

المعيار الرابع

Fourth Standard

معايير الطاقة والتبديل المناخي

Energy and climate change standards

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Assiut University's consumed electrical power and its annual cost during the period from 2017 - 2022

Notes	Value of carbon credit as a result of annual reduction in CO2 emissions (EUR)**	Annual reduction in CO2 emissions from the previous year (1 ton of carbon equivalent)*	The amount of savings in consumption for the previous year (GWh) and the percentage of this savings from the annual consumption (%)	Annual consumption cost (One million Egyptian pounds)	The amount of electric power consumed annually (GWh)	Year
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	-----	-----	-----	30.936	47.920	2017
<ul style="list-style-type: none"> • The load of the Faculty and Hospital of Dentistry has entered the service. • The Load of the Faculty of Veterinary Medicine Hospitals has entered the service 	-----	-----	-----	52.005	48.299	2018
<ul style="list-style-type: none"> • The electrical load of the Faculty and Hospital of Dentistry was completed and began to enter service. • The Load of the Faculty of Veterinary Medicine Hospitals completed and entered the service 	-----	-----	-----	68.704	49.085	2019
<ul style="list-style-type: none"> • The start of the Corona pandemic (COVID-19) and the subsequent procedures to reduce working hours and the application of the distance learning system (Online) 	144,240.0	4,808.0	9.616 / 24.3%	59.019	39.469	2020
<ul style="list-style-type: none"> • The return of work and the study system to their previous and normal status before the Corona pandemic. However, consumption has not returned to the level it was before the start of the pandemic in 2019. 	-----	-----	-----	64.705	43.627	2021
<ul style="list-style-type: none"> • There are savings as a result of consumption reduction measures and improvements in energy efficiency, even though the trauma and emergency hospital's load has begun to provide services. 	75,885.0	2529.5	5.059 / 13.11%	62.773	38.568	2022

* The reduction of the annual consumption by 1.0 GW reduces carbon dioxide (CO₂) emissions by 500 tons of carbon equivalent.

** Considering that the annual return of carbon certificates for Egypt is equal to 30.0 Euros / 1 ton of carbon equivalent.

- The average annual power factor shall not be less than 0.92.

Projects implemented by Assiut University, amounting to 1.5 million Euros, in cooperation with the Supreme Council of Universities and their revenues.

Through "Improving Energy Efficiency in University Buildings" project during the period (2022-2026) funded by the German Development Bank (KfW)

Annex: 4.4.3

Project No./ Name, Average Energy Consumption (MWh)/year	Project no. 1 Elect. Eng. Dept. / Main Building		Project no. 2 Elect. Eng. Dept. / Lab. Building		Project no. 3 Dormitory Building		Project no. 4 Majary Pump Station		Project no. 5 University Street Lightning		Project no. 6 Main Administrative Building of Assiut University		Project no. 7 Architectural Eng. Dept.		Total Cost for Each Opportunity (€*10 ³)/ Total Energy Saving (MWh) / Average cost/MWh saving (€)
	103		70		322		424		36		12588.1		380.0		
Energy Saving (MWh),% , Cost (€*10 ³) EE/RE Opportunities	Energy Saving (MWh) / %	Cost (€*10 ³)	Energy Saving (MWh) / %	Cost (€*10 ³)	Energy Saving (MWh) / %	Cost (€*10 ³)	Energy Saving (MWh) / %	Cost (€*10 ³)	Energy Saving (MWh) / %	Cost (€*10 ³)	Energy Saving (MWh) / %	Cost (€*10 ³)	Energy Saving (MWh) / %	Cost (€*10 ³)	
RE – PV Installation/ <i>KW_p</i>	--	--	365** /520%	180	273.7 /85 %	135	--	--	--	--	547.5 / 4.35 %	270	182.5 / 48 %	90.0	675 / 1369.0
				493.15 €/MWh		493.15 €/MWh						493.15 €/MWh		493.15 €/MWh	493.15 €/MWh
			200		150						300		100		800
Solar water heater	--	--	--	--	--	--	--	--	--	--	222.3 / 1.765%	8.86	--	--	8.86/ 222.3
											39.85 €/MWh				39.1 €/MWh
EE- Replacement of Fluorescent lamps by LED lamps	10.4/ 50%	10.96	13.05 /50%	11.44	--	--	--	--	--	--	349/ 28.68%	108.27	--	--	130.67 /373.0
		1053.8 €/MWh		876.63 €/MWh								310.0 €/MWh			396.0 €/MWh
EE- Replacement of Air Fans by Energy Saving fans	2.3 /50%	2.275	6.29/ 50%	3.978	--	--	--	--	--	--	--	--	--	--	6.253 /8.6
		989.1 €/MWh		632.43 €/MWh											
EE -Replacement of Air Conditions (HVAC) by Energy Saving one	90.9 /50%	56.82	60.0/ 85.7%	51.113	--	--	--	--	--	--	506 /29.2%	283.54	141 / 61%	90.0	481.47 /798.0
		625.1 €/MWh		851.89 €/MWh								560.35 €/MWh		638.3 €/MWh	603.4 €/MWh

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EE – Reducing of Electric stoves & use of Water Boilers	--	--	--	--	111.2 /34%	0.760 6.84 €/MWh	--	--	--	--	--	--	--	--	0.760 /111.16 6.84 €/MWh
EE- Using of Variable Speed Drive (VSD)	--	--	--	--	--	--	58.8/ 14.4%	13.0 221.1 €/MWh	--	--	--	--	--	--	13.00 /58.8 221.1 €/MWh
EE – Street Lightning Energy Control through PV Panels	--	--	--	--	--	--	--	--	19.64 /54%	5.681 289.22 €/MWh	--	--	--	--	5.681 /19.65 289.22 €/MWh
EE – Nano Window Film on Window Glazing	50.0 /44%	43.43 868.7 €/MWh	45.0/ 64.3%	58.67 1,303.8	--	--	--	--	--	--	--	--	50.9/ 39%	61.0 1198.4 €/MWh	163.1 /146.0 1184.0 €/MWh
EE-Nano Painting on External Building Envelope	--	--	--	--	--	--	--	--	--	--	--	--	37.6/ 39%	34.0 904.3 €/MWh	34.0 /37.6 904.3 €/MWh
Total Project (s) Cost (€* 10³)	113.488		305.201		135.76		13.000		5.681		670.67		275.0		1,518.80

*Percentage of Energy saving with reference to the opportunity itself only and not with respect to the total annual consumption.

**Always assuming that the average no. of annual working hours = 1825 (i.e. 5 hours/day)

- ❖ Total expected annual energy savings due to the execution of improving energy efficiency projects and the use of new and renewable energies = 3.2 GWh/year
- ❖ The ratio of additional energy saved attributed to the total annual consumption of the university, from new projects, taking 2022 as the reference year = 8.3%
- ❖ The value of the decrease in CO₂ emissions due to savings in annual consumption of new projects = 1,600.0 tons of carbon equivalent (considering that every 1 GWh reduces emissions by 500 tons of carbon equivalent).

- ❖ The return value of the carbon credits due as a result of the additional annual reduction in CO₂ emissions as a result of the new projects = 48,000.0 Euro (1 ton of carbon equivalent amounting to 30 Euro).

Energy and Climate Change Standards

S. No.	Standard Items/Indicators	Additional item/indicator activities at the university level	Activities for each item/indicator at the faculties level	Annex
4.1	Energy Conservation Program	<ul style="list-style-type: none"> • Assiut University Council, in its session No. 649 held on December 30, 2014, approved Resolution No. 1746 to establish the Energy Management Centre at Assiut University (Annex 4.1.1). • The Supreme Council of Universities approved Resolution No. 231 issued on September 21, 2015, for the establishment of the Energy Management Centre at Assiut University (Annex 4.1.2). 	<ul style="list-style-type: none"> • The faculties have prepared an energy conservation program that includes several procedures according to the Resolution issued by Assiut University Council, including cleaning and maintaining all lamps and light bulbs and disconnecting air conditioners and light bulbs in periods when there is no one of the faculty staff members or employees inside their workplaces. • Committees have been formed within each college that holds their meetings periodically to follow up on the implementation of procedures for energy conservation in addition to preparing periodic follow-up reports in this regard (Annex (4.1.3), Annex (4.7.2), Annex (4.1.4), Annex (4.1.5) Annex (4.1.6). 	<p>Annex (4.1.1) Annex (4.1.2) Annex (4.1.3) Annex (4.7.2) Annex (4.1.4) Annex (4.1.5) Annex (4.1.6)</p>
4.2	Use energy-saving devices instead of	<ul style="list-style-type: none"> • Assiut University Council, in its session No. 643, held on May 31, 2014, approved 	<ul style="list-style-type: none"> • Based on the recommendation of the Energy Conservation Committee on 	Annex (4.2.1)

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	<p>traditional devices.</p>	<p>Resolution No. 546 of the proposals submitted by the Council of Community Service and Environmental Development Affairs at Assiut University (Annex 4.2.1) regarding the implementation of several measures necessary for energy conservation within all university buildings and workplaces of Assiut University, for example, the following:</p> <ol style="list-style-type: none"> 1. Reducing the lighting in all offices in buildings to one-third 2. Continuous follow-up by all officials and employees of the various colleges to reduce electrical loads in general and lighting if not used and after official working hours 3. Maximizing the use of natural lighting in university buildings 4. Replacing electronic transistors in fluorescent bulbs as a substitute for the current regular transistors 5. Exchanging and replacing ordinary light 	<p>the need to use energy-saving devices, the concerned departments in the faculties provided and distributed energy-saving bulbs and shall take this into account when purchasing new devices and supplies.</p> <ul style="list-style-type: none"> • The faculties have implemented the necessary procedures for energy conservation pursuant to the resolution issued by Assiut University Council in its session No. 643, held on May 31, 2014, Resolution No. 546 (Annex 4.2.1). 	

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		<p>bulbs with energy-saving bulbs (LED), which consume only 20% of the electric power compared to their fluorescent counterparts of the same illumination intensity, Approximately 60% of the total light bulbs in the administrative building of the university and 40% in all faculties of the university have already been replaced.</p> <p>6. Setting air-conditioning devices at a temperature of not less than 25 °C and maintaining those devices regularly</p> <p>7. Using air conditioners with a high-power factor that operate with modern technology and save energy consumption.</p>		
4.3	Renewable Energy Use Policy	<ul style="list-style-type: none"> • Approving policies to expand the application of new and renewable energy uses, Assiut University's Community Service and Environmental Development Sector has prepared a study or project (technical or financial) to optimise the construction site of 		Annex (4.3.1) Annex (4.3.2)

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		<p>Assiut University to produce electric power from its new and renewable sources. The study includes installing photovoltaic solar cells (PV) on the roofs of buildings of all faculties of Assiut University and feeding the electric power generated from these photovoltaic cells on the Egyptian Electrical Unified Network, after contracting with the Ministry of Electricity to purchase that generated energy according to the rules of Egypt's Feed-in-Tariff program for renewable energies and using the revenue to execute the rest of the plan to develop and improve energy efficiency in university buildings (Annex 4.3.1).</p> <p>In general, the project aims to:</p> <ul style="list-style-type: none"> ❖ The gradual transition to the use of new and renewable energy (solar, wind, biofuels, etc.) instead of electric power generated from traditional sources in 		

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		<p>various fields of energy use within the university</p> <ul style="list-style-type: none"> ❖ Establishing a specialized scientific center for the development, research, maintenance, training, transfer, and modernization of new and renewable energy uses for the regional and local community, ❖ Self-sufficiency and diversification of the use of new and renewable energy (wind, biofuel, biomass, etc.), ❖ Reducing the use of energy generated from traditional sources that cause increased carbon emissions and using energy savings to be used in development projects. <ul style="list-style-type: none"> • A study was conducted to light Assiut University streets with about 1,500 lightning poles that use photovoltaic solar cells. These lightning poles are controlled and connected to batteries to store electric power and use energy-saving LED bulbs (Annex 4.3.2). • An application has been submitted to the 		

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		<p>Ministry of International Cooperation to provide the required funding to start implementing the project time plan</p>		
4.4	Annual electricity consumption rate	<ul style="list-style-type: none"> • The energy consumption of Assiut University decreased in 2022 compared to 2021 by (5.059) GWh, equivalent to (13.11%) of the annual consumption value at the university level. This is because of the measures taken by the university to conserve energy and improve its efficiency. • The value of the annual consumption of the university decreased by about 25% in 2020 compared to 2019, due to the start of the Corona pandemic and the partial suspension of work and study at the university, which led to a decrease in the amount and value of annual energy consumption for the year 2020. • In 2021, because of the return of study and work to their normal conditions, consumption increased by about 10.5% compared to 2020. However, the total consumption for 2021 did 	<ul style="list-style-type: none"> • Assiut University is one of the universities that applied to participate in the project to improve energy efficiency in university buildings among 20 other Egyptian public universities. The project is financed by a loan provided by the German Development Bank (KFW) for this purpose. The seven project proposals submitted by Assiut University are approved as models that use different methods, whether to generate energy from new and renewable energy sources or use other methods to reduce energy consumption and improve its efficiency. The German company GOPA Infra will provide technical support throughout the project period 	<p>Annex (4.4.1) Annex (4.4.2) Annex (4.4.3)</p>

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		<p>not return to the value it had in 2019, before the start of the Corona pandemic. Nevertheless, consumption in 2021 was reduced by about 11% compared to 2019.</p> <ul style="list-style-type: none"> • It is anticipated that the value of the annual consumption of the university will decrease by 7.5% compared to the consumption of 2022 due to the projects that have been implemented (7 projects with a cost equivalent to 1.5 million euros). These projects are funded by the Improve Energy Efficiency in University Buildings project, which is being implemented in 18 public universities under the full supervision of the Supreme Council of Universities. It is funded by the German Development Bank (KfW). In addition, the German company GOPA Infra provides technical support services for this project during the period from 2022 to 2026. 	between 2022 and 2026.	
4.5	The ratio of renewable energy production to total	<ul style="list-style-type: none"> • Electric power generation plants will be established as models to be expanded in the future from new and renewable energy 		Annex (4.4.1) Annex (4.4.2) Annex (4.4.3)

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	energy use per year	sources represented by photovoltaic (PV) solar cells with an output of 800 watts (peak). It will be installed in several university buildings. These plants will generate about 1.4 GWh per year, which is equivalent to about 4.0% of the university's annual consumption, considering the consumption of 2022 as the base year.		
4.6	Greenhouse Gas Emissions Reduction Program and Return on carbon certificates	<ul style="list-style-type: none"> Based on the action taken by Assiut University according to the program of rationalizing the use of electric power over the past years in general and the last three years in particular, the gas emissions of carbon dioxide (CO₂) have been reduced. <u>Considering that reducing 1 kWh reduces carbon dioxide emissions by 0.50 kg CO₂ equivalent, as follows:</u> According to the rationalization of consumption in electrical power, the energy consumed for the year 2022 decreased by about 5.059 GWh compared to the consumption of 2021, which means a 		Annex (4.4.1) Annex (4.4.2)

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		<p>reduction in carbon dioxide (CO₂) emissions of 2,530.0 tonnes of (CO₂) equivalent compared to 2021 and because of the action taken by the university to conserve energy, raise efficiency, and improve its efficiency.</p> <ul style="list-style-type: none"> • The decrease in carbon dioxide (CO₂) emissions in 2022 compared to 2021 has occurred despite operating the Trauma and Emergency Hospital as of July 2021 (Annex 4.4.1). • Emissions, equivalent to 5,259.0 tons of carbon equivalent, are reduced because of the reduction in annual consumption in 2022 compared to 2019, despite the completion of the operation of the Faculty and Hospital of Dentistry and the Faculty of Veterinary Medicine Hospitals in 2019. As well as the loads for the faculties of fine arts and kindergarten. • The value of the annual return from credits for low carbon dioxide emissions for 2022 amounts to about 75,900.0 euros. 		

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4.7	Projects implemented in the University to confront climate change	<ul style="list-style-type: none"> 7 projects will be implemented at a total cost of 1.5 million euros within the "Improving Energy Efficiency in University Buildings Project," in which 18 Egyptian public universities participate under the supervision of the Supreme Council of Universities and are funded by the German Development Bank (KFW). These projects are models that can be expanded in the future at the level of Assiut University and will lead to a reduction in consumption of about 3.2 GWh. 		<p>Annex (4.4.3)</p> <p>Annex (4.4.4)</p>