Al-Mustaqbal University College

Progress Report SDG7 2021

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1 INTRODUCTION

Energy sector is playing important in the priority of the civilization and making the life of citizens better by offering jobs for engineers, technician etc. In this way the countries that uses wide range of especially renewable energy will help our environment to remain clean. Besides, the renewable energy support the conventional type of energy which they are based upon combustion of the fossil fuel. In this way, the country with high quality energy section will fight the poor, hunger and even enhancing the quality of educations.

Also, MUC do its best to introduce renewable energy through many projects which if the industry care on these project, it will help the society for different cocking and heating water purposes in addition to generating of electrical power.

2 AFFORDABLE AND CLEAN ENERGY

2.1 MUC CONTRIBUTION IN BUILDINGS

Sustainable Energy for all SDG goals is a call for both revolution and reform: a radical vision where everyone can access and afford the reliable energy, they need to live a productive, healthy, secure life, while respecting the planetary constraints that we all face as a result of climate change.

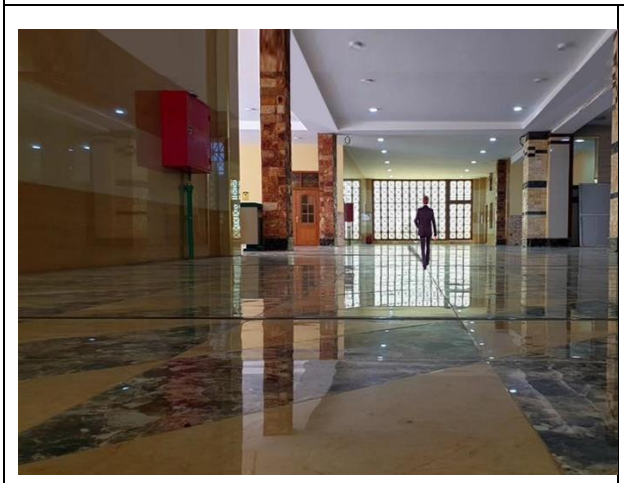
Our college had many higher energy efficiency buildings. For example, utilizing of solar photovoltaic that installed in the roof of MUC buildings for LED lighting and lamps. Also, solar umbrella that installed within our college for charging smart phone and even to lighting the street in nights. Also, our buildings contains LED lightings which is better more than the conventional lightings, lowest cost and less heating generation.

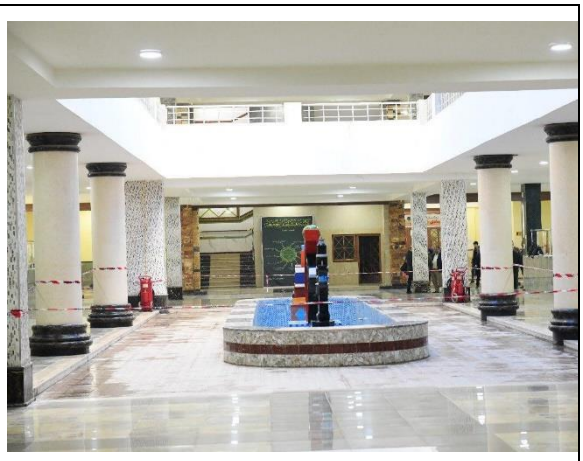
The air conditionings and split unit assisted by solar panels had been utilized within MUC buildings. It is worthy to mention that skylights to allowing sunshing and natural light flood into the buildings.

A new buildings regarding the renewable energy research had been built and its lightings powered by two sources of renewable energy sources (solar energy panels and horizontal axis wind turbine). It contains also, solar absorption refrigerator that it would be helpful in the rear regions as it works on solar energy.

Also, w.r.t. COVID-19, we design of ventilations systems for the office room and the hospitals buildings which take into account the COVID-19 spread within the buildings laboratories of MUC

Images to the above mentioned works are inserted below;

Energy Efficient Appliances Usage: using efficient appliance devices in the (Al-Mustaqbal University College – Iraq – Babylon)	
	
Solar Photovoltaic (PV) panels for LED lighting and lamps.	
	
Use of LED lighting and lamps with light detection	Solar street lightng

	
Using efficient air conditioning split unit working on the solar panel	Installing skylights to allowing sunshing and natural light flood into the building
	
replace the old computer with new laptop	Implementation walk-through disinfection gates powered using solar panel
 	 

solar umbrella	Solar Absorption Refrigerator
	 
Solar split unit	Energy labs sustainability due to its service the community espicially the students and researchers
	
Air Conditioning & Refrigeration Engineering Department Promotes a	smart research solar center

Refrigeration Entity Operated by a Hybrid Solar System	
 Ventilation system in hospitals which help in redcue the COVID-19 spread	
Figure 1. Higher energy systems in MUC	

Figure 2 shows other buildings in MUC in addition to new building that it under construction and it is predicted that it will be ready for receiving our students for the new academic year 2021 – 2022. It can be seen the green area always taken into our consideration.

Figure 2. MUC new buildings

2.2 MUC IN CARBON DIOXIDE MANAGEMENT

The context in which the Carbon Management has been developed is outlined in the following sections.

Al-Mustaqabl University College has adopted a series of core values for carbon management. These include a statement of concern for sustainability and the relationship with the environment. On that basis a University Environmental Policy has been developed that is reviewed regularly by the Environmental Strategy Committee. The Policy states that:

In achieving excellence in teaching and research, the MUC aims to manage its activities, buildings and estates to promote environmental sustainability, to conserve and enhance natural resources and to prevent environmental pollution, to bring about a continual improvement in its environmental performance.

The University will comply fully with environmental legislation and officially approved codes of practice, and will make continued efforts:

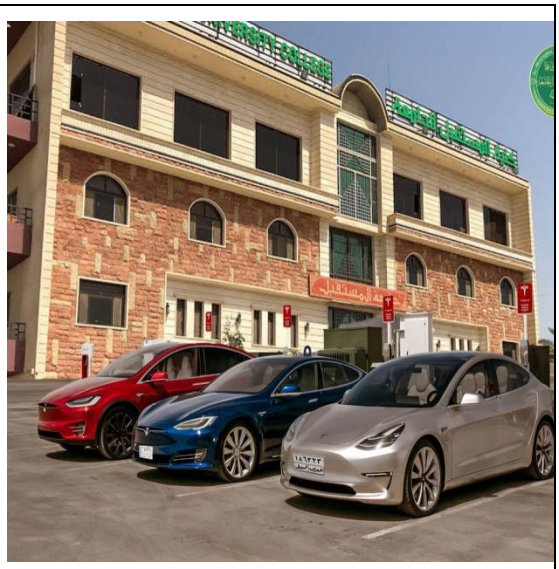
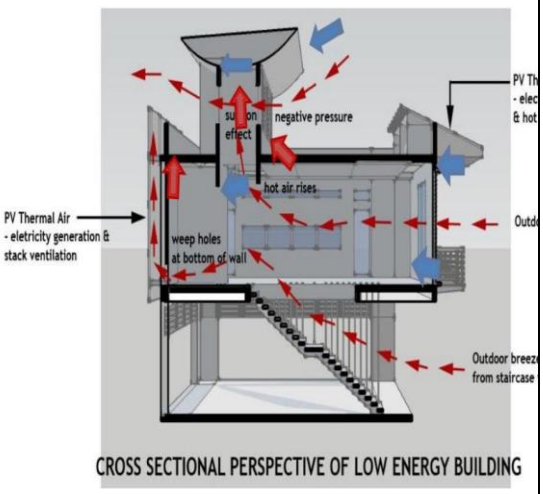
- to promote sound environmental management policies and practices in the work of all, Departments, and other units ;
- to increase awareness of environmental responsibilities amongst staff and students;
- to work with other agencies locally, nationally, and internationally to promote appropriate environmental policies;
- to implement policies and procedures that contribute to a reduction in the University's carbon footprint;
- to minimise waste and pollution, and to operate effective waste management procedures;
- to reduce the consumption of fossil fuels;
- to reduce water consumption;
- to promote a purchasing policy which will give preference, as far as practicable, to those products and services which cause the least harm to the environment;
- to avoid use, wherever possible, of environmentally damaging substances, materials, and processes;

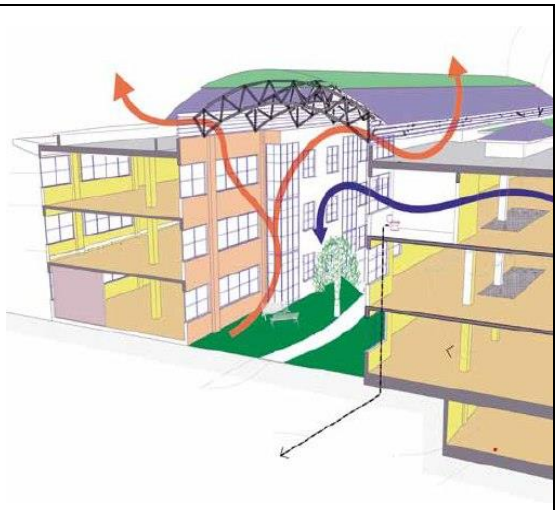
- to maintain the grounds and buildings of the University Estate in an environmentally sensitive way;
- to have regard to environmental factors as far as practicable in respect of the growth of the University and the integration of new developments into the local environment;
- to encourage modes of transport by staff and students which minimise the environmental impact;
- to communicate with interested parties on issues relating to the Environmental Policy including contacts in the immediate neighbourhood, and the regional, national and global community.

Al-Mustaqbal University College contributes to climate change directly, through emissions from University facilities, and indirectly, through both emissions associated with its demand for goods and services and through the disposal of wastes. These emissions are categorized as

- Direct emissions that occur from sources that are owned or controlled by the organisation, for example emissions from combustion in owned or controlled boilers, furnaces, vehicles
- Emissions from the generation of purchased electricity consumed by the organisation
- All other indirect emissions which are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation, for example, water, waste, business travel, commuting and procurement.

- **Zero Emission Vehicles (ZEV) Policy on Campus**

	
Campus Bikes (Al-Mustaqbal University College, Iraq)	Charging points for EV (Al-Mustaqbal University Colleg, Iraq)
	
Green Building Implementation - Overview Green Technologies implemented at the Environmental Campus Birkenfeld (Al-Mustaqbal University College, Iraq)	Cross section of the Green Building Implementation - Overview Green Technologies implemented at the Environmental Campus Birkenfeld (Al-Mustaqbal University College, Iraq)



The simple design makes it possible for the building to function as a chimney, where warm air is drawn from the ground floor and through the engineering buliding areas, and then escapes under the sides of the vaulted roof, ensuring comfortable temperatures in the classroom and air circulation throughout the building.

Figure 3. Carbon management in MUC

Throughout this Plan, carbon is expressed in terms of Carbon Dioxide Equivalent (CO2 (e)). The Total Carbon Footprint (CO_2 emission in the last 12 months, in metric tons) can be found from the following:

The calculations regarding the concentration of Carbon is inserted below;

CO_2 (electricity)

$$= \frac{electricity\ usage\ per\ year\ (kWh)}{1000} \times 0{,}84$$

$$= \frac{331120\ kWh}{1000} \times 0{,}84$$

$$= 278.14\ \text{ metric tons in (2018/2019)}$$

$$= \frac{123134 kWh}{1000} \times 0{,}84$$

$$= 103.43\ \text{metric tons in (2019/ 2020)}$$

$$= \frac{205350 kWh}{1000} \times 0{,}84$$

$$= 172.5\ \text{ metric tons in (2020/ 2021)}$$

CO_2 (bus)

$$= \frac{number\ of\ shuttle\ bus\ in\ your\ university \times total\ trips\ for\ shuttle\ bus\ service\ each\ day \times approximate\ travel\ distance\ of\ vehicle\ each\ day\ inside\ campus\ only\ (KM) \times 240}{100} \times 0{,}01$$

$$= \frac{7 \times 6 \times 12 \times 240}{100} \times 0{,}01$$

$= 12.096$ metric tons in (2018/2019)

$$= \frac{7 \times 4 \times 12 \times 240}{100} \times 0{,}01$$

= **8.06** metric tons in (2019/ 2020)

$$\frac{15 \times 6 \times 5 \times 240}{100} \times 0{,}01$$

= 1**0.8** metric tons in (2020/ 2021)

CO_2 (cars)

$$= \frac{\text{number of cars entering your university} \times 2 \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0{,}02$$

$$= \frac{495 \times 2 \times 2 \times 240}{100} \times 0{,}02$$

$= 95.04$ metric tons in (2018/ 2019)

$$\frac{200 \times 2 \times 2 \times 240}{100} \times 0{,}02$$

$= 38.4$ metric tons in (2019/ 2020)

$$\frac{150 \times 2 \times 1.5 \times 240}{100} \times 0{,}02$$

$= 21.6$ metric tons in (2020/ 2021)

CO_2 (motorcycle)

$$= \frac{\text{number of motorcycle entering your university} \times 2 \times \text{approximate travel distance of vehicle each day inside campus only (KM)} \times 240}{100} \times 0{,}01$$

$= \frac{495 \times 2 \times 2 \times 240}{100} \times 0{,}01$

$= 47.52$ metric tons in (2019)

$= \frac{50 \times 2 \times 2 \times 240}{100} \times 0{,}01$

$= 4.8$ metric tons in (2019/ 2020)

$= \frac{100 \times 2 \times 1 \times 240}{100} \times 0{,}01$

$= 4.8$ metric tons in (2020/ 2021)

CO_2 (total) in (2018/ 2019)

$= 278.14+12.096+95.04+51.84$

$= 437.116$ metric tons

Carbon footprint in 2018/2019 = 437.116 metric tons

CO_2 (total) in (2019/ 2020)

= 103.34 + 2 +38.4 + 4.8 = 148.54 metric tons

Carbon footprint in 2019/2020 = 148.54 metric tons

CO_2 (total) in (2020/ 2021)

= 172.8 + 10.8+21.6+ 4.8 = 210 metric tons

Carbon footprint in 2020/2021 = 210 metric tons

Carbon emissions due to our activities are one of our most significant environmental impacts and we have ambitious targets to reduce these emissions and limit our impact on the environment. It is important to create a campus that is a living example of sustainability, reducing our impact in practice as well as translating this through our teaching and learning environment.

It can be seen that from Figure 4 which shows the carbon dioxide due to four different sources (buses, cars, motorcycle, and electricity) during the time periods 2019 – 2021. Firstly, w.r.t. bus, it may be noted that COVID-19 had ignorance influence on the CO_2 because buses are not common in Babylon province in a comparison with Baghdad

bases upon the data. Secondly, w.r.t. CO_2 due to cars, it can be seen that there was an obvious reduction of its concentration due to COVID-19 where the plan of government "stay home" had been applied which restrict the movement of the cars. Thirdly, the movement of motorcycle had a little impact on CO_2 concentration in the atmosphere.

Finally, the CO_2 emission ratio due to electricity had the highest rate and it can be seen that the spread of COVID-19 and plan of "Stay Home" was highly influences on the rate of CO_2 . This is due to most of schools, universities, industrial factory had been closed. It can be seen that the total concentration rate in 2019 was the highest rate where the life is normal during the entire year. While in 2020, the concentrations rate was reduces about (30 %) and then in 2021 there is a slight increment in the CO2 emission ratio as there is an increasing in the public transportations and the life is partly back normally and the universities, factories and schools open again.

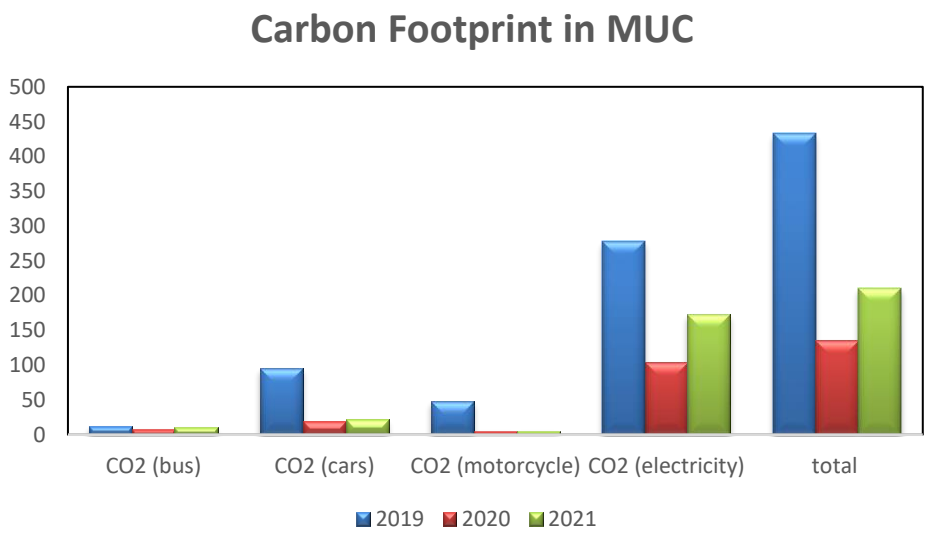


Figure 4. The CO2 Emissions

2.3 MUC IN REDUCTION OF ENERGY CONSUMPTION

(*Al-Mustaqbal University College has many application of solar energy on the building for lighting ,heating, and multipurpose use . The following is an example of the description.*

1. On roofs of administration building, laboratory engineering building, and other teaching buildings, the solar PV power station of total 0.65 MW is installed.

2- energy station has 8 solar thermal water heater, and each one about is 200 kW, to provide hot water for most of the laboratory buildings in winter.

3- installation of solar dual inverter air conditioner split uint in new security building.

MUC had plan that applied in place in order to reduce overall energy consumption which can be summarized in the following major points;

- Solar collectors techniques had been implemented within MUC in order to reduce the total energy consumption and reduce the electrical load on the national grid. Flat plate solar collector [FPSC] had been utilized so much in other comparison with the other types of collectors.

- It is worthy to mention that parabolic trough collector had been installed in our college for the heating purposes.

- These is a plan to install solar dish collector within the next few month starting from 10-10-2021.

- Solar panels had been also utilized for electricity generations which help of course the national grid. It had been installed on many buildings.

- Horizontal axis wind turbine had been utilized and designated via our MUC to generate the electricity

- In this way, two source of renewable energy had been presented in our college which help and service the community of our college and show the students the importance of the renewable energy on reducing emission and support the conventional power plants.

- In Iraqi climate, the HVAC devices utilized a lot of electrical power so, we connect the solar energy technology with the HVAC for two major reasons. The first reason is to supply the energy to drive the systems and the second reason is to reduce the emission as much as possible.

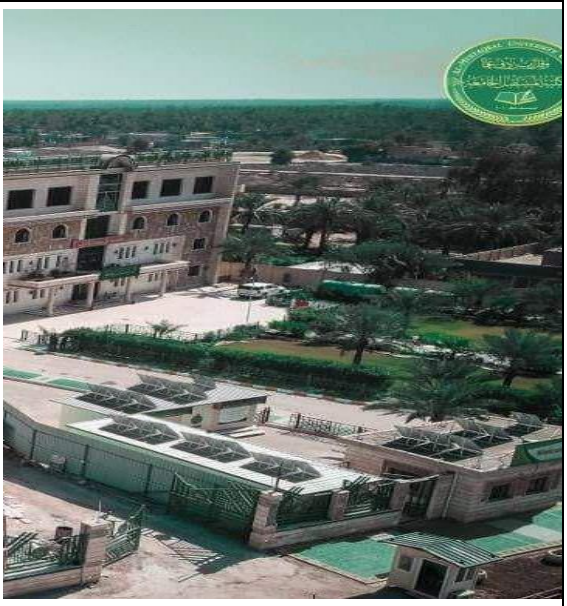
Use the solar water heater on the roof of the shopping book center .	Installed the solar water heater on the roof of the laboratory engineering building.
	
Roof Mounted Solar Panels on the administration building	Roof Mounted Solar Panels on the main restaurant.
	
Use the Solar Panels for multipurpose use (mobile charging	Mounted Solar Panels on the main entrance

Figure 5. Energy consumption within MUC

2.4 ENERGY CONSUMPTION

The analysis approach is based on monitored changes in behavior and energy use collected for Al-Mustaqbal University College between 2020 and 2021 periods to identify areas where energy wastage is the highest and to estimate the overall impacts of stay home order

on the electricity demand in MUC. First, the monitored building are described including their main features and the variations of their energy use between 2020 and the end of September of 2021. Finally, energy consumption is utilized to estimate the impact of both the actual lockdown period as well as the cost benefits of some mitigation measures to reduce the energy consumption in the MUC building.

1- Energy Consumption Calculation

The MUC is located in Babylon Province well known historical ancient as Babylon, a100-km from the capital Baghdad. Al-Mustaqbal university College comprises the following building: Engineering building, Medical building, administration building, sports building, engineering lab building, medical lab building' restaurant. The Percentage of energy consumption in the MUC Buildings for the period of 2020 and 2021 is shown in Figure 6(a-b). The focus of this paper is on the annual energy usage of an office building and its HVAC system, and on-peak powers (demands). It can be seen from Figure 6(a-b) that the medical building has high energy consumption by about 50% of the total energy consumption followed by the engineering building, by about 19%, and the other building (sport and admin, lab building) by about 31 %. .

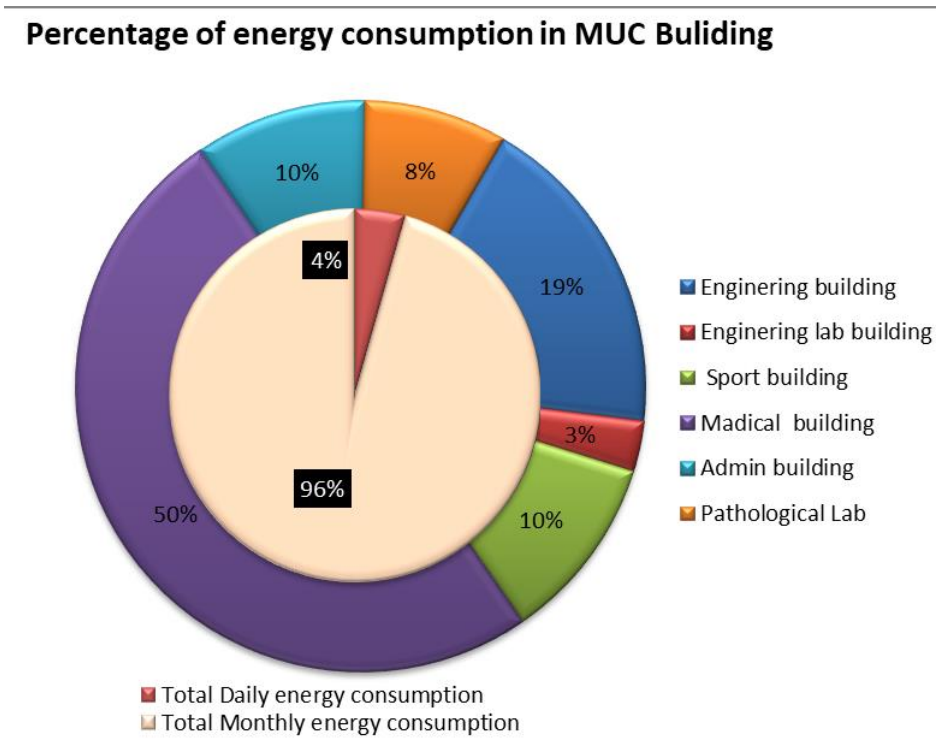


Figure 6a show the annual energy usage in the main MUC Building in 2021

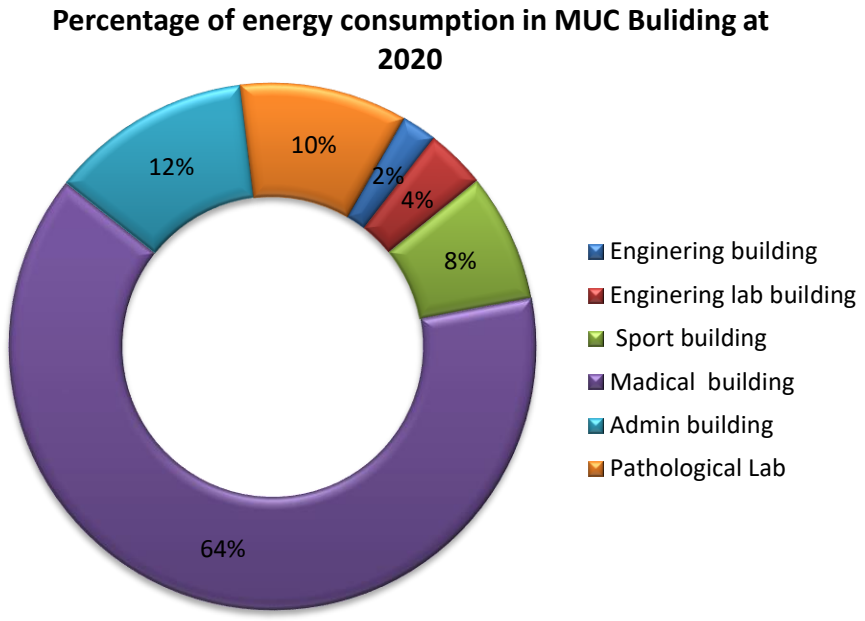


Figure 6b show the daily and annual energy usage of MUC main campus building in 2020.

2- Electricity USAGE PER YEAR (IN KILOWATT-HOUR)

To limit the spread of COVID-19, most countries have issued lockdown and stay-home orders that resulted in drastic changes in work and living habits for people worldwide. Consequently, energy demand has seen shifted more heavily towards the residential building sector since other sectors are either completely shut down as in the case of most commercial buildings, or operating at lower activity levels such as the case of manufacturing facilities.

Figure 7 shows that the total electricity usage of AL- Mustaqbal University during the periods 2018 – 2021. The reason behind this is to show how the spread of COVID-19 pandemic influences on the energy consumption. It can be seen that in 2018 which the academic year is normal, the total electricity consumption was 250,000 kWh. During the entire year of 2019, the energy consumption was a little bit bigger than 2018 which indicate 275,000 kWh. On December 19, 2019 the first confirmed case of COVID – 19 was recorded in Wuhan in China. Since this pandemic start to spread among countries and when it reaches to Iraq on February 2020, it can be seen that there is an obvious reduction energy

consumption. For example, in 2020 is 123,134 kWh, while in 2019 is 331120 kWh. On the main campus area of AL–Mustaqbal University College electricity is used for lighting, cooling, heating, and laboratory appliances. The data that be collected focus on peak-hour consumption (08:00-16:00) because this is when most consumption activity would normally take place. It can be seen as illustrated via Figure 8 that between Jan until (20 March 2020) the electricity consumption has decreased by about 12 %, while between (20 March) until (1 Sep) the electricity consumption reduced by 78 %, due to that the most of staff and student stay home. After 1 September, the college has invited the staff to work by 25 %, so the electricity usage has increased slightly. It can be seen Figure 9 which displays the evolution of total monthly electricity consumption for the entire period under study, shows a decrease in electricity consumption in 2021.

However, it can be seen that in 2021 there is a slight increasing in the energy consumption to reach about 200,000 kWh. The reason behind this increment is due to the policy of the government that had been suggested in order to reduce the spread of COVID-19. In order to elaborate in the energy consumption during 2021 for all months, it can be seen that at Jan, the electrical consumption was 22,000 kWh while it decreases into 13,000 kWh which it reduces by 69%. It is worthy to mention that the peak load of electricity was on April which recorded 31,000 kWh. The rest of months had diverse distribution of electrical usage based on the final examinations and holidays.

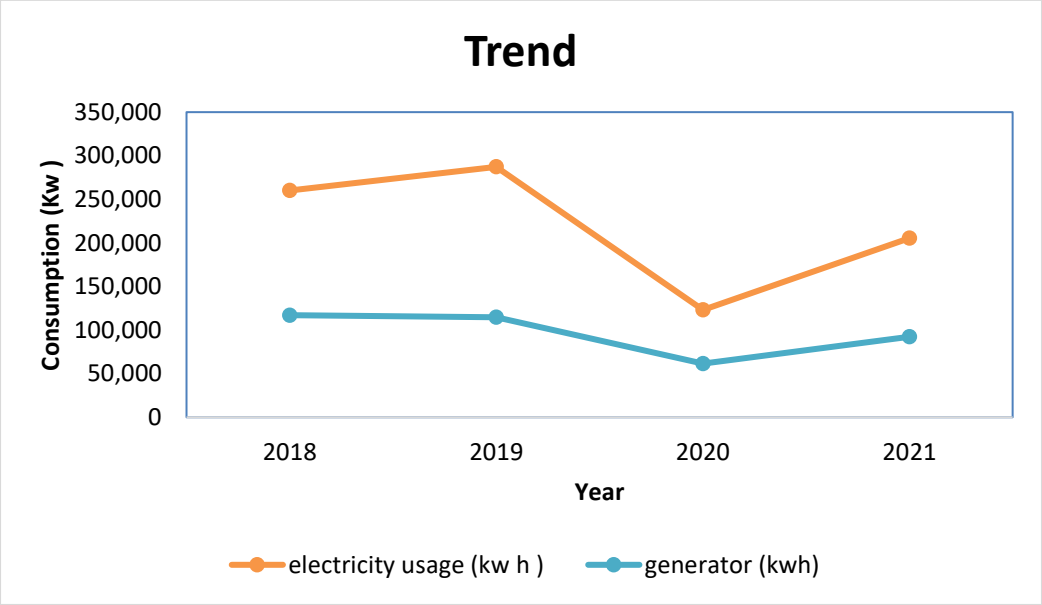


Figure 7. the trend evolution of electricity demand from (2018 to 2021)

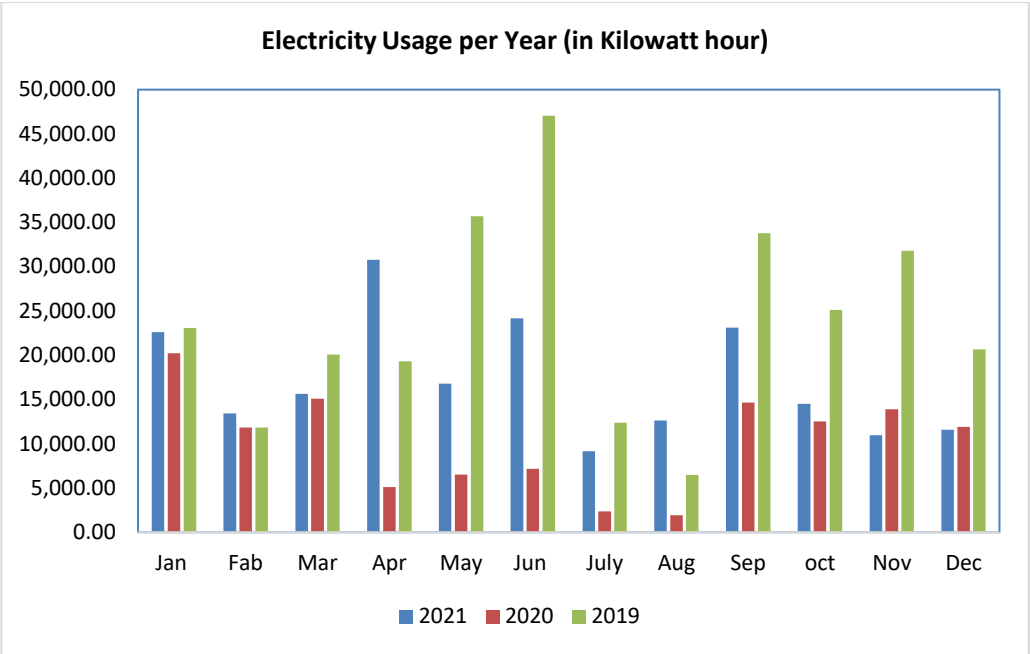


Figure 8 Comparison differences in electricity consumption between 2020 and 2019

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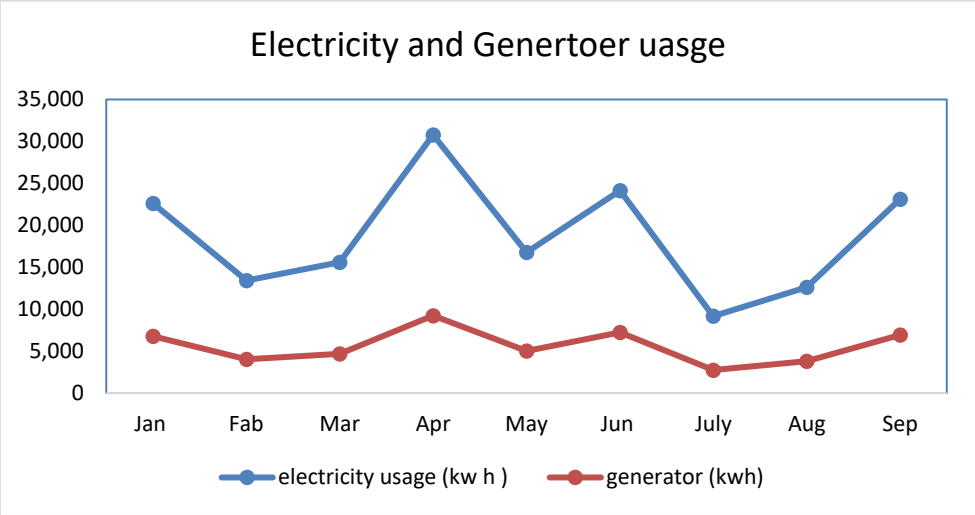

Figure 9 The total electricity and generator usage in all location of MUC in 2021.

It also has seen that from Figure 10 that the daily peak of energy consumption starting from 10 AM to 4.30 PM, during this time a large magnitude of solar energy available which makes it a highly appealing source of electricity

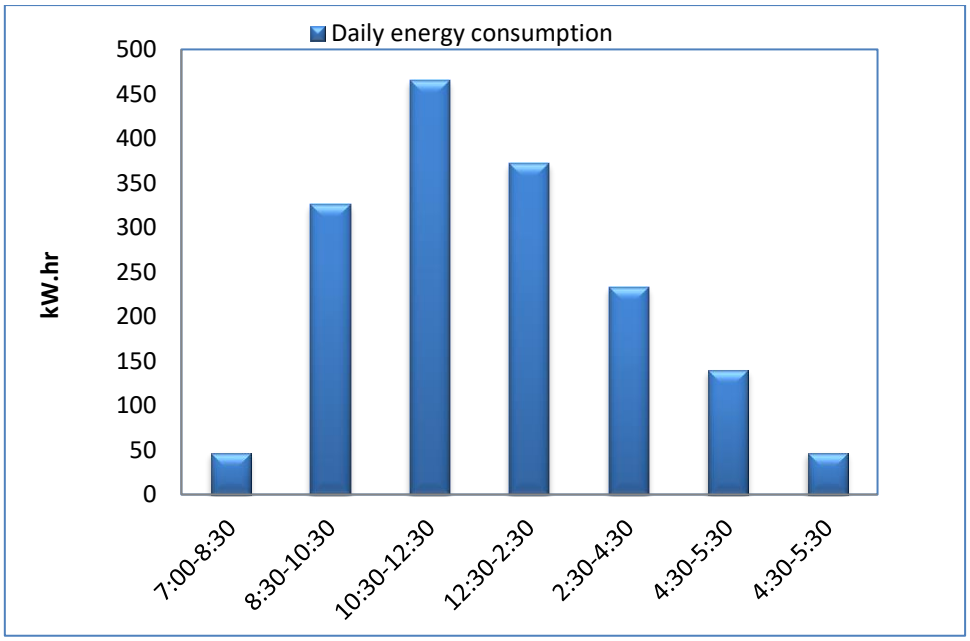

Figure 10. The daily energy consumption of MUC .

Figure 11. shows the daily and monthly energy consumption for 2019, as it is illustrated that the electricity consumption increases during the study period specially in May and June, due to the increase in the use of air conditioners in the summer. While in July and August the semester ends, which causes decreasing the use of the appliances. September represents the month of the semesters beginning, and the weather in Iraq is mostly hot, which means the use air conditioning is needed, so that the figure shows an increase in energy consumption. In October, November, December and January the results show that the energy consumption slightly decreases, due to that the ambient temperature decrease and the air conditioning system decrease. In February, March, and April the results show a decrement in the energy consumption, due to the weather is become moderate.

Figure 12. shows the daily and monthly energy power consumption in MUC medical building , the results show an increment in energy consumption during the period from January to March and from September to December, due to this is the semesters period and the students persistence in the college. While during the period from April to June the energy consumption significantly decreases, due to the appearance of COVID-19 and discontinuity of the students, which decreases the load, and energy consumption decreases.

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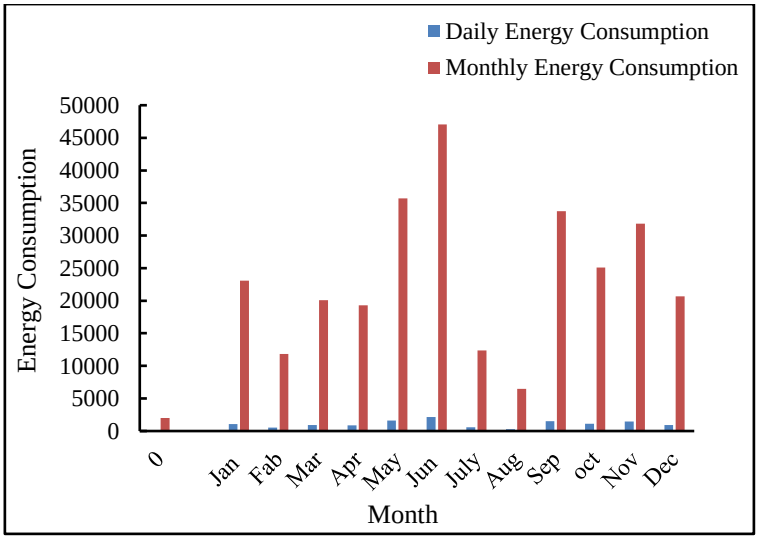


Figure 11. Daily and Monthly Power Consumption

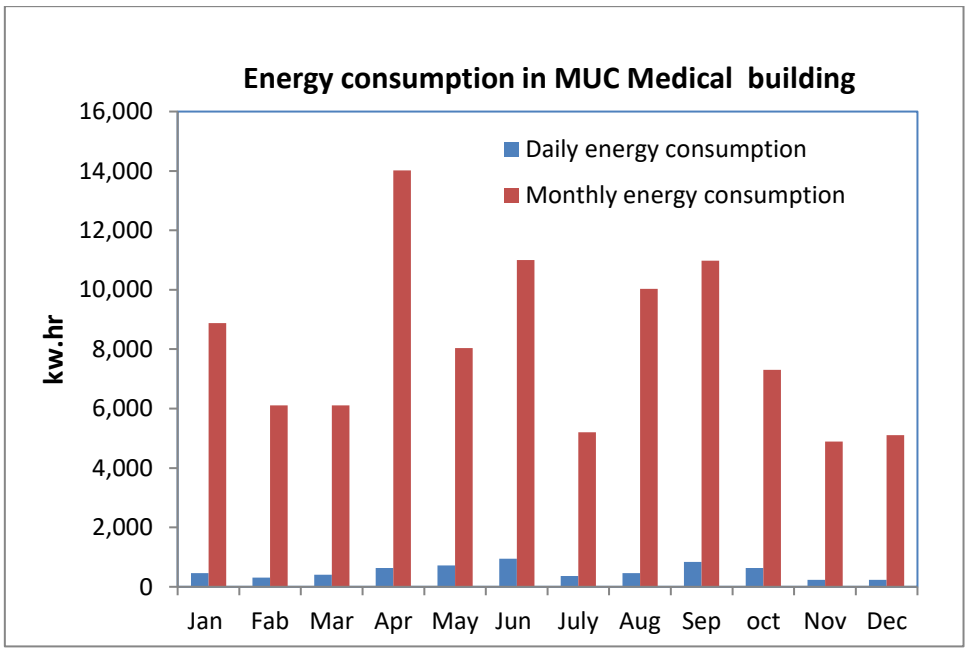


Figure 12. Daily and Monthly Energy Power Consumption in 2021 at MUC Medical building

Estimation of Change in Occupancy and Operation Patterns

In addition to energy consumption data for 2019 and the end of September of 2020, behavior patterns of occupants of the MUC building are obtained through surveys and questionnaires. Moreover, dwelling physical features are collected including, constructions, types of lighting and appliances, and air conditioning systems and their performance. Table 1 summarizes the main characteristics of the energy models for all main MUC building.

Table 1. Behavior schedules specific to 2019 calibration of the energy models for all MUC audited building .

Building model		Eng. building		Medical building		Administration building		Sport building		Security building	
Typical Schedules	Hours	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)
Occupancy	1-8	0%	0%	0%	0%	0%	0%	0%	0%	25%	25%
	8-14	100%	0%	100 %	0%	100%	0%	100 %	0%	100%	50%
	14-18	50%	0%	25%	0%	0%	0%	40%	0%	75%	25%
	18-24	0%	0%	0%	0%	0%	0%	0%	0%	25%	25%
Lighting	1-8	3%		5%		1%		0%		30%	
	8-14	75 %	0%	80%	3%	100 %	1%	80%	0%	100 %	60%
	14-18	100 %	5%	50%	3%	1%	1%	50%	0%	100 %	40%
	18-24	3%		5%		1%		1%		50%	
Appliances	1-8	0%	0%	0%	0%	0%	0%	0%	0%	40%	
	8-14	80%	0%	80%	0%	100 %	0%	70%	0%	100 %	50%
	14-18	40%		30%		0%	0%	40%	0%	75%	50%
	18-24	0%		0%		0%		0%		50%	30%

Table 2. Behavior schedules specific to 2020 calibration of the energy models

Building model		Eng. building		Medical building		Administration building		Sport building		Security building	
Typical Schedules	Hours	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)	WD (Sat-Wed)	WEH (Thu-Fri)
Occupancy	1-8	0%	0%	0%	0%	0%	0%	0%	0%	25%	25%
	8-14	20%	0%	30%	0%	50%	0%	10%	0%	50%	30%
	14-18	50%	0%	25%	0%	0%	0%	40%	0%	50%	25%
	18-24	0%	0%	0%	0%	0%	0%	0%	0%	25%	25%
Lighting	1-8	3%		5%		1%		0%		30%	
	8-14	25 %	0%	30%	3%	100%	1%	20%	0%	100%	60%
	14-18	5%	5%	5%	3%	1%	1%	5%	0%	100%	40%
	18-24	3%		5%		1%		1%		50%	
Appliances	1-8	0%	0%	0%	0%	0%	0%	0%	0%	40%	
	8-14	20%	0%	20%	0%	100%	0%	20%	0%	75%	50%
	14-18	0%		0%		0%	0%	0%	0%	75%	50%
	18-24	0%		0%		0%		0%		50%	30%

Energy Efficient Appliances Usage

Al_Mustaqbal university college intends to realize further energy savings by paying close attention to energy management. All parts of the organization can assess their own energy consumption and realize their own energy-saving potential by means of, for example, insulation, LED lighting, and the deployment of sustainable technology. Figure 13 shows that the high energy-efficient appliance used in Al- Mustaqbal university college is the LED lamp compare to other appliance devices It can be seen that the LED lamp saving in energy by about 93 %.

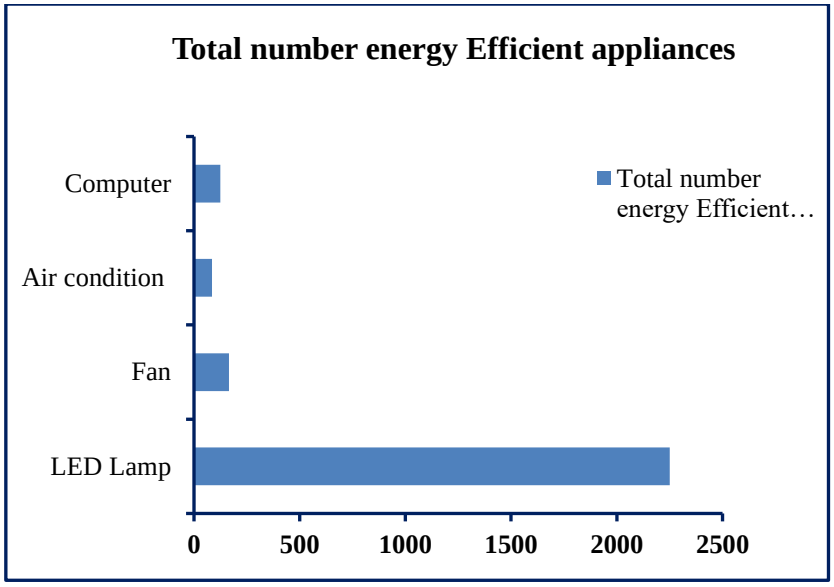


Figure 13. The high energy-efficient appliance used in Al-Mustaqbal University College

Table 3.The Percentage of Energy Efficient Appliances

Appliance	Total Number	Total number energy Efficient appliances	Percentage
LED Lamp	3800	3550	93%
Fan	150	95	63%
Air condition	320	195	60%
Computer	600	480	80%
Fan ceiling	650	465	69%
Etc.	…	**…**	**…**
		Average Percentage	**73%**

2.5 MUC CLEAN ENERGY PROGRAMS

MUC had many programs to illustrates the importance of renewable energy to local community as illustrated in images inserted below

1- An initiative project program for affordability energy

	
Refrigerator assisted solar panel	Solar energy system
	
evacuated tube solar collector	Solar water heater

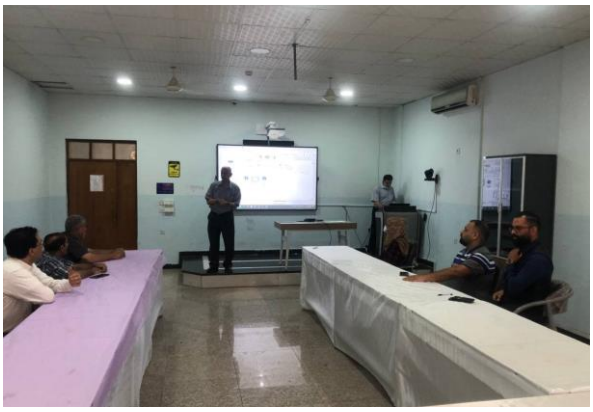
	
Maintenance of fluid mechanics energy devices	Experiment on control systems which service the sustainability
	
Our department contribution in research of energy and engineering	Visiting to Al-Jameiy Specialist Hospital in Al-Basrah to examine the central cooling units
	

Air Conditioning **&** Refrigeration Techniques Engineering Department at Al-Mustaqbal University College organizes a visit to the Directorate of Electricity Transmission Network in Diwaniyah Governorate	Students of Air Conditioning **&** Refrigeration Techniques Engineering Department organize a Field Visit
	
Nanotechnology Projects in the Labs of Air Conditioning **&** Refrigeration Engineering Department which enhance the thermal systems performance and sustainability	Parabolic Trough Solar Collecor
Provided very helpful consultation, field training, and design calculations for installing and installing different energy systems	
	

The Department of HVAC and Electricity Engineering organizes a scientific visit to the Renewable Energy Center in Baghdad

Visiting of Prof. Dr. Kamaruzzaman Sopian

Using of LPG gas interms of recucing pollution and extending the life of engine and oil, and thus achieving sustainability

	
Participating in a Training Course on the Technologies of Wind Energy	The Academic Ms. Zahra Al-Khafaji Participates in a Workshop on Designing Lab Devices
	
A Workshop on Water Turbines	A delegation representing the Air Conditioning **&** Refrigeration Engineering Department pays a visit to the Union Company for Food Industries Ltd**.**

Third Year Students of Air Conditioning & Refrigeration Engineering Department at Al-Mustaqbal University College Organize a Scientific Trip to Al-Warith Factory for Engineering Industries

جامعة بابل / كلية الهندسة - المسيب

شهادة مشاركة

نويد مشاركة السيد (عمار عبدالكاظم فنعي) المحترم في الندوة العلمية الأفتراضية "

الطاقات المتجدده في العراق: التحديات والفرص " والتي أقامها قسم هندسة الطاقه في

كلية الهندسة – المسيب يوم الخميس 2021/7/15.

أ.م.د وسام جليل عنبر

عميد الكلية

جامعة بابل / كلية الهندسة - المسيب

شهادة مشاركة

نويد مشاركة السيد (ا.م.د . أزهر محسن عبد حزة) المحترم في الندوة العلمية

الأفتراضية " الطاقات المتجدده في العراق: التحديات والفرص " والتي أقامها قسم

هندسة الطاقه في كلية الهندسة – المسيب يوم الخميس 2021/7/15.

أ.م.د وسام جليل عنبر

عميد الكلية

Renewable Energy: Challenges and apportonties [Workshop]

Devices used in sustainability energy research

	
Workshop on energy labrotaries	Energy sustainability device: Mechanical Heat Pump
	
Project on energy exxchnage thermal system	Confenrece of B.Sc. Graduation Projects in Al-Nahrain University
	
Visiting solar energy system	MUC support sustainability goals

Figure 14. MUC contribution in energy to local community

2.6 ENERGY EFFICIENT APPLIANCES USAGE

Al- Mustaqbal University College intends to realize further energy savings by paying close attention to energy management. All parts of the organization can assess their own energy consumption and realize their own energy-saving potential by means of, for example, insulation, LED lighting, and the deployment of sustainable technology as illustrated in Figure 15.

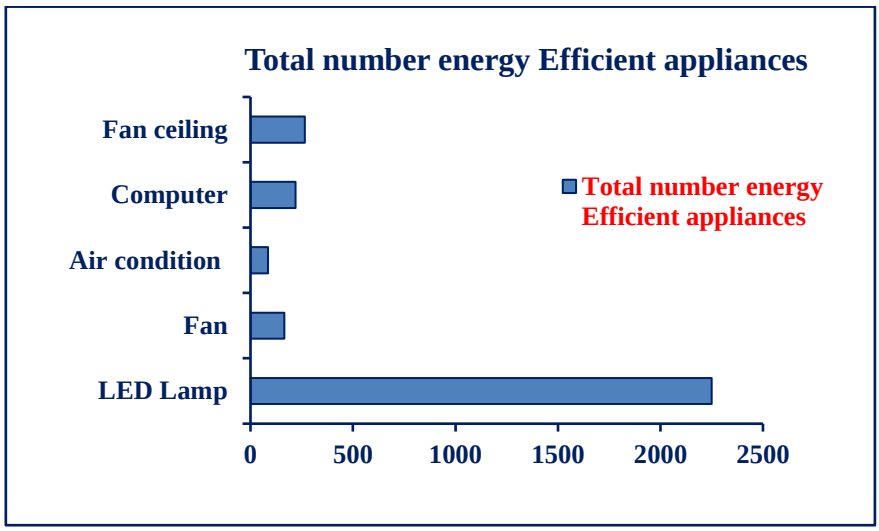


Figure 15. the high energy-efficient appliance used in MUC

2.7 RENEWABLE ENERGY SOURCES IN CAMPUS

The solar energy is the main renewable energy source which is used to provide the electricity to MUC building during the sun time. Solar energy harvested as electricity using Photovoltaic panels (PV panels) is a highly suitable source not only to satisfy immediate needs at the Domestic and the commercial level but also to be sold to the national grid to support its capacity. This technology is not alien to Al-Mustaqbal University College but sufficient penetration of it to make a meaningful difference is lacking. Here, we showed the photos of PV systems that use in our college and propose some possible avenues to popularise the widespread use at a national level. These PV panels had been installed over the roofs of administration buildings, shopping book center, and the main restaurant as illustrated in Figures (16-18). Also, it can be seen as shown in Figure 19, the usage of heating of water via solar collector system to supply the hot water during the winter season which of course reduces the thermal load on the national grid. It was also mobile charging had been done with the help of PV panels. The usage of duel inverter is recommended in

terms of reduction of total energy consumption. Additionally, the usage of solar panel with air conditioning will help in reduction of this energy consumption as shown in Fig. 16. It is important to mention here, that in the rear region where the refrigeration systems is difficult to reach, we make a rig of absorption refrigerator that work on solar energy as shown in figure 18.

Finally, it can be seen in Figure 20 that we include this year another renewable energy source which is the horizontal axis wind turbine to generate electricity.

Figure 16 Use the solar water heater on the roof of the shopping book center

Figure 17 Roof Mounted Solar Panels on the administration building

Figure 18 Roof Mounted Solar Panels on the main restaurant.

Figure 19 installed the solar water heater on the roof of the laboratory engineering building.

Figure 20 Use the Solar Panels for multipurpose use (mobile charging)

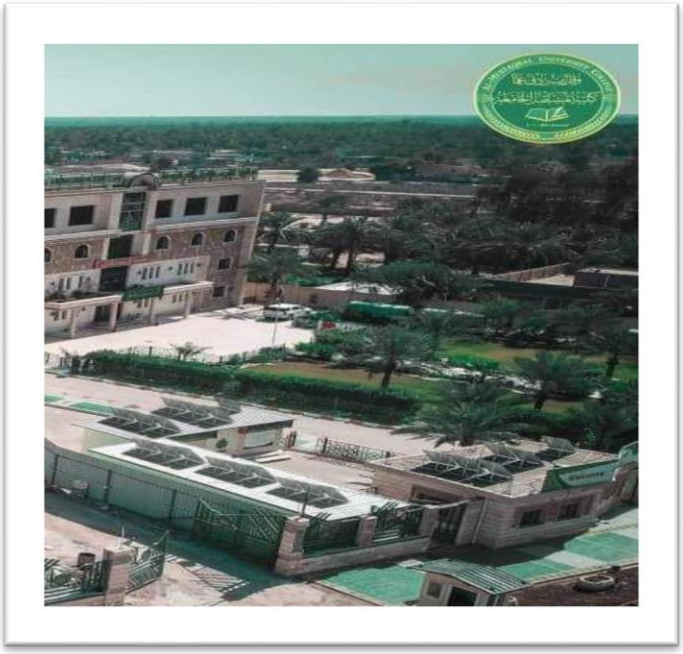


Figure 21 solar panels mounted on roofs of buildings

Figure 22 installation of solar dual inverter air conditioner split

Figure 23 Solar thermal collector used for different applications in MUC.

Figure 24 Solar Absorption Refrigerator

Figure 25 Solar umbrella

Figure 26 horizontal axis wind turbine

2.8 PATENTS AND INTERNATIONAL AWARDS

2.8.1 Patents for Industrial Designs under the evaluation stage:

- Solar Energy Umbrella

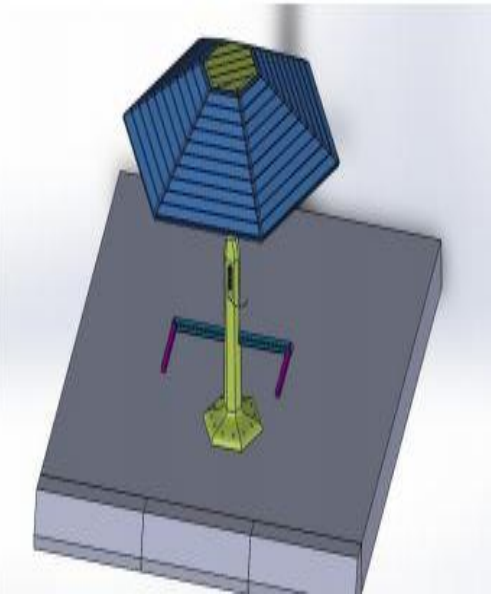
وزارة التخطيط
المركز المركزي للتقييس والسيطرة النوعية
قسم الملكية الصناعية

رقم النموذج: ٦٠٨٥
تاريخ المنح: ٢٠١٩/٥/١٩

شهادة تسجيل نموذج صناعي

على توفر الشروط القانونية المنصوص عليها في المادة (٣٨) من قانون براءة الاختراع والنماذج الصناعية
(٦٥) لسنة ١٩٧٠ المعدل نشهد بهذا بان النموذج الصناعي المبينه صورته أعلاه قد سجل لدينا باسم:
1- م.د.حسن شاكر مجدي 2- م.د.ازهر محسن عبد حمزة 3- المهندس عبد الرضا شاكر مجدي
الجنسية العراقي) الجنسية المقيم في 1- كلية المستقبل الجامعة بابل-عميد الكلية
2-كلية المستقبل الجامعة بابل-مدير قسم هندسة تقنيات التكييف والتبريد
3-كلية المستقبل الجامعة بابل-مدير الوحدة الهندسية
في الصنف العشرون) من الجدول تصنيف النماذج الصناعية الملحق بنظام براءة الاختراع والنماذج
الصناعية رقم (٦٥) لسنة ١٩٧٠ والموسوم (طاقة الطاقة الشمسية - المستقبل ١).
وعليه فقد تم اصدار هذه الشهادة
كتب ببغداد في اليوم الرابع عشر من شهر رمضان سنة ١٤٤٠
الموافق ليوم التاسع عشر من شهر ايار سنة ٢٠١٩
رقم بلد الاسبقية تاريخهما

د.حسين علي داود
مسجل براءات الاختراع والنماذج الصناعية
رئيس الجهاز



- An Industrial Bump yard to generate electricity

وزارة التخطيط
المركز المركزي للتقييس والسيطرة النوعية
قسم الملكية الصناعية

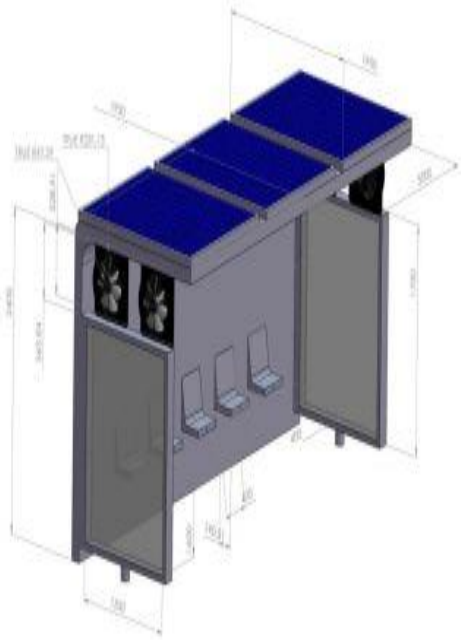
رقم النموذج: ١١٤٥
تاريخ المنح: ٢٠٢٠/١/١٣

شهادة تسجيل نموذج صناعي

على توفر الشروط القانونية المنصوص عليها في المادة (٣٨) من قانون براءة الاختراع والنماذج الصناعية
رقم (٦٥) لسنة ١٩٧٠ المعدل نشهد بهذا بان النموذج الصناعي المبينه صورته أعلاه قد سجل لدينا باسم:
1-أ.م.د. حسن شاكر مجدي 2- المهندس عبد الرضا شاكر مجدي 3- م.د. ازهر محسن عبد حمزة
الجنسية (العراقي) الجنسية المقيم في 1- كلية المستقبل الجامعة -بابل عميد الكلية
2-كلية المستقبل الجامعة -بابل
3-كلية المستقبل الجامعة -بابل
في الصنف الثالث) من الجدول تصنيف النماذج الصناعية الملحق بنظام براءة الاختراع والنماذج
الصناعية رقم (٦٥) لسنة ١٩٧٠. والموسوم (درج متحرك وينطوي -المستقبل - ٧).
وعليه فقد تم اصدار هذه الشهادة
كتب ببغداد في اليوم التاسع عشر من شهر جمادي الاولى سنة ١٤٤١
الموافق ليوم الثالث عشر من شهر كانون الثاني سنة ٢٠٢٠
رقم بلد الاسبقية تاريخهما

د.حسين علي داود
مسجل براءات الاختراع والنماذج الصناعية
رئيس الجهاز

- Public seats equipped with Solar Energy



نموذج ن - ص - ٢ -

وزارة التخطيط
المركزي للتقييس والسيطرة النوعية
قسم الملكية الصناعية

رقم النموذج: ١٠٨٩
تاريخ المنح: ٢٠١٩/٥/٢٠

شهادة تسجيل نموذج صناعي

على توفر الشروط القانونية المنصوص عليها في المادة (٣٨) من قانون براءة الاختراع والنماذج الصناعية
٦٥) لسنة ١٩٧٠ المعدل نشهد بهذا بان النموذج الصناعي المبينه صورته أعلاه قد سجل لدينا باسم:
م.د.حسن شاكر مجدي 2- م.د.انعام ريكان حسن3- م.ملاحظ رفني . محمد احمد عبد الجبار علوان
عراقي) الجنسية المقيم في 1- كلية المستقبل الجامعة-بابل -عميد الكلية
2- جامعة تكنولوجيا المعلومات والاتصالات
3- وزارة النفط - شركة توزيع المنتجات النفطية (شركة عامة)
في الصنف العشرون) من الجدول تصنيف النماذج الصناعية الملحق بنظام براءة الاختراع والنماذج
الصناعية (٢١) لسنة ١٩٧٠. والموسوم (مقاعد عامة مجهزة بالطاقة من الالواح الشمسية- المستقبل - ٥).
وعليه فقد تم اصدار هذه الشهادة
كتب ببغداد في اليوم الخامس عشر من شهر رمضان سنة ١٤٤٠
الموافق لليوم العشرون من شهر ايار سنة ٢٠١٩
بلد الاسبقية تاريخهما

د.حسين علي داود
مسجل براءات الاختراع والنماذج الصناعية
رئيس الجهاز

- Compressor cooling mechanism in the split type air-condition

نموذج ن - ص - ٢ -

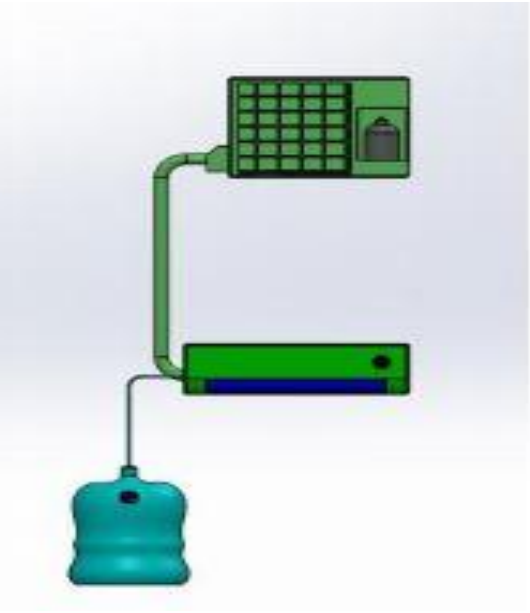
وزارة التخطيط
المركزي للتقييس والسيطرة النوعية
قسم الملكية الصناعية

رقم النموذج: ١١٤٦
تاريخ المنح: ٢٠٢٠/١/١٣

شهادة تسجيل نموذج صناعي

على توفر الشروط القانونية المنصوص عليها في المادة (٣٨) من قانون براءة الاختراع والنماذج الصناعية
٦٥) لسنة ١٩٧٠ المعدل نشهد بهذا بان النموذج الصناعي المبينه صورته أعلاه قد سجل لدينا باسم:
1- أ.م.د. حسن شاكر مجدي 2- م.د. ازهر محسن عبد حمزة ٣- المهندس عبد الرضا شاكر مجدي
عراقي) الجنسية المقيم في 1- كلية المستقبل الجامعة -بابل- عميد الكلية
2- كلية المستقبل الجامعة -بابل- قسم هندسة تقنيات التكييف والتبريد
3 -كلية المستقبل الجامعة -مدير الوحدة الهندسية -بابل
في الصنف الثالث) من الجدول تصنيف النماذج الصناعية الملحق بنظام براءة الاختراع والنماذج
الصناعية رقم (٦٥) لسنة ١٩٧٠. والموسوم (الية تبريد ضاغطة التبريد في المكيف - المستقبل -9).
وعليه فقد تم اصدار هذه الشهادة
كتب ببغداد في اليوم التاسع عشر من شهر جمادي الاولى سنة ١٤٤١
الموافق لليوم الثلاث عشر من شهر كانون الثاني سنة ٢٠٢٠
بلد الاسبقية تاريخهما

د.حسين علي داود
مسجل براءات الاختراع والنماذج الصناعية
رئيس الجهاز



2.8.2 International awards.


Certificate of Design Patent

Universiti Kebangsaan Malaysia
The National University of Malaysia

THIS CERTIFIES THAT

Azher M. Abed

HAS BEEN GRANTED FOR(SINGLE STAGE ABSORPTION COOLING SYSTEM USING DUAL EJECTORS AND FLASH TANK), WITH THE FILING DATE OF 1/7/2016 AND APPLICATION NO. (PI 2016702456)

SOLAR ENERGY RESEARCH INSTITUTE
UNIVERSITI KEBANGSAAN MALAYSIA/
THE NATIONAL UNIVERSITY OF MALAYSIA
Inspiring Future, Nurturing Possibilities

Prof. Dato' Dr. Kamaruzzaman Sopian
Director of Solar Energy Research Institute


World Society of Sustainable Energy Technologies

WSSET Innovation Awards 2016
Energy Efficiency (Absorption Cooling System)

awarded to

AZHER M ABED
Solar Energy Research Institute
Universiti Kebangsaan Malaysia

Professor Saffa B Riffat
President

Date 21st July 2016
Singapore


CERTIFICATE OF PARTICIPATION

Pecipta'17
THE INTERNATIONAL CONFERENCE AND EXPOSITION ON INVENTIONS by Institutions of Higher Learning

NURTURING ENTREPRENEURS THROUGH EDUCATION, INDUSTRY, TECHNOLOGY AND SOCIAL INNOVATION

This is to certify that

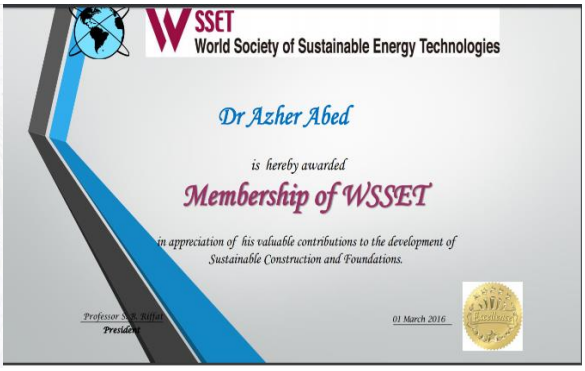
Solar Assisted Absorption Cooling with Dual Ejector Flash Tank System

Prof. Dr. Kamaruzzaman Sopian,
Azher M. Abed, Sohif Mat, Halim Razali

has actively participated in the International Conference and Exhibitions on Inventions by Institutions of Higher Learning (PECIPTA 2017)

held at
Stadium Tertutup Kompleks Sukan Negeri Gong Badak
Kuala Nerus, Kuala Terengganu
7-9 October 2017

DATIN PADUKA IR. DR. SITI HAMISAH BINTI TAPSIR
DIRECTOR GENERAL OF HIGHER EDUCATION
DEPARTMENT OF HIGHER EDUCATION
MINISTRY OF HIGHER EDUCATION


WSSET
World Society of Sustainable Energy Technologies

Dr Azher Abed

is hereby awarded

Membership of WSSET

in appreciation of his valuable contributions to the development of Sustainable Construction and Foundations.

Professor Saffa B Riffat
President

01 March 2016


CERTIFICATE OF DESIGN PATENT

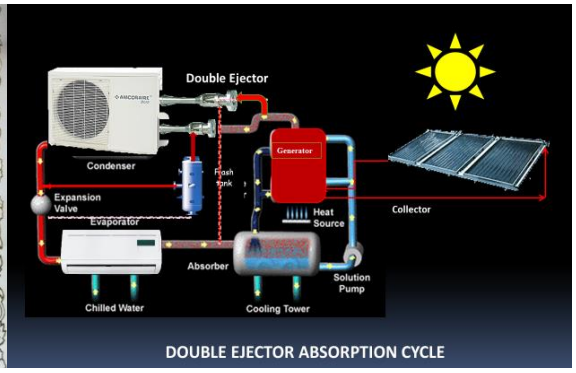
THIS CERTIFIES THAT

AZHER M.ABED

has been granted a patent for (**Single Stage Absorption Cooling System Using Dual Ejectors and Flash Tank**), with the filing date of 1/7/2016 and application No.(PI 2016702456).

Universiti Kebangsaan Malaysia
National University of Malaysia

Director



2.9 STUDENTS INITIATIVES AND PROJECTS TO SUPPORT SOCIETY'S ENERGY

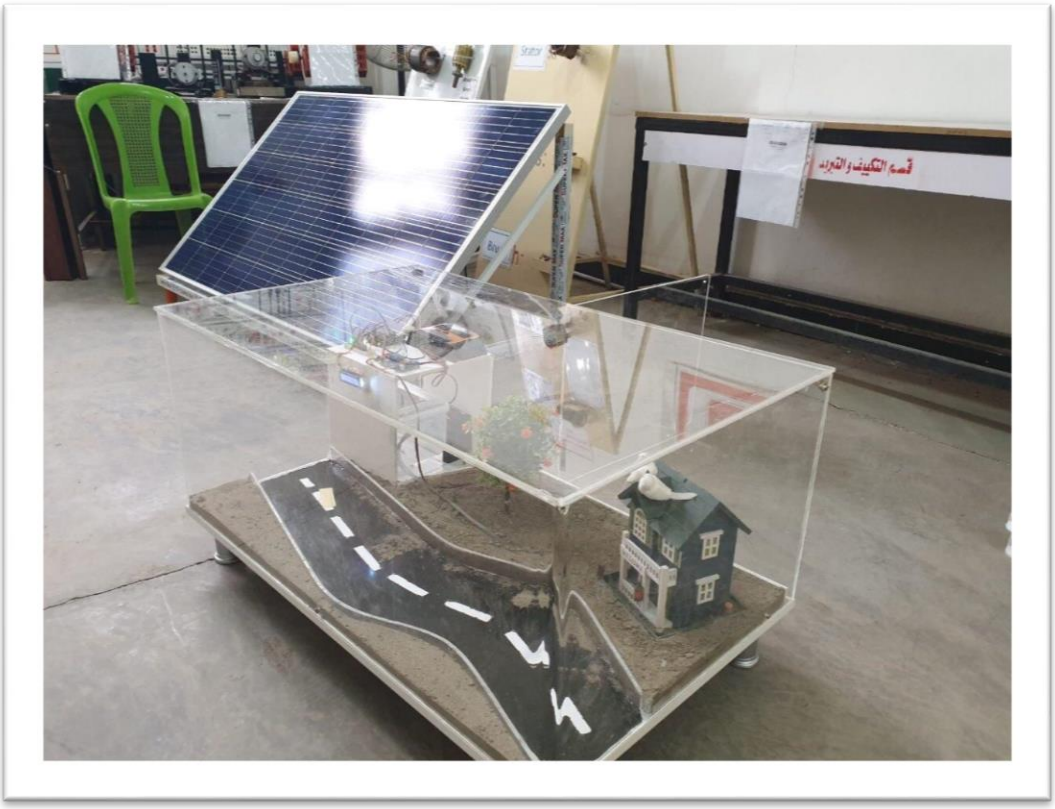


Figure 27 A model of a sprinkler irrigation system powered by Solar Energy

Figure 28 Photovoltaic thermal hybrid solar collector

Graduation Project ‘Improve the Performance of Solar Cells by using a Mechanism for Cooling and Cleaning cells when temperatures increase and exposing them to Dust and Dirt’ for students of the Department of Air Conditioning and Refrigeration Technology Engineering under the supervision of Dr. Azhar Mohsin Abid.

Figure 29 Multi-purpose umbrella powered by Solar Energy.

2.10 RESEARCH GROUPS

Vision

In order to be a world-leader in scientific research and innovation in the field of energy especially the non – conventional (renewable) energy to meet the society standard in order to reduce the carbon emission on the environment.

Research Focus

There are four different research groups as illustrated below;

1. Renewable energy research group
2. Heat transfer and fluid flows group
3. Applied mechanics research group
4. Air conditioning and refrigeration research group

Scientific team

1. Renewable energy research group
   - Asst. Prof. Dr. Azher M. Abed
   - Dr. Athraa Al-Abbasi
   - Omer Ahmed Naeam Al-Kawak
   - Hawraa T. Gatea

2. Heat transfer and fluid flows group
   - Asst. Prof. Dr. Azher M. Abed
   - Dr. Athraa Al-Abbasi
   - Ammar Abdulkadhim
   - Asmaa K. Yakoob

3. Applied mechanics research group
    - Dr. Haider Sabah Al-Jelawy
    - Luay H. Abbud
    - Murtadha Mohsin Motter Al-Massoudy
    - Zahraa Kareem Abdulla
    - Ola

4. Air conditioning and refrigeration research group
    - Asst. Prof. Dr. Azher M. Abed
    - Mustafa M. Gaber
    - Asmaa K. Yakoob
    - Hawraa T. Gatea

Evidences:

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=5839

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6264

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6976

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6952

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6953

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6649

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6271

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6172

https://mustaqbal-college.edu.iq/En/EnNewDep.aspx?depid=2&newid=6460

https://www.mustaqbal-college.edu.iq/En/Sustainability.aspx

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=367

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=416

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=5

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=6

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=351

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=259

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=1446

https://www.mustaqbal-college.edu.iq/NewDep.aspx?depid=6&newid=1111

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=2415

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=3096

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=3125

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=3207

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=3186

https://www.mustaqbal-college.edu.iq/NewCol.aspx?newid=3189

https://mustaqbal-college.edu.iq/NewDep.aspx?depid=2&newid=6172

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