



TEXAS A&M
UNIVERSITY *at* QATAR

Electrical and Computer Engineering Program

FALL 2019 ECEN 403-901: ELECTRICAL DESIGN LAB

Customer Need Analysis
Monitoring The Carbon Footprint in TAMUQ

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On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.

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Introduction

In this report, our goal was to gather information from people to know their opinion regarding our proposed design. In order to know if people are aware of the significance of the problem of carbon footprint we made three surveys to target three audiences. The first survey was made for TAMUQ students since our project will be implemented in the building. The second is for the public since people's opinion about our design is important for us to improve it. The third survey was made for faculty since we need their experience in the field to add it to our design. Interviews were part of this report since it was important to interview experts to shed light on the importance of the project and know their feedback about the idea itself. The results will help us know the public awareness about the idea and familiarize them with the project and know their feedback to improve our design.

Methods

For our project, we chose two main approaches to collect data for the customer need analysis; the two methods are questionnaires and conducting interviews. The two goals for the surveys is to introduce our idea to the customers and to what extent they think our project is essential. The second goal for the surveys is to raise awareness about the relation between carbon footprint and energy consumption. We did three online surveys to measure how people are familiar with our project and the concept of carbon footprint. The first questionnaire was dedicated to students in TAMUQ. The second questionnaire was assigned to the faculty and researchers in TAMUQ. The third questionnaire was sent through social media, targeting mainly the community and getting their feedback about the idea of our project. The three surveys contained seven different questions, and each question is analyzed in the following section. The second method was conducting interviews with experts in the field of energy and sustainability to evaluate our project based on their experiences and knowledge. We did three interviews with three different experts. We asked them five different questions regarding the need for such a project, particularly in Qatar. The first interview was with Monem H. Beitelmal, Ph.D. Principal Research Scientist at Qatar Environment & Energy Research Institute. The second interview was with Dr. Fedaa Safa Mohammed Ali research specialist at Qatar Green building council. The last interview was with *Mays Abdalla* Environmental and Sustainability Specialist at Qatar University. The analysis of the data is presented in the following section.

Design summary and project status

Our proposed project is to design a monitoring system that measures the carbon footprint emission levels of Texas A&M at Qatar (TAMUQ) building. That is by collecting the input data of the amount of energy consumed then converting these values to the carbon footprint. The design of the monitoring system includes creating a carbon footprint calculator designed specifically for TAMUQ. This means that input data will be collected, then measured by the carbon footprint calculator, then finally presents the values of carbon footprint emission due to the TAMUQ building.

Currently, our group is in the process of grasping how the carbon footprint can be measured and choosing the best tools to measure the energy consumption of TAMUQ, in addition to setting a plan to start working on the measurements. Finally, our group is waiting for particular parties to provide us with the information and authorization required to achieve this project.

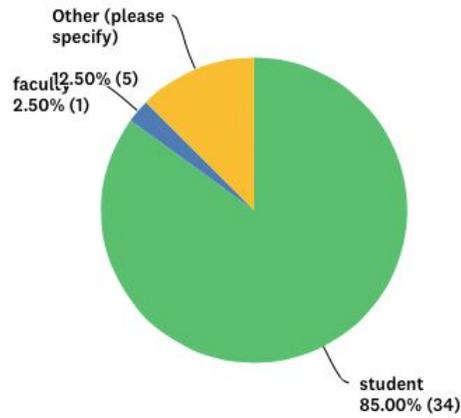
Customer needs analysis

Survey1: Student survey:

the survey was made specifically for TAMUQ students as they are involved since the project is in our university building. We got 46 response from TAMUQ students.

what is your profession?

Answered: 40 Skipped: 3

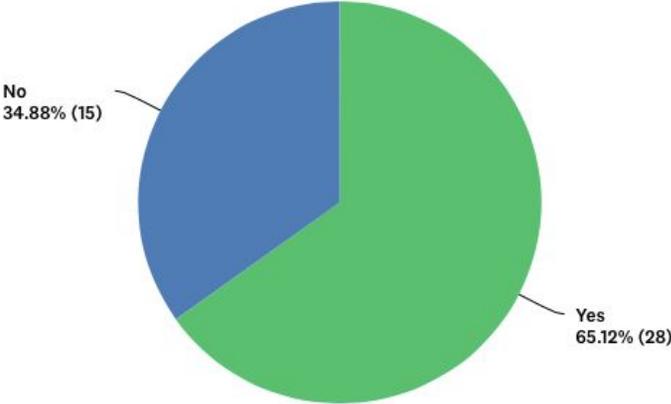


ANSWER CHOICES	RESPONSES
▼ student	85.00% 34
▼ faculty	2.50% 1
▼ Other (please specify)	Responses 12.50% 5
TOTAL	40

Question 1: we wanted to make sure that TAMUQ students will answer this survey and this was accomplished since 85% of the responses are students.

Did you know that carbon footprint refers to the amount of carbon dioxide emitted by a particular human activity?

Answered: 43 Skipped: 0

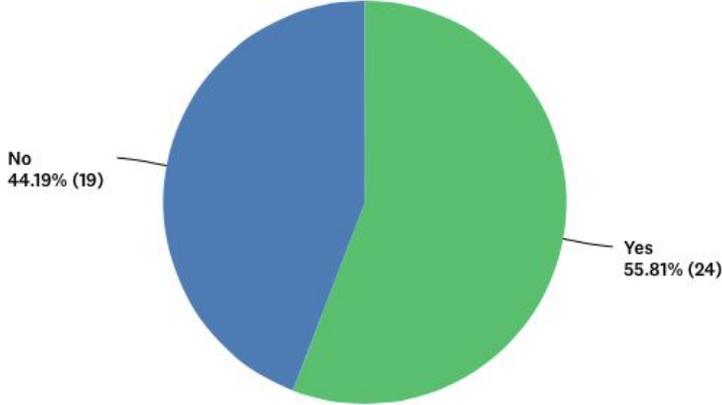


ANSWER CHOICES	RESPONSES
Yes	65.12% 28
No	34.88% 15
TOTAL	43

Question 2: we wanted to know if students are aware about this statement and 65.12% were aware.

Did you know that the devices we use daily such as Air conditioning, computers and Lighting emit carbon dioxide?

Answered: 43 Skipped: 0

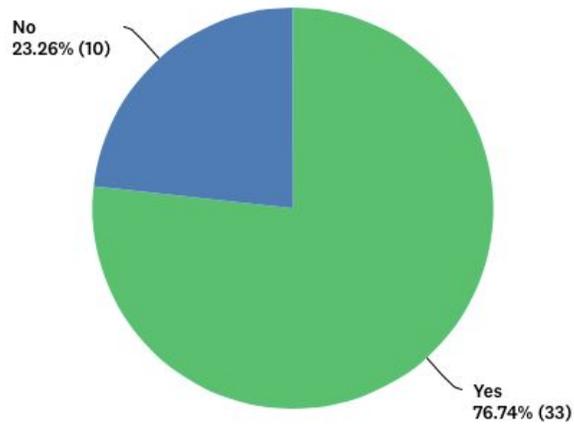


ANSWER CHOICES	RESPONSES	
Yes	55.81%	24
No	44.19%	19
TOTAL		43

Question 3: we wanted to know if students are aware that the devices we use daily emit carbon dioxide and the results were similar 55.81% know about it and 44.19% are not aware.

Did you know that the more energy you use the more carbon dioxide is emitted?

Answered: 43 Skipped: 0

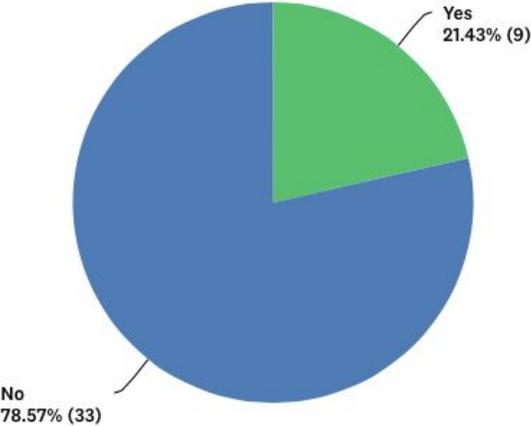


ANSWER CHOICES	RESPONSES	
▼ Yes	76.74%	33
▼ No	23.26%	10
TOTAL		43

Question 4: for this statement we wanted to know if students are aware about it, and from the results we got 76.74% are aware.

Are you following any plans or methods in order to reduce your energy consumption?

Answered: 42 Skipped: 1

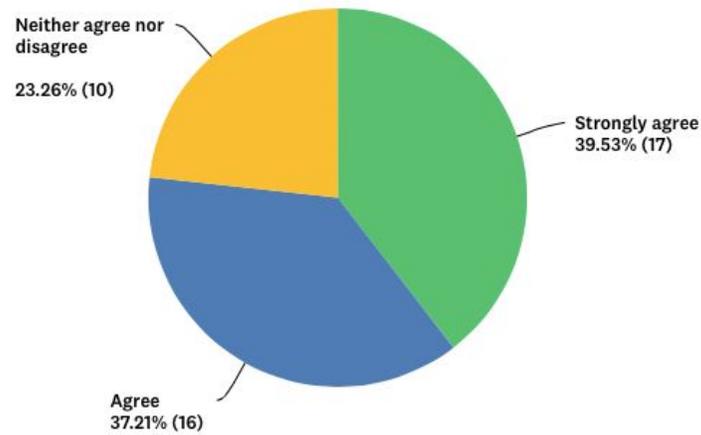


ANSWER CHOICES	RESPONSES
▼ Yes	21.43% 9
▼ No	78.57% 33
TOTAL	42

Question 5 : for this question we wanted to know if students follow any plans to reduce carbon footprint, the results show 78.57% don't follow any plans.

To what extent do you agree that a Real-time monitoring system for carbon footprint will minimize energy consumption and carbon footprint?

Answered: 43 Skipped: 0

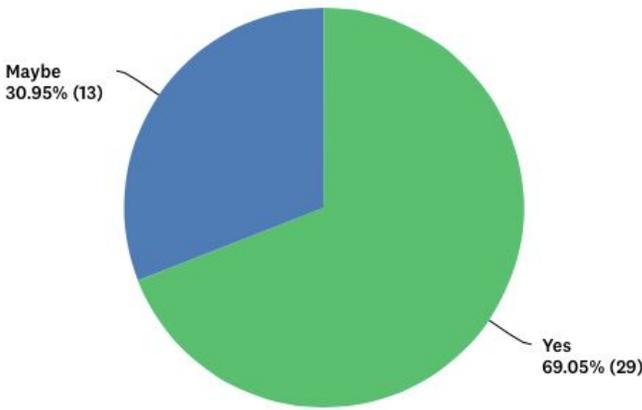


ANSWER CHOICES	RESPONSES
Strongly agree	39.53% 17
Agree	37.21% 16
Neither agree nor disagree	23.26% 10
Disagree	0.00% 0
Strongly disagree	0.00% 0
TOTAL	43

Question 6: we wanted to know the student's opinion about our proposed design which is providing monitoring system for carbon footprint, the results show that 39.53% strongly agree and 37.21% agree.

If there are proposed solutions that would minimize carbon footprint will you apply it?

Answered: 42 Skipped: 1

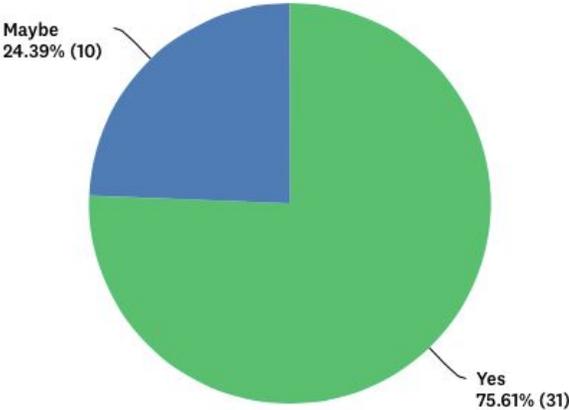


ANSWER CHOICES	RESPONSES
Yes	69.05% 29
Maybe	30.95% 13
No	0.00% 0
TOTAL	42

Question 7: we wanted to mention the second part of our project which is proposed solutions and if students would apply them. The results show that 69.05% will apply them.

Do you think our project will contribute in bringing awareness about carbon footprint and help reduce it?

Answered: 41 Skipped: 2



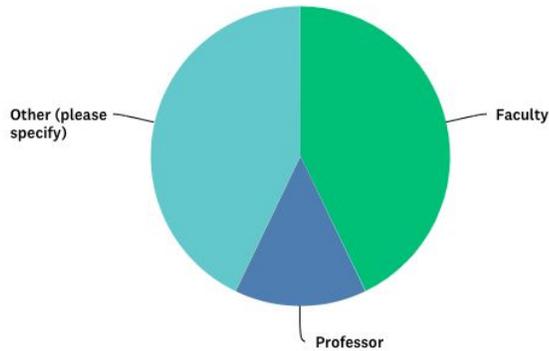
ANSWER CHOICES	RESPONSES
Yes	75.61% 31
Maybe	24.39% 10
No	0.00% 0
TOTAL	41

Question 8: we wanted to ask students if our project will bring awareness about carbon footprint and this will help us in our project since its a major element, and the results were helpful since 75.61% agree that our design will help raise awareness.

Survey 2: Experts/Faculty survey:

What is your profession?

Answered: 7 Skipped: 0

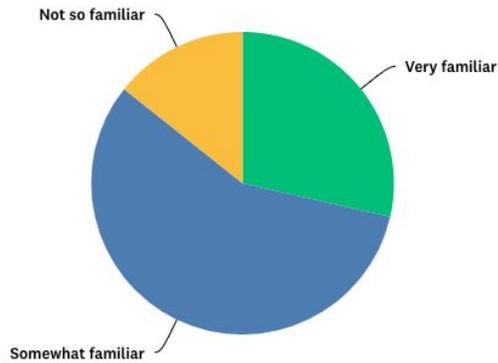


ANSWER CHOICES	RESPONSES
Faculty	42.86% 3
Professor	14.29% 1
Researcher	0.00% 0
Other (please specify)	Responses 42.86% 3
TOTAL	7

Question 1: It was to determine under which category each person is under and how might the amount of energy consumed can be estimated. It was also targeted to people working in the electrical field.

To what extent are you familiar with carbon footprint?

Answered: 7 Skipped: 0

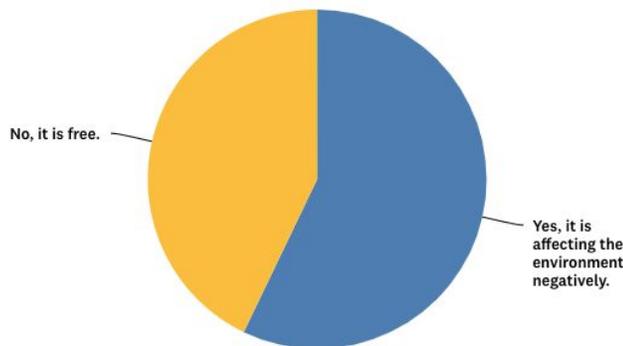


ANSWER CHOICES	RESPONSES	
Very familiar	28.57%	2
Somewhat familiar	57.14%	4
Not so familiar	14.29%	1
TOTAL		7

Question 2: To visualize how familiar the people working in the electrical engineering field with carbon footprint. It shows that almost half are somewhat familiar.

Do you monitor your energy consumption in your workplace? Why?

Answered: 7 Skipped: 0

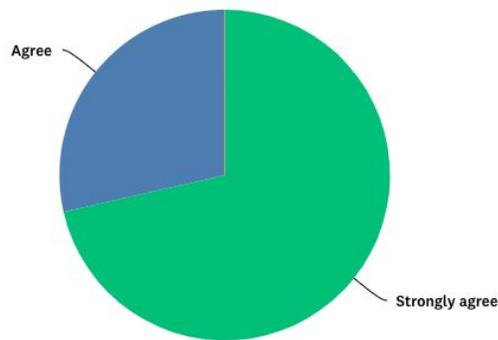


ANSWER CHOICES	RESPONSES	
Yes, the company has to pay the bill.	0.00%	0
Yes, it is affecting the environment negatively.	57.14%	4
No, it is free.	42.86%	3
TOTAL		7

Question 3: This question was to see if people monitor the amount of energy they are consuming. It shows that several do not monitor their energy consumption since it is free of charge.

Do you think carbon footprint is detrimental to the environment and is a world-wide problem?

Answered: 7 Skipped: 0

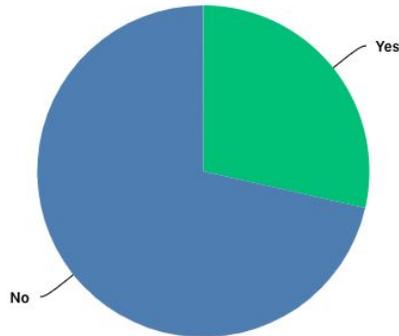


ANSWER CHOICES	RESPONSES
Strongly agree	71.43% 5
Agree	28.57% 2
Neither agree nor disagree	0.00% 0
Disagree	0.00% 0
Strongly disagree	0.00% 0
TOTAL	7

Question 4: The majority strongly agree that carbon footprint is detrimental to the environment and is a worldwide problem. This question also gave us an insight if these experts are familiar with the issue of carbon footprint.

Are you aware of any efforts made in Qatar to reduce the carbon footprint?

Answered: 7 Skipped: 0

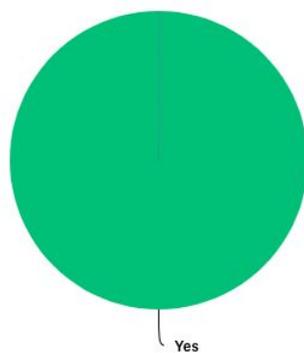


ANSWER CHOICES	RESPONSES	
▼ Yes	28.57%	2
▼ No	71.43%	5
TOTAL		7

Question 5: The majority of 71.43% are not aware of any efforts made in Qatar to reduce the carbon footprint.

Do you think providing real time monitoring system would help make people aware of the problem and try to reduce carbon footprint?

Answered: 7 Skipped: 0

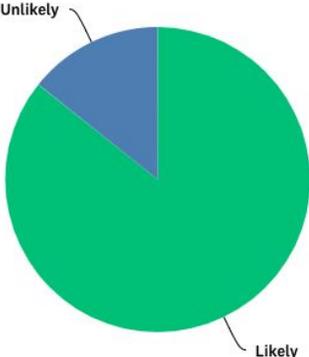


ANSWER CHOICES	RESPONSES	
▼ Yes	100.00%	7
▼ No	0.00%	0
TOTAL		7

Question 6: All participants agreed to the fact that providing a monitoring system will help raise awareness and reduce carbon footprint.

Do you think our project will contribute to bringing awareness and reducing carbon footprint?

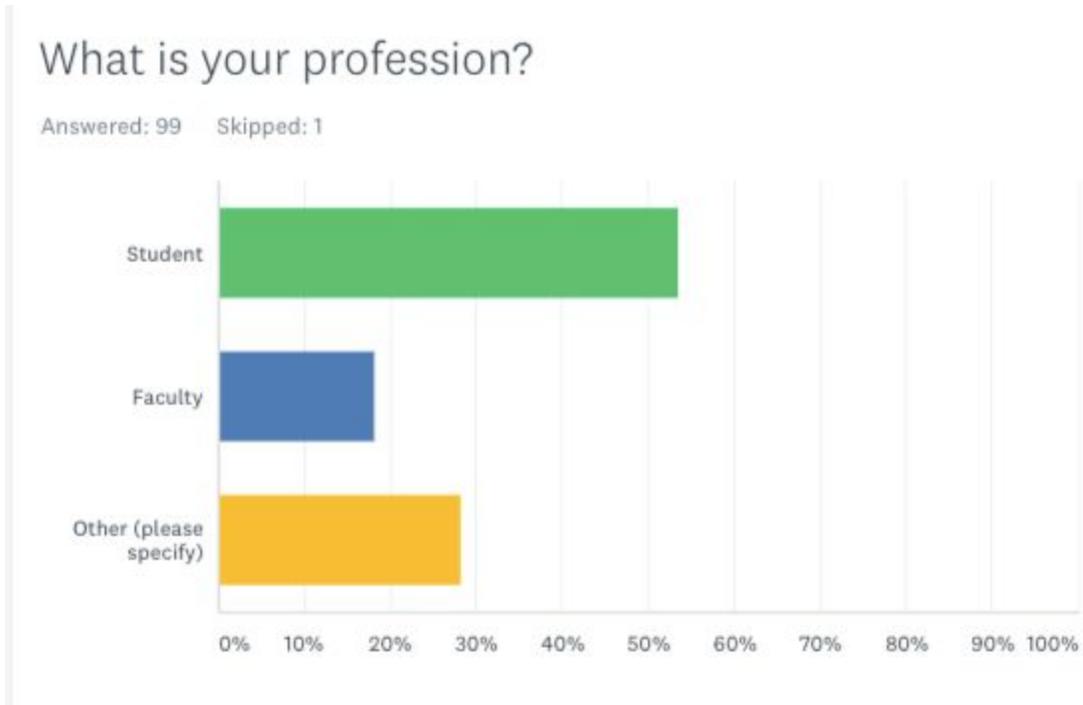
Answered: 7 Skipped: 0



ANSWER CHOICES	RESPONSES
▼ Likely	85.71% 6
▼ Unlikely	14.29% 1
TOTAL	7

Question 7: The majority of 85.71% agreed that our project will contribute to bringing awareness and reducing carbon footprint.

Survey 3: Public survey:



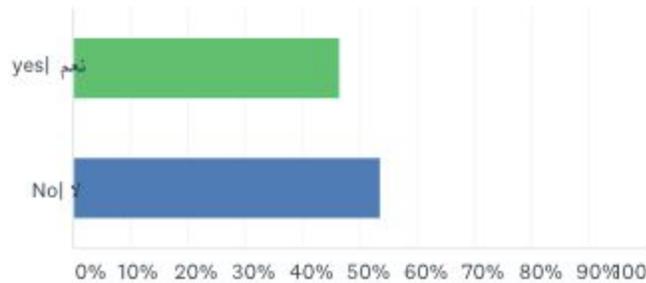
Question 1: we wanted to know the occupation of the responders.

Q2

Customize Save as

Did you know that carbon footprint refers to the amount of carbon dioxide emitted by a particular human activity?
س: هل تعلم أن البصمة الكربونية تشير إلى كمية ثاني أكسيد الكربون المنبعثة من نشاط بشري

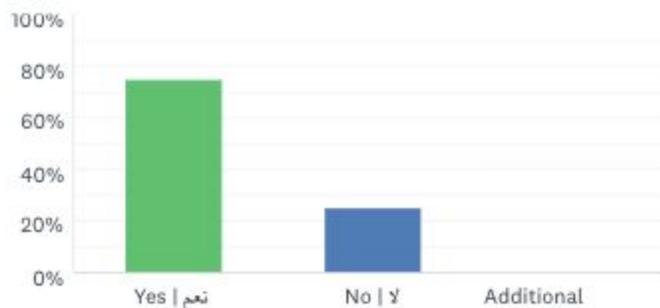
Answered: 99 Skipped: 1



Question 2: we wanted to know if the public are aware about this statement and 65.12% were aware.

Did you know that the more energy you use the more carbon dioxide is emitted?
س: هل تعلم أنه كلما زادت الطاقة التي تستخدمها كلما زاد انبعاث ثاني أكسيد الكربون؟

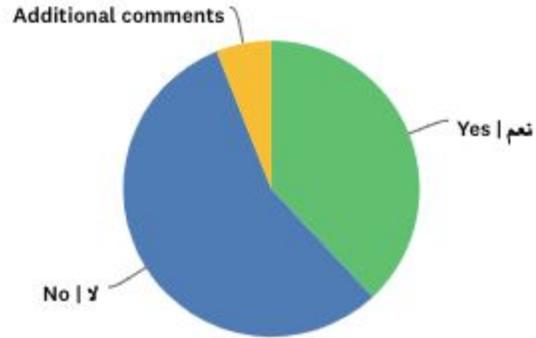
Answered: 100 Skipped: 0



Question 3: we wanted to know if the public are aware that the devices we use daily emit carbon dioxide.

Are you currently following any plans or methods in order to reduce your energy consumption? هل تتبع أي خطط أو طرق من أجل تقليل استهلاك الطاقة الخاصة بك؟

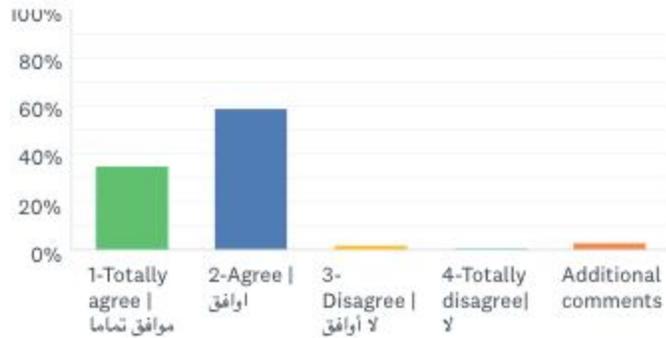
Answered: 100 Skipped: 0



Question 4: for this statement we wanted to know if the public are aware about it.

To what extent do you agree that a Real-time monitoring system for carbon footprint will minimize energy consumption and carbon footprint? من إلى أي مدى توافق على أن نظام مراقبة لبصمة الكربون سوف يقلل من استهلاك الطاقة وانبعاثات الكربون

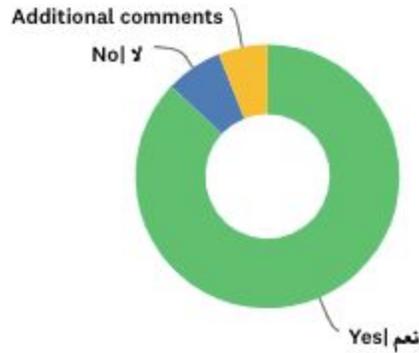
Answered: 100 Skipped: 0



Question 5 : for this question we wanted to know if the public follow any plans to reduce carbon footprint,

If there are proposed solutions that would minimize Carbon footprint will you apply it?
س: إذا كانت هناك حلول مقترحة من شأنها تقليل انبعاثات ثاني أكسيد الكربون إلى الحد الأدنى، فهل ستطبقها؟

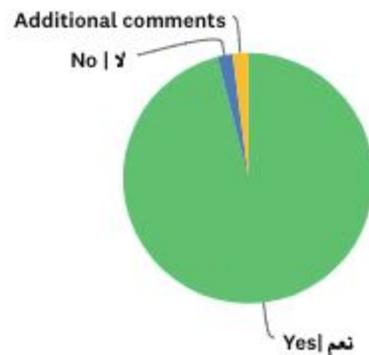
Answered: 100 Skipped: 0



Question 6: we wanted to know the public opinion about our proposed design which is providing monitoring system for carbon footprint.

Do you think our project will contribute in bringing awareness about carbon footprint and help reduce it?
س: هل تعتقد أن مشروعنا سيساهم في نشر الوعي حول البصمة الكربونية ويساعد على تقليلها؟

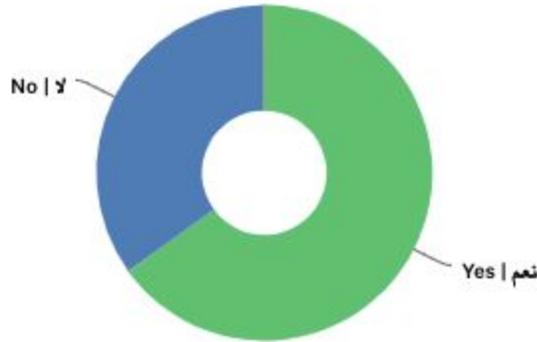
Answered: 100 Skipped: 0



Question 7: we wanted to mention the second part of our project which is proposed solutions and if the public would apply them.

did you know that the devices we use daily such as Air conditioning, computers and Lighting emit carbon dioxide?
س: هل تعلم أن الأجهزة التي نستخدمها يوميا مثل تكييف الهواء وأجهزة الكمبيوتر والإضاءة تنبعث منها ثاني أكسيد الكربون؟

Answered: 100 Skipped: 0



Question 8: we wanted to ask the public if our project will bring awareness about carbon footprint and this will help us in our project since its a major element.

Evaluation of assignment

Survey 1: Student survey:

Three surveys were made targeting TAMUQ students, the public, and Experts in the field of engineering.

For the first survey we made it specific for TAMUQ students, the first question was to ask about the profession of the person doing the survey and since this survey was just for TAMUQ students so 85.00% were TAMUQ students and 12.50% were employees and postgraduate students. The second question in the survey was to know if people are aware that carbon footprint refers to the amount of carbon dioxide emitted by a particular human activity, and the results were 65.12% were aware about this problem but 34.88% were not aware about this. The third question was related to the second one because we wanted to know if students are aware that air conditioners, lighting, and the devices they use emit carbon footprint, and the results were that 55.81% are aware however a large percentage as well didn't know about this issue 44.19%, the two percentages are similar so we can say that half of the students were not familiar with this fact. For the fourth question, we wanted to know if students are aware that the more energy we consume the more carbon footprint is emitted and the results showed a high percentage which is 76.74% of students that are aware of this statement and 23.26% that are not aware about this, we have also got a comment that the question we mentioned made him/her aware about this fact. For the fifth question, it was very important to us to know if students follow any methods to reduce carbon footprint and the results were expected that 78.57% of students don't follow any methods to reduce carbon footprint and this is a big percentage that affects energy consumption and carbon footprint. For the sixth question we related to our proposed design which is providing real time monitoring system if it would help reduce carbon footprint and the results were motivation because 39.53% of students strongly agree and 37.21% agree with this statement and 23.26% neither agree or disagree and 0% disagree so this result motivated us because from the student's point of view, our monitoring system would help to solve this issue. For the seventh question, we focused on mentioning the second part of our design which is if we provided solutions to reduce carbon footprint would students apply it? And the results we got were 69.05% are willing to apply the proposed design and this encouraged us to move forward with this statement, but 30.95% were not sure if they would apply them or not but it's a small percentage and 0% was people that refuse to apply it. The eighth question, it was very important for us to know if our project would bring awareness about carbon footprint, and the results were positive since 75.61% agree that it would raise awareness and one student

suggests that to get information on how much power TAMUQ building needs per day would also help and we will take this into consideration.

Survey 2: Experts/Faculty survey

we targeted experts in the field of engineering. Therefore, the first question which asked the profession of the person taking the survey. We found that 43.86% were faculty members, 14.29% were professors, and 42.85% chose the “other” category. The second question asked to what extent are they familiar with carbon footprint. The results vary where 28.57% were very familiar, 57.14% were somewhat familiar, and 14.29% were not familiar with the concept of carbon footprint. The third question asked if they monitor energy consumption in their workplace and why. It was interesting to find that 57.14% do monitor the energy consumption because it is affecting the environment negatively, whereas, 42.86% do not monitor the energy consumption since it is provided to them for free. The fourth question asked if they think if carbon footprint is detrimental to the environment and is a worldwide problem. It was found that 71.43% strongly agreed, whereas, 28.57% agreed. The fifth question asked if they were aware of any efforts made in Qatar to reduce the carbon footprint. The majority of 71.43% are not aware of any efforts made, however, 28.57% are aware of the efforts made in Qatar to reduce the carbon footprint. The sixth question asked if they think that providing a real-time monitoring system would help make people aware of the problem and try to reduce carbon footprint. All of the responses do think that providing a real-time monitoring system will help bring awareness and try to reduce the carbon footprint. Finally, the last question was if they think our project will contribute to bringing awareness and reducing carbon footprint. It was found that 85.71% think that it is likely to achieve this objective, whereas, 14.29% think that it is unlikely to achieve the objective of bringing awareness and reducing the carbon footprint.

Survey 3: Public survey:

The audience for the third survey is the public, the study contains seven questions written in English and Arabic, and we used social media to send the survey, we received 100 responses. There are two main goals for the public survey. The first goal of the survey is to raise awareness among people by introducing the concept of carbon footprint . not only that, but we also wanted to inform them about the linear relationship between energy consumption and carbon footprint. The second goal was to introduce our proposed design and measure the extent to which people adopt the proposed

solutions. The first four questions are intended for the first goal, while the last four are intended for the second goal. Around half of the responders were students while the other half was faculties and other occupations such as school teacher, alumni, and a housewife. In the first questions, we asked about the profession to know the background knowledge the responders had. 53.54% of the responders were students, 18.18% were faculty, and 28.28% were school teachers and housewives. In the second question, we asked the public if they were aware of the concept of carbon footprint, which is the amount of carbon dioxide emitted by particular human activity. The results showed 46.46% knew about the idea of carbon footprint, and 53.54% didn't know what carbon footprint. In the third question, we asked them whether they knew that the devices we use daily in our life, such as air conditioning, computers, and lighting, consume energy, and therefore causes carbon footprint. 65% of the responders were aware of this, while 35% didn't know this fact. In the fourth question, we also focused on their consumption, so we asked them whether they knew that the more energy we use, the more carbon footprint emitted. 75% were aware of this fact, while 25% were not aware of this relationship between energy consumption and carbon footprint. In the fifth question, we wanted to know whether they follow any energy management plans. The results showed that only 38% of the responders do, and 56 % of the responders don't follow any procedures. In the sixth question, we wanted to know to what extent they agree that a carbon footprint monitoring system will help to minimize energy consumption and carbon footprint. Around 94% of the responder agrees with the idea while 2% disagrees with our proposed solution. In the last questions, we asked the responders if proposed solutions exist would they apply it. 87 % of the responders were willing to use the proposed solution, while 7 % were not willing.

Interviews

Three interviews were made with people that are experts in the field

Interview 1: QEERI interview with Dr.Abdlmonem Beitelmal

Dr.Abdlmonem is a principal research scientist at Qatar Environment & Energy Research Institute so we wanted to benefit from his experience in the field of energy efficiency to know hid feedback about our project.

We prepared five questions for the interview, starting with the first question which is : how detrimental is carbon footprint to the environment and is it a world-wide problem ? Dr. Abdlmonem answered that carbon footprint is the amount of energy used and there is high demand on energy that is increasing, and this is a world-wide problem that we need to limit. For the second question which is : are you aware of any efforts made in

Qatar to reduce carbon footprint? We wanted to know if this idea was approached in the region or not , and Dr.Abdlmonem answered that there are efforts made in the country and specifically by Tarsheed-Kahramaa since they are trying to limit the usage of energy and increase awareness, also they put regulations to enforce them to help reduce carbon footprint.in addition he mentioned that national steps are taken but there a lot to be done not only on the national level but world-wide since sustainability brings everything in because everyone is involved. For the third question which is : do you think providing a monitoring system would help make people become aware of the problem and would reduce carbon footprint? This is question is important to us since its part of our proposed design and we wanted to know his opinion about it. He answered that monitoring help and prevent people from wasting energy since it shows by numbers the energy consumed and adding solution to limit it would help achieve the goal. For the fourth question which is : how do you see our project contribute to bringing awareness about carbon footprint and helping to reduce it? He answered that since our project is a case study which will be applied in TAMUQ building this would raise awareness in Qatar foundation community and then this project might be applied to all the buildings in education city. Convince people by educating them to follow this project. For the last question which is : what would make our project effective in achieving its objective? This question is very important to us since we want Dr.Abdlmonem to answer since he's an expert in energy efficiency and would help us know what to add to our project to make it more effective. He answered that we should design our methodology using accurate data to obtain accurate results, highlighting the main takeaway and reduce energy consumption.

Interview 2: Qatar Green Building Council interview with Dr. Fedaa

The first question asked was, how detrimental is carbon footprint to the environment and is it a worldwide problem. Dr. Fedaa answered, of course, the carbon footprint is detrimental to the environment worldwide since it releases one of the greenhouse gasses which is CO₂ emission. She also expressed how this is one of the major main causes of global warming and climate change. The second question asked was if she is aware of any efforts made in Qatar to reduce the carbon footprint. Dr. Fedaa mentioned that the Ministry of Environment has a plan of action to monitor the carbon footprint emission to help solve the problem of climate change and global warming in the future. In addition, Ras Laffan is the first industrial area working on Neutral air. This means that the amount of CO₂ emitted will equal the CO₂ absorbed by plants resulting in a net of zero. Dr. Fedaa also indicated that she previously worked in QEERI. During her stay, they worked on air quality which means that Qatar foundation and some of the

surrounding areas would result in having a neutral environment. They had three stations placed separately monitoring the emissions in this area. The third question asked if she thinks that applying a monitoring system would help reduce the carbon footprint and bring awareness to people. Dr. Fedaa specified that by disseminating our work and results found by the monitoring system will raise awareness, however, the monitoring system will make us (the people that are designing the monitoring system) aware. The fourth question, in Dr. Fedaa's opinion, was very similar to the previous question. However, she replied by stating that our group can disseminate our work through workshops, discussion panels, and visiting secondary schools to raise awareness. Finally, Dr. Fedaa agreed that reducing the energy consumption in the building will contribute to reducing the amount of carbon footprint emitted. Also, monitoring the end-use such as air conditioning, computers and more, is one of the vital steps of energy auditing and assessment of the building.

Interview 3 : Qatar University with Ms.Mays Abdalla

we interview Mays Abdalla, who is an Environmental and Sustainability Specialist at Qatar University. We asked her five questions regarding the importance of our project and her thoughts about the idea as well . for the first question, we wanted to know her opinion about carbon footprint is and whether its a significant problem that affects the world. Her immediate response was yes, and carbon dioxide is the primary cause of global warming and climate change. It is a significant issue, especially with the fact that Qatar is the second-highest carbon footprint per capita, according to the World Wildlife Fund. The second question we asked her if she is aware of any effort is done to reduce the carbon footprint in Qatar.Ms.Mays mentioned that the starting point was with Qatar vision 2030 environmental development pillar. They stated that we need to get the harmony between economics and environment protection. A lot of national effort has been made to raise awareness about energy efficiency, especially in the last two decades. In the third question, we asked her what does she think about providing a monitoring system would help make people aware of the problem and would reduce carbon footprint. She responded that providing a monitoring system will help us find controlling measures, .but for the awareness aspect, we need to engage the community with seminars, infographics attractively displayed on the screens, and conducting surveys. In the last question, we asked for recommendations in which we can make the carbon footprint reduction more efficient. Ms. Mays emphasized society's role along with facility management on saving energy and that without their involvement, not much change can be made.

Conclusion:

To conclude, we prepared three survey and made three interviews to collect feedback about our proposed design project. The surveys were made to target students, public and experts as our goal was to raise awareness and familiarize them with our project. The interview was done to benefit from the experts experience to apply it in our project. From the results we got we became more aware about people's opinions and how we can use the responses and feedback to improve our project.

Appendix

Survey 1: Student survey:

Carbon Footprint Monitoring System

Carbon footprint is the amount of carbon dioxide released as a result of individual or group activities. Qatar is ranked the first in carbon footprint per capita, therefore we aim in our project to design a real-time monitoring system for carbon footprint in TAMUQ in order to come up with optimum usage of energy in the building and reduce carbon footprint.

1. what is your profession?

- student
- faculty
- Other (please specify)

2. Did you know that carbon footprint refers to the amount of carbon dioxide emitted by a particular human activity?

Yes

No

Additional comments?

3. Did you know that the devices we use daily such as Air conditioning, computers and Lighting emit carbon dioxide?

Yes

No

Additional comments?

4. Did you know that the more energy you use the more carbon dioxide is emitted?

Yes

No

Additional comments?

5. Are you following any plans or methods in order to reduce your energy consumption?

Yes

No

Additional comments?

6. To what extent do you agree that a Real-time monitoring system for carbon footprint will minimize energy consumption and carbon footprint?

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Additional comments?

7. If there are proposed solutions that would minimize carbon footprint will you apply it?

- Yes
- Maybe
- No

Additional comments?

8. Do you think our project will contribute in bringing awareness about carbon footprint and help reduce it?

- Yes
- Maybe
- No

Additional comments?

Survey 2 : experts/faculty survey:

Carbon Footprint Monitoring System

Carbon footprint is the amount of carbon dioxide released as a result of individual or group activities. Qatar is ranked the first in carbon footprint per capita, therefore we aim in our project to design a real-time monitoring system for carbon footprint in order to come up with optimum usage of energy in the building and reduce carbon footprint.

1. What is your profession?

2. To what extent are you familiar with carbon footprint?

- Very familiar
- Somewhat familiar
- Not so familiar

Additional Comments

3. Do you monitor your energy consumption in your workplace? Why?

- Yes, the company has to pay the bill.
- Yes, it is affecting the environment negatively.
- No, it is free.

Additional Comments

4. Do you think carbon footprint is detrimental to the environment and is a world-wide problem?

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Additional Comments

5. Are you aware of any efforts made in Qatar to reduce the carbon footprint?

6. Do you think providing real time monitoring system would help make people aware of the problem and try to reduce carbon footprint?

Yes

No

Additional Comments

7. Do you think our project will contribute to bringing awareness and reducing carbon footprint?

Likely

Unlikely

Additional Comments

Done

Survey 3: public survey:

Carbon Footprint Monitoring System

Carbon footprint is the amount of carbon dioxide released as a result of individual or group activities. Qatar is ranked the first in carbon footprint per capita, therefore we aim in our project to design a real-time monitoring system for carbon footprint in order to come up with optimum usage of energy in a building and reduce carbon footprint.

البصمة الكربونية هي كمية ثاني أكسيد الكربون المنبعثة نتيجة للأنشطة الفردية أو الجماعية. تحتل قطر المرتبة الأولى من حيث نصيب الفرد من الكربون ، وبالتالي فإننا نهدف في مشروعنا إلى تصميم نظام مراقبة لانبعاثات الكربون من أجل التوصل إلى الاستخدام الأمثل للطاقة في المبنى والحد من البصمة الكربونية.

1. What is your profession?

- Student
- Faculty
- Other (please specify)

2. Did you know that carbon footprint refers to the amount of carbon dioxide emitted by a particular human activity?

س: هل تعلم أن البصمة الكربونية تشير إلى كمية ثاني أكسيد الكربون المنبعثة من نشاط بشري

- yes | نعم
- No | لا

Additional comments

3. did you know that the devices we use daily such as Air conditioning, computers and Lighting emit carbon dioxide?

س: هل تعلم أن الأجهزة التي نستخدمها يوميا مثل تكييف الهواء وأجهزة الكمبيوتر والإضاءة تنبعث منها ثاني أكسيد الكربون؟

- Yes | نعم
- No | لا
- Additional comments

4. Did you know that the more energy you use the more carbon dioxide is emitted?
س: هل تعلم أنه كلما زادت الطاقة التي تستخدمها كلما زاد انبعاث ثاني أكسيد الكربون؟

Yes | نعم

No | لا

Additional comments

5. Are you currently following any plans or methods in order to reduce your energy consumption?
س: هل تتبع أي خطط أو طرق من أجل تقليل استهلاك الطاقة الخاصة بك؟

Yes | نعم

No | لا

Additional comments

6. To what extent do you agree that a Real-time monitoring system for carbon footprint will minimize energy consumption and carbon footprint?

س: إلى أي مدى توافق على أن نظام مراقبة لبصمة الكربون سوف يقلل من استهلاك الطاقة وانبعاثات الكربون

- 1-Totally agree | موافق تماما
- 2-Agree | اوافق
- 3-Disagree | لا أوافق
- 4-Totally disagree | لا أوافق تمامًا
- Additional comments

7. If there are proposed solutions that would minimize Carbon footprint will you apply it?

س: إذا كانت هناك حلول مقترحة من شأنها تقليل انبعاثات ثاني أكسيد الكربون إلى الحد الأدنى ، فهل ستطبقها؟

- Yes | نعم
- No | لا
- Additional comments

8. Do you think our project will contribute in bringing awareness about carbon footprint and help reduce it?

س: هل تعتقد أن مشروعنا سيساهم في نشر الوعي حول البصمة الكربونية ويساعد على تقليلها؟

- Yes | نعم
- No | لا
- Additional comments

Interview questions: for the three interviews

1.How detrimental is carbon footprint to the environment? Is it a world-wide problem? Why?

2.Are you aware of any efforts made in Qatar to reduce the carbon footprint? If so, has there any success in this regard?

3.Based on your knowledge and background, would you think providing a monitoring system would help make people become aware of the problem and would reduce carbon footprint?

4.How do you see our project contribute to bringing awareness about carbon footprint and helping to reduce it?

5.What would make our project effective in achieving its objective?