainability community [6].

To achieve success, i.e., to become a campus that does more than just teach sustainability, but actually takes theory and puts it into comprehensive practice, requires considerable effort and focus [7]. Changing the mindset of all user groups - students, employees, visitors - by implementing sustainable solutions or by setting a good (visible) example with innovative technology is an extra objective for the sector higher education, apart from the energy efficiency targets[8]. This research was conducted on the attributes of IUT campus comparing it to the criteria of STARS Manual. This research has the following objectives:

- Determining how an adapted STARS sustainability assessment framework can be applied at IUT.
- Understanding the role that Different organizations and the university administration can play in gathering and analyzing data for a campus sustainability assessment framework.

- Preparing a guide that will direct students of IUT towards "Greening the Campus" course and IUT volunteers on how to undertake the data gathering and synthesis of information for the assessment.
- This study investigated how much sustainable is IUT campus comparing with the criteria provided in the STARS technical manual.
- Suggesting important initiatives to make necessary improvements of IUT to make it more acceptable as a sustainable campus.

## 2. METHODOLOGY:

The study area, Islamic University of Technology, commonly known as IUT is situated at BoardBazar, Gazipur, Dhaka, Bangladesh. It is one of the international educational institution of the country, having a campus of 30 acres with 201 administrative and academic staffs, 890 and 150 undergrad and postgrad students respectively. This university is mainly run by OIC's (Organization of Islamic Cooperation) donation and contributions. For investigation, data were collected from the faculties and staffs of IUT, official records of IUT and by practical experience. The main way of collecting information from the IUT staffs were by filling up a questionnaire survey. The honorable staffs of IUT contributed to the investigation by their knowledge about the campus. After all the data were collected, the calculations were done with the help of the formulas and TABLEs provided in the STARS Technical Manual. STARS participants pursue credits and may earn points in order to achieve a STARS Bronze, Silver, Gold or Platinum rating, or recognition as a STARS Reporter.

TABLE 1  
Rating System of STARS:

Stars rating	Minimum score required
Bronze	25
Silver	45
Gold	65
Platinum	85
Reporter	<25

The credits included in STARS span the breadth of higher education sustainability and include performance indicators and criteria related to Academics, Engagement, Operations, and Planning & Administration.

STARS credits were initially developed in large part by reviewing campus sustainability assessments, sustainability reports from businesses, and other sustainability rating and ranking systems. Credits have been revised based on feedback from hundreds of diverse stakeholders and experts.

## 3. EXPERIMENTAL ANALYSIS:

### 3.1. Academics and Demographics Criteria:

- Number of academic divisions: 5
- Number of academic departments: 5
- Number of students enrolled for credit: 1040

- Number of employees (Staffs + Faculties): 201
- Full time equivalent student enrollment: 975
- Full time equivalent of employees: 180
- Full-time equivalent of students enrolled exclusively in distance education: 0
- Number of students resident on-site: 950
- Number of employees resident on-site: 15
- Number of other individuals resident on-site, e.g. family members of employees, individuals lodging on-site (by average occupancy rate), and/or in-patient hospital beds (if applicable): 5

Weighted campus users =

$$(A + B + C) + 0.75 [(D - A) + (E - B) - F]$$

A= Number of students resident on-site

B= Number of employees resident on-site

C= Number of other individuals resident on-site and/or in-patient hospital beds

D= Total full-time equivalent student enrollment

E= Full-time equivalent of employees (staff + faculty)

F= Full-time equivalent of students enrolled exclusively in distance education

Weighted campus user:

$$(950 + 15 + 5) + 0.75 [(975 - 950) + (180 - 15) - 0] = 1112.5$$

### 3.1.1. Credit rationale and criteria for academic curriculum:

This credit recognizes institutions that offer sustainability courses and that include sustainability in courses across the curriculum. The criteria and their scoring procedures are given in the following TABLEs. Here part 1 discusses sustainable courses or courses that include sustainability and part 2 discusses about departments that offer sustainability courses.

TABLE 2  
Scoring Methods for Curriculum Criteria:

Academic Courses (part 1)						
Course type	Factor	Multiply	Number of courses offered of each type	Divide	Total number of courses offered by the institution	Highest points
Sustainability courses		*		/		
Courses that include sustainability		*		/		
Total points						8
Academic Courses (part 2)						
Factor	Multiply	Number of courses with sustainability course offerings	Divide	Total number of departments	=	Highest points
62/3	*		/		=	6

### 3.1.2. Learning Outcomes:

This credit includes graduate as well as undergraduate programs. For this credit, “degree programs” include majors, minors, concentrations, certificates, and other academic designations.

TABLE 3  
Scoring for Learning Outcome:

Factor	Multiply	Number of students that graduate from programs that have adopted at least one sustainability learning outcome	Divide	Total number of graduates	Equals	Points earned
8	*		/		=	Upto 8

### 3.1.3. Scoring for Graduate and Undergraduate programs:

For both graduate and undergraduate programs institutions earn the maximum of 3 points available for this credit for having at least one sustainability-focused degree program or the equivalent for undergraduate students. Partial points are available. An institution with no sustainability-focused degree program that has at least one sustainability-focused minor, concentration or certificate earns 1.5 points (half of the points available for this credit).

### 3.1.4. Immersive Experience:

For this credit, the program must meet one or both of the following criteria:

- It concentrates on sustainability, including its social, economic, and environmental dimensions;
- It examines an issue or topic using sustainability as a lens.

Institutions earn 2 points for meeting the criteria outlined above. Partial points are not available for this credit.

### 3.1.5. Sustainability Literacy Assessment:

This credit recognizes institutions that are assessing the sustainability literacy of their students. Such an assessment helps institutions evaluate the success of their sustainability education initiatives and develop insight into how these initiatives could be improved. An institution may use a single instru-

ment that addresses sustainability literacy, culture, and/or engagement to meet the criteria for this credit if at least a third of the assessment focuses on student knowledge of sustainability topics and challenges.

TABLE 4  
Scoring for Sustainability Literacy Assessment:

Topic	Highest points
An assessment of sustainability literacy is: <ul style="list-style-type: none"> <li>• Administered to the entire student body or, at minimum, to the institution's predominant student body (e.g. all undergraduate students), directly or by representative sample. (2 points) Or</li> <li>• Administered to a subset of students (e.g. students enrolled in a sustainability program) or a sample of students that may not be representative of the institution's predominant student body (e.g. graduate and not undergraduate students). (1 point)</li> </ul>	
• Administered as a pre- and post-assessment to the same cohort of students or to representative samples in both the pre-test and post-test.	
Total points	4

### 3.1.6. Incentives for Developing Courses:

This credit recognizes institutions that offer incentives to help faculty expand sustainability course offerings. Incentives may include release time, funding for professional development, and trainings offered by the institution. Institutions earn 2 points for meeting the criteria outlined above. Partial points are not available for this credit.

### 3.1.7. Campus as a Living Laboratory:

This credit recognizes institutions that utilize their infrastructure and operations as living environments for multidisciplinary learning and applied research that advances sustainability on campus. Institutions earn 0.4 points for each area covered, regardless of how many projects there are in each area. Institutions with projects that cover 10 or more areas earn the maximum of 4 points available for this credit.

### 3.1.8. Research and Scholarship:

TABLE 5  
Scoring for Research and Scholarship:

Research and Scholarships (Part 1)						
Factor	Multiply	Faculty and staff engaged in sustainability research	Divide	Total faculty and staff engaged in research	Equals	Highest points
40	*		/		=	6
Research and Scholarships (Part 2)						
Factor	Multiply	Departments that conduct sustainability research	Divide	Total number of departments that conduct research	Equals	Highest points
8	*		/		=	6

**Support for Research:** Institutions earn the maximum of 4 points available for this credit by providing all of the incentives and supports. Partial points are available based on the number of incentives and/or supports provided

**Open Access to Research:** Institutions earn the maximum of 2 points available for this credit by having an open access policy that meets the criteria. Partial points are available if some, but not all, of the institution's research-producing divisions (e.g. schools, colleges, departments) are covered by an open access policy.

### 3.2. CAMPUS ENGAGEMENT CRITERIA:

TABLE 5  
Scoring for Campus Engagement (Part 1)

Student Educators Program						
Factor	Multiply	Number of students served by a peer-to peer outreach and education Program	Divide	Total number of students enrolled for credit	Equals	Highest points
4	*		/		=	4
Student orientation						
Factor	Multiply	Percentage of entering students provided orientation activities and programming that include sustainability (0-100)			Equals	Highest points
.02	*				=	2

This credit recognizes institutions that include sustainability in student educators program, student orientation, student life, outreach materials and publications, outreach campgain etc.

TABLE 6:  
Scoring for Campus Engagement (Part 2)

Student life
Institutions earn 0.25 points for each category listed above for which it has one or more programs up to a maximum of 2 points available for this credit. Partial points are available based on the number of categories for which an institution has programs.
Outreach materials and publications
Institutions earn 0.25 points for each type of publication and/or outreach material described above, regardless of how many of each type are produced. Institutions with eight or more types of publications or outreach materials earn the maximum of 2 points available for this credit.
Outreach campaign
Part 1: An institution earns the maximum of 2 points available for Part 1 of this credit for having one or more sustainability-related outreach campaigns that are directed at students and yield measurable, positive results in advancing sustainability. Partial points are not available for Part 1 of this credit.
Part 2: An institution earns the maximum of 2 points available for Part 2 of this credit for having one or more sustainability-related outreach campaigns that are directed at employees and yield measurable, positive results in advancing sustainability. Partial points are not available for Part 2 of this credit.



### 3.2.1 Assessing sustainability culture:TABLE 7 Scoring of Sustainability Culture

Attributes of the sustainability culture assessment (points awarded)	Points earned
<b>An assessment of sustainability culture (i.e. values, behaviors and beliefs) is:</b> <ul style="list-style-type: none"> <li>Administered to the entire campus community (students, staff and faculty), directly or by representative sample (0.25 points)</li> <li>Administered to a subset of the campus community or a sample that may not be representative of the entire community. (0.5 points)</li> </ul>	
<ul style="list-style-type: none"> <li>Administered longitudinally to measure change over time (i.e. with one or more follow-up assessments administered to the same cohort or representative samples of the same population).</li> </ul>	<b>*2</b>
<b>Points earned</b>	<b>Upto 1</b>

### 3.2.2. Employee educators program and Employee orientation

Employee sustainability educators are formally designated and receive formal training or participate in an institution-sponsored orientation to prepare them to conduct peer outreach to other employees.

TABLE 8:  
Scoring of Educators Program

Factor	Multiply	Number of employees served by a peer-to peer outreach program	Divide	Total number of Employees	Equals	Points earned
3	*		/		=	Upto 3

Factor	Multiply	Percentage of new employees offered orientation and/or outreach and guidance materials that cover sustainability (0-100)	Equals	Points earned
0.01	*		=	Upto 1

### 3.2.3. Staff professional development:

For this criteria, Institution makes available training and/or other professional development opportunities in sustainability to all staff at least once per year for part 1.

And for part 2, Institution's regular (full-time and part-time) staff participate in sustainability training and/or professional development opportunities that are either provided or supported by the institution.

An institution earns 1 point by making available sustainability training and/or professional development opportunities to all staff members at least once a year. Partial points are not available for Part 1.

An institution earns the maximum of 1 point available for Part 2 of this credit when 75 percent or more of regular (full-time and part-time) staff participate annually in sustainability training or professional development that is either provided or supported by the institution. Partial points are available based on the percentage of regular employees that participates.

### 3.3. SCORING METHODS FOR PUBLIC ENGAGEMENT CRITERIA:

For community partnerships institutions earn the maximum of 3 points available for this credit for having at least one formal community partnership that is "transformative", i.e. it meets all of the criteria. Partial points are available for institutions that have a partnership that meets at least one of the criteria.

For inter campus collaboration institutions earn 0.5 points for each initiative up to the maximum of 3 points available.

For institution offering education courses as continuing education that address sustainability earn the maximum of 3 points for this credit when courses that address sustainability comprise 10 or more percent of all continuing education courses offered. Incremental points are awarded based on the percentage of continuing education course offerings that address sustainability. For example, an institution where 5 percent of all continuing education courses offered were sustainability courses would earn 1.5 points. And for institution has at least one sustainability-themed certificate program through its continuing education or extension department earns 2 points in this credit for having at least one certificate program that meets the criteria outlined above. Partial points are not available for this credit.

TABLE 9  
Public Engagement Criteria:

Community partnerships	This credit recognizes institutions that have developed campus-community partnerships to advance sustainability
Inter campus collaboration	This credit recognizes institutions that collaborate with other colleges or universities to help build campus sustainability broadly
Continuing education	This credit recognizes institutions that provide continuing education courses and programs in sustainability to the community
Community service	This credit recognizes institutions that engage their student bodies in community service, as measured by how widespread participation is at the institution
Participation in public policy	This credit recognizes institutions that promote sustainability through public policy advocacy.
Trademark licensing	This credit recognizes institutions that join a monitoring and verification organization to help ensure that apparel bearing the institution's name is produced under fair conditions

Institutions earn 0.67 points for advocating for public policies that support campus sustainability or that otherwise advance sustainability. A maximum of 2 points are available for this credit.

Institutions earn 2 points by being a member of the Fair Labor Association or the Worker Rights Consortium. Partial points are not available for this credit.

### 3.4. OPERATIONS CRITERIA

**Air and climate:** This credit recognizes institutions that have inventoried their greenhouse gas (GHG) emissions and that have reduced their adjusted net Scope 1 and Scope 2 GHG emissions.

TABLE 10  
Scoring for Air and Climate Quality:

Components of the GHG Inventory	Points available	Points earned
Scope 1 and Scope 2 GHG emissions	1.0	
Scope 3 GHG emissions from: <ul style="list-style-type: none"> <li>• Business travel</li> <li>• Commuting</li> <li>• Purchased goods and services</li> <li>• Capital goods</li> <li>• Fuel- and energy-related activities</li> <li>• Waste generated in operations</li> <li>• Other sources</li> </ul>	.083 each	Upto .5
Validation or verification	0.5	
Total points earned		Upto 2

**Outdoor air quality:** Recognizes institutions that are working to protect ecosystems and human health by minimizing atmospheric pollution and protecting outdoor air quality. Institutions earn the maximum of 0.5 points available for this credit for having policies or guidelines in place to improve outdoor air quality and minimize air pollutant emissions from mobile sources. Partial points are not available.

### Building operation and maintenance:

TABLE 11  
Scoring for Building operation and maintenance:

Operation and maintenance level	Factor	Multiply	Floor area of building space certified at each level	Divide	Total floor area of building space	Equals	Points earned
Certified LEED O+M Platinum or at the highest achievable level under another GBC rating system	5	*		/		=	
Certified LEED O+M Gold or at the 2nd highest level under another 4- or 5-tier GBC rating system	4	*		/		=	
Certified at mid-level under a 3- or 5-tier GBC rating system (e.g. BREEAM In Use, CASBEE for Existing Buildings, DGNB, Green Star Performance)	3.5	*		/		=	
Certified LEED O+M Silver or at a step above minimum level under another 4- or 5-tier GBC rating system	3	*		/		=	
LEED O+M Certified or certified at minimum level under another GBC rating system	2.5	*		/		=	
Certified at any level under a non-GBC rating system (e.g. BOMA BEST, Green Globes CIEB)	2.5	*		/		=	
Not certified, but managed according to sustainable guidelines or policies	5-2	*		/		=	

Recognizes institutions that operate and maintain their buildings in ways that protect the health of building occupants and the environment.

**Building design and construction:** Recognizes institutions that have incorporated environmental features into their de-

sign and construction projects.

TABLE 12

Scoring of Building design and construction (Part 1)

Design and construction level	Factor	Multiply	Floor area of building space certified at each level	Divide	Total floor area of newly constructed and renovated building space	Equals	Points earned
Certified Living under the Living Building Challenge	3.5	*		/		=	
Certified LEED BD+C Platinum or at the highest achievable level under another GBC rating system	3	*		/		=	
Certified LEED BD+C Gold or at the 2nd highest level under another 4- or 5-tier GBC rating system	2.5	*		/		=	
Certified at mid-level under a 3- or 5-tier GBC rating system (e.g. BREEAM, CASBEE, DGNB, Green Star)	2	*		/		=	
Certified LEED BD+C Silver or at a step above minimum level under another 4- or 5-tier GBC rating system	1.875	*		/		=	
LEED BD+C Certified or certified at minimum level under another GBC rating system	1.5	*		/		=	
Certified at any level under a non-GBC rating system (e.g. Green Globes NC)	1.5	*		/		=	
Not certified, but constructed according to green building guidelines or policies	.18-1.25	*		/		=	
Total points							Upto 3

TABLE 13

Scoring of Building design and construction (Part 2)

Institution's formally adopted green building design and construction guidelines and policies cover:	Factor	Factor to be applied
Impacts on the surrounding site	.18	
Energy consumption	.18	
Building-level energy metering	.18	
Usage of environmentally preferable materials	.18	
Indoor environmental quality	.18	
Water consumption	.18	
Building-level water metering	.18	
Total factor to be applied		Upto 1.25

Total building energy consumption (source energy) =  $[A - (B + D)] + (B \times C) + (D \times E)$

A = Total building energy consumption, all sources (MMBtu)

B = Grid-purchased electricity (MMBtu)

C = Source-site ratio for grid-purchased electricity (see F.

Measurement)

D = District steam/hot water (MMBtu)

E = Source-site ratio for district steam/hot water (see F. Measurement)

Points earned for this credit are calculated according to the formula below. STARS awards only positive points; points will not be deducted if building energy consumption per gross square foot/meter of floor area increased rather than decreased during the time period.

Points Earned =  $6 \times \{ [(A/B) - (C/D)] / (A/B) \}$

A = Total building energy consumption (source energy), baseline year (MMBtu)

B = Gross floor area of building space, baseline year (gross square feet/meters)

C = Total building energy consumption (source energy), performance year (MMBtu)

D = Gross floor area of building space, performance year (gross square feet/meters)

**Clean and renewable energy:** Recognizes institutions that support the development and use of energy from clean and renewable sources.

TABLE 14

Scoring of Clean Energy:

Clean and renewable energy option	Factor	Multiply	Energy generated or purchased that meets criteria (MMBtu)	Divide	Total energy consumption	Equals	Points earned
Option 1	4	*		/		=	
Option 2	4	*		/		=	
Option 3	4	*		/		=	
Option 4	4	*		/		=	
Total points earned							Upto 4

**Food and beverage purchasing:** Recognizes institutions that are supporting sustainable food systems through their food and beverage purchases.

TABLE 15

Scoring of Food Purchasing:

Category	Factor	Multiply	Percentage of total dining services food and beverage expenditures on products in each category (0-100)	Equals	Points earned
Third Party Verified or Both Local and Community-Based	.04	*		=	
Other sustainability attributes	.02	*		=	
Total points earned					$2 \times \{ [(100 - A) - 70] / 30 \}$

**Sustainable dining:** Recognizes institutions that are supporting sustainable food systems and minimizing the impacts of their dining service operations. An institution earns 0.125 points for each initiative up to the maximum of 1 point available.

**Landscape management:** Recognizes institutions that manage their grounds sustainably.

TABLE 16  
Scoring of Landscape Management

Management level	Factor	Multiply	Area managed at each level	Divide	Total area of managed grounds	Equals	Points earned
Conventional program	0	*		/		=	
IPM program	1	*		/		=	
Organic program	2	*		/		=	
Total points earned							Upto 2

**Biodiversity:** Recognizes institutions that have a biodiversity management strategy designed to identify vulnerable ecosystems and species on campus and prevent, manage, and/or remediate damage to natural habitats and sensitive areas. 2 points are available for this credit if the institution owns or manages land that includes or is adjacent to any of the above. 1 point is available for this credit for all other institutions. Please note that users do not have to calculate the number of points available themselves; points available will be calculated automatically when the relevant information is reported in the Institutional Characteristics section of the online Reporting Tool.

**Sustainable procurement:** Recognizes institutions that apply sustainability criteria when making procurement decisions. An institution earns 0.5 points for this credit for having written policies, guidelines or directives that seek to support sustainable purchasing across commodity categories, institution-wide. For employing Life Cycle Cost Analysis (LCCA) as a matter of policy and standard practice when evaluating all energy- and water-using products and systems. Partial points are available for institutions that employ LCCA less comprehensively. Institution earns 0.25 for each category of products and services for which it has published sustainability criteria

**Electronics purchasing:** Recognizes institutions that are supporting markets for environmentally preferable computers and other electronic products.

TABLE 17  
Scoring of Electronics Purchasing:

EPEAT registration level	Factor	Multiply	Expenditures on EPEAT registered electronics	Divide	Total expenditures on electronics	Equals	Points earned
Bronze	.33	*		/		=	
Silver	.67	*		/		=	
Gold	1.00	*		/		=	
Total points							Upto 1

**Cleaning and janitorial purchasing:** recognizes institutions that purchase green cleaning and janitorial products. TABLE 18

Scoring of Cleaning and janitorial purchasing:

Factor	Multiply	Expenditures on certified green cleaning and janitorial paper products	Divide	Total expenditures on cleaning and janitorial paper products	Equals	Total points earned
1	*		/		=	Upto 1

**Office paper purchasing:** Recognizes institutions that purchase recycled-content and third party certified office paper.

TABLE 19  
Scoring of Office paper purchasing



Percentage of postconsumer recycled, agricultural residue, and/or FSC certified content	Factor	Multiply	Expenditures on specified level of postconsumer recycled, agricultural residue, and/or FSC certified content office paper	Divide	Total expenditures on office paper	Equals	Points earned
10-29	.2	*				=	
30-49	.4	*		/		=	
50-69	.6	*		/		=	
70-89	.8	*		/		=	
90-100	1.00	*		/		=	
Total points							Upto 1

**Campus fleet:** recognizes institutions that use cleaner fuels and fuel-efficient vehicles.

TABLE 20  
Scoring of Campus fleet

Factor	Multiply	Number of vehicles that meet a criterion (A-H) for power or fuel type	Divide	Total number of vehicles in fleet	Equals	Points earned
1	*		/		=	Upto 1

**Student and Employee commute modal split:** Recognizes institutions where students and employees use preferable modes of transportation to travel to and from the institution.

TABLE 21  
Scoring of commute modal split

Factor	Multiply	Total percentage of students using more sustainable commuting options (0-100)	Equals	Total points earned
0.02	*		=	Upto 2

**Support for sustainable transportation:** Recognizes institutions that support active transportation and commuting alternatives for its students and employees. Institution earns maximum of 2 points available for this credit.

**Waste minimization and diversion:** Recognizes institutions that are minimizing their production of waste, diverting materials from landfills and incinerators, and conserving resources by recycling and composting.

Part 1: Institution has implemented source reduction strategies to reduce the total amount of waste generated (materials di-

verted + materials disposed) per weighted campus user compared to a baseline.

Part 2: Institution's total annual waste generation (materials diverted and disposed) is less than the minimum performance threshold of 0.50 tons (0.45 tonnes) per weighted campus user.

Part 3: Institution diverts materials from the landfill or incinerator by recycling, composting, donating or re-selling. For scoring purposes, up to 10 percent of total waste generated may also be disposed through post-recycling residual conversion. To count, residual conversion must include an integrated materials recovery facility (MRF) or equivalent sorting system to recover recyclables and compostable material prior to conversion.

Scoring:

Part 1:

$$\text{Points earned} = 5 \times \{ [(A/B) - (C/D)] / (A/B) \}$$

A = Total waste generated (diverted + disposed), baseline year (short tons/tonnes)

B = Weighted campus users, baseline year

C = Total waste generated (diverted + disposed), performance year (short tons/tonnes)

D = Weighted campus users, performance year

Part 2:

$$\text{Points earned} = 2.78 \times \{ [C - (A/B)] / C \}$$

A = Total waste generated (diverted + disposed), performance year (short tons/tonnes)

B = Weighted campus users, performance year

C = Minimum performance threshold (0.50 short tons or 0.46 tonnes)

Part 3:

$$\text{Points earned} = 3 \times \{ [(A + B + C) + (F \text{ if } D \geq F, \text{ else } D)] / (A + B + C + D + E) \}$$

A = Materials recycled, performance year (short tons/tonnes)

B = Materials composted, performance year (short tons/tonnes)

C = Materials donated or re-sold, performance year (short tons/tonnes)

D = Materials disposed through post-recycling residual conversion, performance year (short tons/tonnes)

E = Materials disposed in a solid waste landfill or incinerator, performance year (short tons/tonnes)

F = Maximum allowable residual conversion  $[0.1 \times (A + B + C + D + E)]$

**Construction and Demolition Waste:** Recognizes institutions that have diverted construction and demolition (C&D) wastes.

TABLE 22

Scoring of Construction and Demolition Waste:

Factor	Multiply	C&D waste recycled, donated or otherwise recovered	Divide	Total amount of C&D waste generated (recovered + disposed)	Equals	Points earned
1	*		/		=	Upto 1

**Diversion hazardous waste management:** Recognizes institutions that seek to minimize and safely dispose of all hazardous, universal, and non-regulated chemical waste and that have electronic waste (“e-waste”) recycling and/or reuse programs.

Part 1: Institution has strategies in place to safely dispose of all hazardous, special (e.g. coal ash), universal, and non-regulated chemical waste and seeks to minimize the presence of these materials on campus.

Part 2: Institution has a program in place to recycle, reuse, and/or refurbish electronic waste generated by the institution and/or its students.

Scoring: Institutions earn 0.5 points for meeting the criteria outlined above. Partial points are not available for Part 1. Institutions earn the maximum of 0.5 points available for Part 2 for having or participating in a program to responsibly recycle, reuse, and/or refurbish electronic waste generated by both the institution and its students. Partial points are available.

**Water use:** Recognizes institutions that have reduced water use.

TABLE 23  
Scoring of Water Use:

Physical risk QUANTITY	Points available for each part	Total point for this credit
Low and Low to Medium Risk	1 <sup>2/3</sup>	4
Medium to High Risk	1 <sup>2/3</sup>	5
High and Extremely High Risk	2	6

**Rainwater management:** Recognizes institutions that implement policies and programs to reduce storm water runoff and resultant water pollution, and treat rainwater as a resource rather than as a waste product.

TABLE 24  
Scoring of Rainwater Management

Which of the following best describes the institution's approach to rainwater management?	Points earned
Institution has comprehensive policies, plans or guidelines that cover the entire campus and use of green infrastructure and LID practices for all new construction, major renovation, and development projects.	1
Institution has policies, plans or guidelines that are less comprehensive (e.g. do not cover the entire campus, cover buildings and no other types of projects, or require consideration of rather than mandate green infrastructure and LID practices).	.5
Uses green infrastructure and LID practices on a case-by-case basis or for demonstration projects.	.25

#### 4. RESULTS AND DISCUSSION

Results were calculated using the TABLEs and formulas described in the methodology section. For some data questionnaire survey were conducted. Some data needed a visit to the site and some required case study of previous years. Following bar charts (figure 1-15) show the comparison between the highest points within a criteria determined by STARS Manual and the points earned by IUT campus:

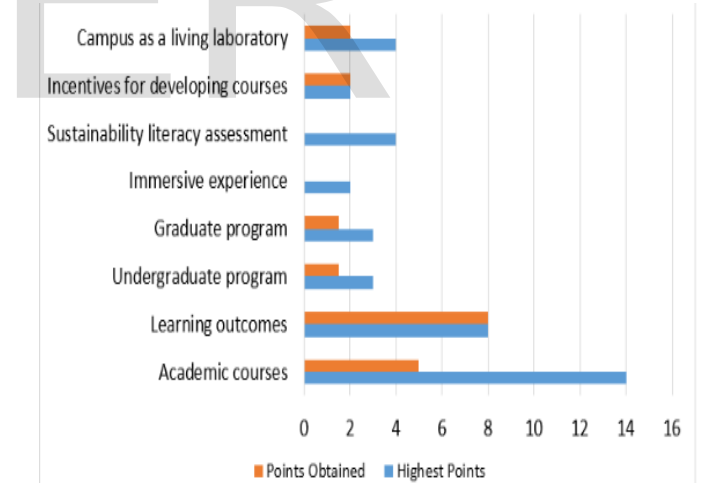


Fig. 1: Points earned in curriculum

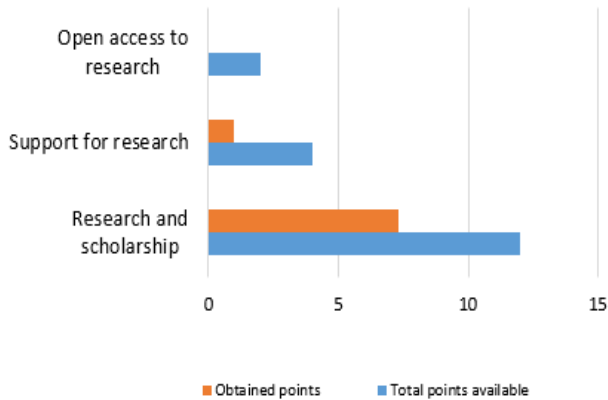


Fig 2: Points earned in research  
Fig 3: Points earned in Water Managemnet

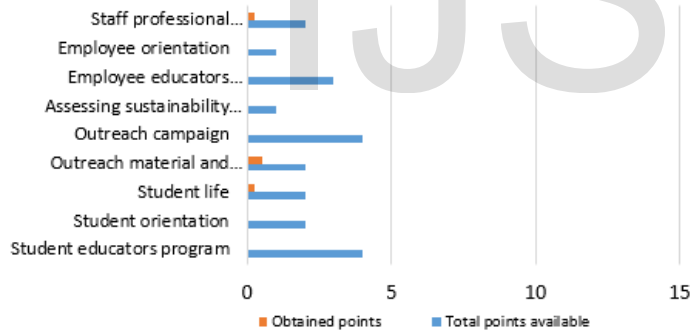
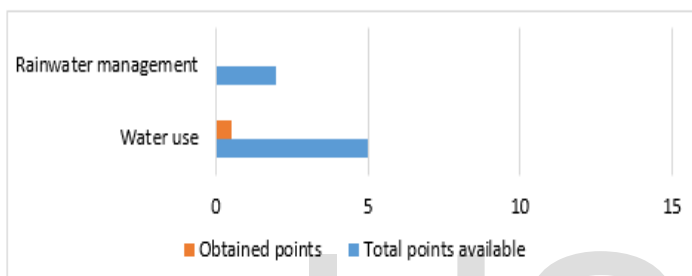


Fig 4: Points earned in campus management

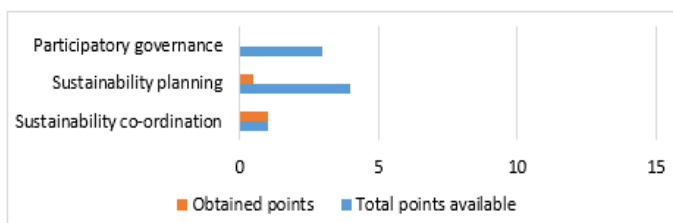


Fig 5: Points earned in co-ordination and planning

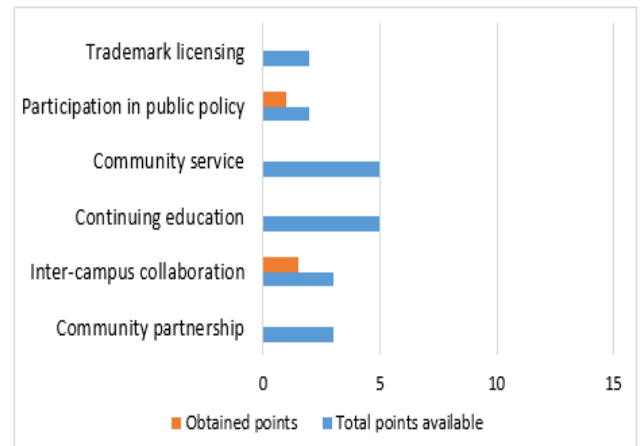


Figure 6: Points earned in public engagement

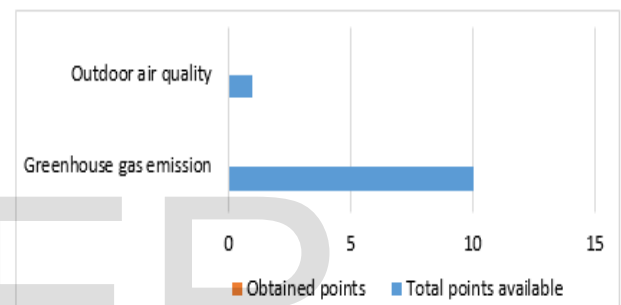


Fig 7: Points earned in outdoor air and climate

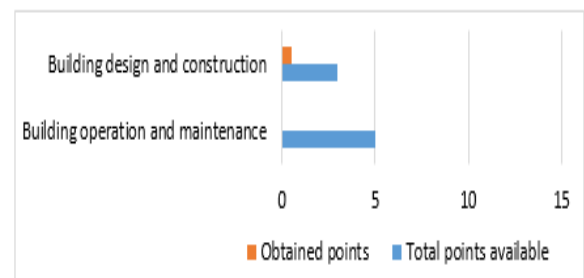


Fig 8: Points earned in energy managementp

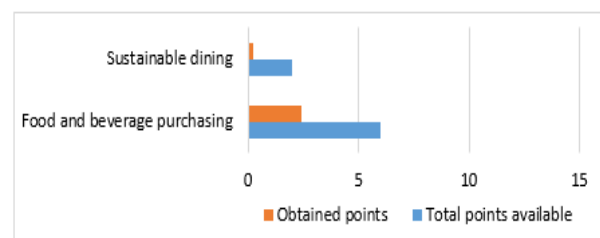


Fig 9: Points earned in food and dining

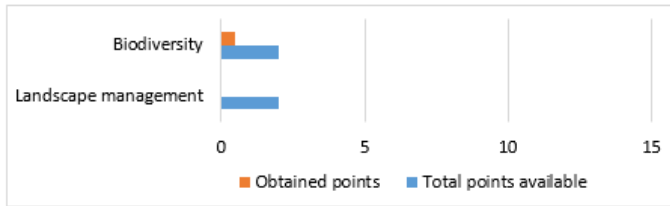


Fig 10: Points earned in ground management



Fig 11: Points earned in purchasing

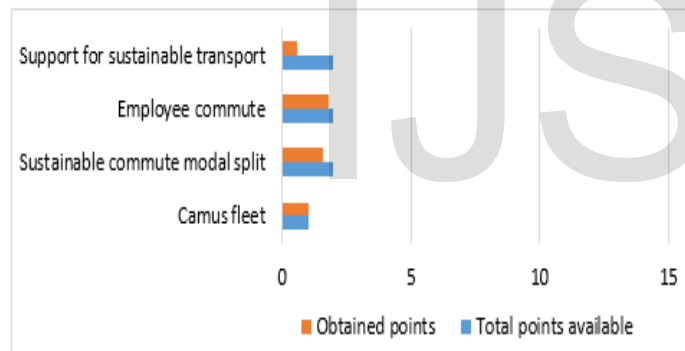


Fig 12: Points earned in transportation

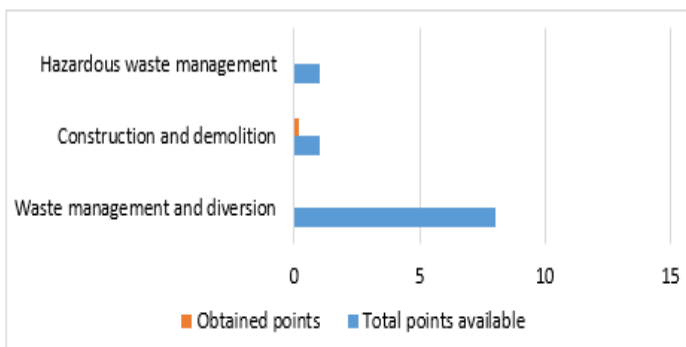


Fig 13: Points earned in waste management

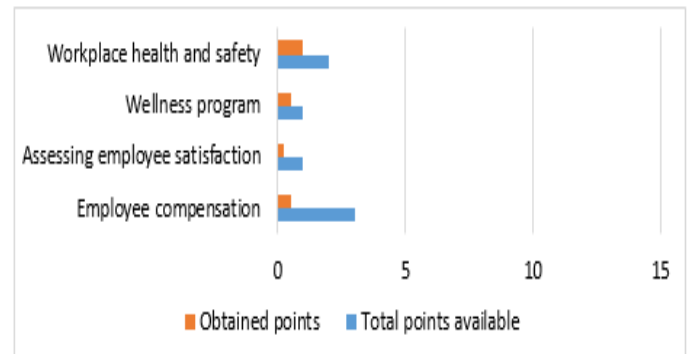


Fig 14: Points earned in wellbeing and work

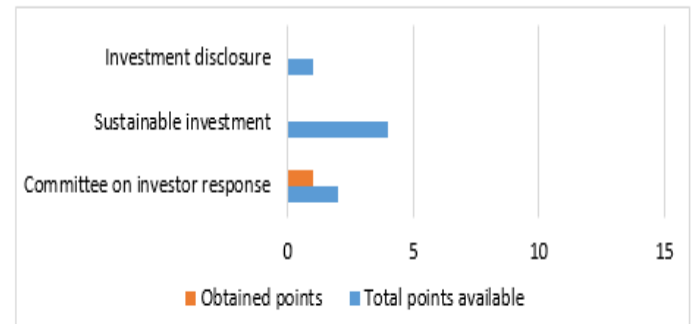


Fig 15: Points earned in investment

## 5. Recommendations:

University campuses are now a day considered as an individual city. So creating a sustainable campus can be the pivot to building a sustainable environment. So it should be made sure that there is no lack in the effort to make a campus sustainable and eventually making the environment sustainable.

Each and every member of a campus should be made aware of this and the authority should play a vital role in this regard.

## 6. Limitations and future works:

Though preliminary this study was planned to conduct by assessing the academic credentials of each departments, only the academic syllabus of Civil and Environmental Engineering department was considered. Besides some data were assumed so there might be a very little fluctuation between the derived points and the actual points.

This study can be extended in the future as well. Sustainability has 3 pillars- society, economics and environment [9]. This study can be merged with the assessment of social and economic sustainability for further improvement of sustainable attributes.

## 5. CONCLUSION

If we are to achieve a sustainable future, institutions of higher education must provide the awareness, knowledge, skills, and values that equip individuals to pursue life goals in a manner that enhances and sustains human and non-human well-being. [10]

After all the calculations, it has been found that, total points

obtained by Islamic University of Technology (IUT) campus are, 27.

So this makes IUT a “**Bronze**” category campus. From the points obtained, it can be said that IUT campus still has a lot to improve. But this campus has all the potentials that are required to become a gold category campus and it is not that difficult. Enthusiasm among the students, faculty members and the staffs along with some positive decisions by the administration will be good enough for this.

University campuses are now a day considered as an individual city. So creating a sustainable campus can be the pivot to building a sustainable environment. So it should be made sure that there is no lack in the effort to make a campus sustainable and eventually making the environment sustainable.

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