



Pharos University in Alexandria
Vice President for Graduate Studies & Research
International Ranking committee



THE Impact Ranking SDG7 Report



Affordable and
Clean Energy



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Pharos University in Alexandria is paying a lot of attention to the affordable and clean energy issues. This is in the form of initiatives, courses, events, projects, and cooperation agreements. The following are some examples of the university's efforts to address energy.

1) Students' Field Projects Addressing Energy at Pharos University:

Students contributes with the following projects in the field of energy

No	Project Name	Summary
1	Natural Fibers	The usage of natural resources will play a leading role in the sustainable development of the cement and concrete industry during this century. Plant-based natural fibers are used more increasingly in construction materials. Despite the low-cost of such environmentally friendly renewable material, it could enhance the mechanical properties of construction materials. This project presents extensive experiments on the use of plant based natural fibers as reinforcement for cement-based composites, with a particular emphasis upon fiber types; fiber characteristic, and fiber-cement composites performance.
2	Solar PV pumps for sustainable irrigation in Egypt	This project represents a comprehensive design of photovoltaic water pumping system powered entirely by solar energy with object of conserving electricity by reducing the usage of grid power and conserving water by reducing water losses. The proposed system is easy to implement and environment friendly solution for irrigation fields as well as requires minimal maintenance and attention and is self-starting.



No	Project Name	Summary
3	Design and optimization of solar collectors' network for swimming pool heating application	<p>This project presents a general procedure for designing and optimizing the arrangement of solar collectors of swimming pool heating applications using TRNSYS software. The optimal arrangement of the solar collectors for thermal applications requires a merge between thermal and hydraulic objectives. For the thermal side, the working fluid must provide the heat load for the swimming pool at the specified temperature also for the hydraulic side the fluid must flow through the system facing a pressure drop within the specified limits. In this project, the overall arrangement of solar collectors which forms the total collector surface area is named by the (solar collector's network). This network will be practically applied on a swimming pool as a case study for this project. In addition to, an experimental model of a solar heater is constructed to fit the swimming pool.</p>
4	Design, Modeling, and performance analysis of solar still	<p>Two identical conventional solar still have been fabricated and will be assembled. For enhancing the freshwater yield, we used some parameters on solar still like black aluminum sheets fins fixed on a black basin (steel, 80*50*10 cm, thickness 6mm). The transparent glass covers 5 mm thickness were placed at an inclination of 30 degrees to the horizontal. Moreover, we used absorbing material like a black dye and sensible heat storage material on different water depth (20mm, 30mm and 40mm). Also, modeling has been carried out aided by some basic and simplified hypotheses, according to overall thermal energy balances on glass, water mass basin, while taking into consideration an atmospheric condition such as temperatures, humidity, and solar intensity as well as wind speed.</p>



No	Project Name	Summary
5	Smart campus	This project is still proceeding in the academic year 2020/2021 and it aims to construct a smart system for the life of students and staff members in university campus. It helps the education process and provides facilities to check attendance. It also allows students to enter the campus and study rooms with a smart card that can also be used for fees payment.

Evidence url:

<https://www.pua.edu.eg/pharos-university-organized-towards-sustainable-tomorrow-competition/>

2) Courses Addressing Energy at Pharos University:

No	Faculty in Pharos University	Course name	Course code	SDG of relevance	Topics in each course
1	Engineering	Energy Systems	EE 271	SDG 7	Studying the availability of using PV arrays in residential & commercial areas
2	Engineering	Energy conservation	EP 330	SDG 7	Different methods of energy conservation: electrical energy conservation, lightning, energy saving, heat energy saving, insulation, reusing of hot wastewater
3	Engineering	Renewable energy and storage systems	EM 333	SDG 7	Different methods of energy storage systems: electrical energy lightning, energy saving, heat energy saving, insulation, solar energy, smart building, equipment design, sensors and computer-controlled processes.



3) Lecture about Fuel Cells to the Petrochemical Engineering Department:

In light of the significant development the world has been witnessing recently in the development and production of hybrid and electric vehicles (HEV/EV) plus the recent developments in high voltage battery technologies due to its environmental advantages, the Petrochemical Engineering Department organized a lecture on fuel cells.



Evidence url:

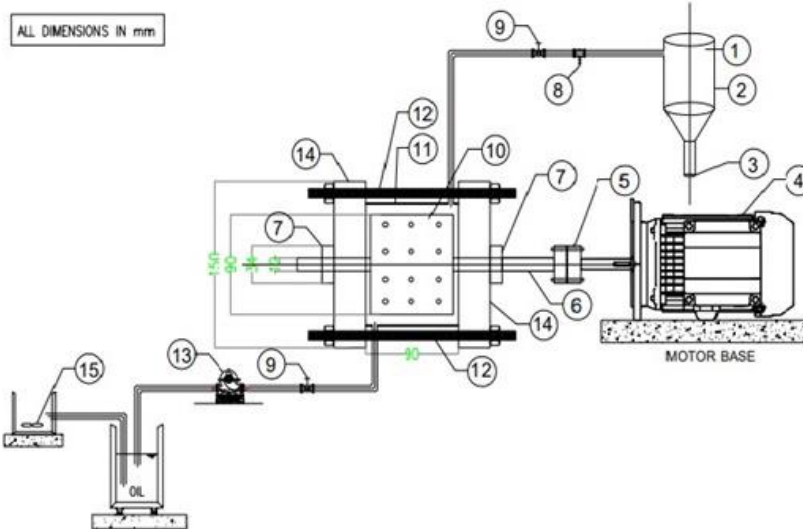
<https://www.pua.edu.eg/%d9%85%d8%ad%d8%a7%d8%b6%d8%b1%d8%a9-%d8%b9%d9%86-%d8%ae%d9%84%d8%a7%d9%8a%d8%a7-%d8%a7%d9%84%d9%88%d9%82%d9%88%d8%af-%d9%84%d8%b7%d9%84%d8%a7%d8%a8-%d9%82%d8%b3%d9%85-%d9%87%d9%86%d8%af%d8%b3%d8%a9/>

4) A study aiming at designing a reactor for the production of biofuel using hydrodynamic cavitation technique.

The Petrochemicals Department at the Faculty of Engineering carried out a study aiming at designing a reactor for the production of biofuel using hydrodynamic cavitation technique. This technique is based on intensifying the rate of the reaction and the production of biofuels from non-edible oil by introducing bubbles to the liquid. A model was constructed to explain this process and validate it using

experimental data. The reactor has already been implemented successfully and experiments have been conducted to test to prove its effectiveness. This clean biofuel is considered as an alternative to fossil fuel used in industry, in aviation in addition to avoiding the negative impacts of fossil fuel combustion.

NO.	DESCRIPTION	NO.	DESCRIPTION	NO.	DESCRIPTION
01	BIO FUEL	06	MECHANICAL STAINLESS STEEL SHAFT	11	TRANSPARENT STATOR
02	SEPARATION HOPPER	07	HIGH SPEED BEARING	12	8M THREADED BOLT WITH NUTS
03	GLYCERIN	08	SAMPLING POINT	13	PERISTALTIC PUMP
04	ELECTRIC MOTOR (3000 RPM)	09	GATE VALVE (ISOLATION)	14	FLANGE
05	FLEXIBLE SHAFT COUPLING	10	CYLINDRICAL ABSORTOR	15	MAGNETIC STRIRER



Evidence url:

<https://www.pua.edu.eg/production-of-biojet-fuel-using-hydrodynamic-cavitation-reactor-in-paros-university/>

5) Mechanical Engineering Department visits Abu Qir Power Plant:

This is part of the Thermal Power Plants Operation & Management Course and the Control and Safety of Thermal Systems course for senior students in the Mechanical Power Engineering major. During the visit, the students learned about the different sections of the plant, namely: (steam and gas turbine room, filtration, purification and water treatment unit, boiler building, pumps room, automatic control and monitoring room).



Evidence url:

<https://www.pua.edu.eg/mechanical-engineering-department-visits-abu-qir-power-plant/>

6) Freshman students of the of Basic Sciences Department and senior students of the Petrochemical Engineering Program visited Alexandria Specialty Petroleum Products Company (ASPPC).

The visit began with an introductory lecture on the history and establishment of the company. This was followed by a tour inside the production units and the different laboratories of the company, where the students were familiarized with the different control systems. The students expressed their delight with this visit and how they greatly benefited from it.





Evidence url:

<https://www.pua.edu.eg/faculty-of-engineerings-visit-to-asppc/>

7) The Electrical Engineering Department organized a scientific trip through visiting Sidi Kerir Power Plant of the West Delta Electricity Production Company (WDEPC).

The gas circuits (compressors, pistons, fire chambers, and gas turbines) and the steam cycle (gas turbines of various types, heat recovery boilers, and steam condensers) were examined. Many mechanical pumps, electric generators, primary and auxiliary transformers, excitation transformers, and all practical interconnecting circuits were also viewed on-site.

As a result, being familiarized with the complete work system through the main control center of the station, the students were given a realization of their role as the future engineer at the work site, whether as an operation engineer or a maintenance engineer.



Evidence url:

<https://www.pua.edu.eg/electrical-engineering-department-visits-sidi-kerir-power-plant/>



8) A field visit to the Sidi Kerir Petrochemicals Company (SIDPEC) for the students of the pre-engineering year.

Within the framework of the Faculty of Engineering's keenness on providing field visit to its students, the Basic Sciences Department, in cooperation with the Petrochemical Engineering Department, organized a field visit to the Sidi Kerir Petrochemicals Company (SIDPEC) for the students of the pre-engineering year.

The visit was welcomed by Eng. Mahmoud Basal, company's assistant president for production. The visit's program began with an introductory session about the company that included security and safety. Then the students listened to a detailed session about the production and manufacturing of polyethylene in the company. Later, the students visited the ethylene and the polyethylene plants.



Evidence url:

<https://www.pua.edu.eg/basic-sciences-and-petrochemical-engineering-departments-visit-sidpec/>

9) Protocol on Cooperation Between PUA and ANRPC:

A highly-ranked delegation from Alexandria National Refine & Petrochemical Company (ANRPC) visited PUA on Wednesday, March 9th, 2022. The delegation was headed by Chem. Salah Gaber Bahnasy, Chairman and Managing Director. It also included Eng. Ghada Abdul Hameed, Technical Office Director-General, Acc. Mohammad Ali Assi, Assistant Director for Financial Affairs, Chem. Essam Qabari, Director-General of Industrial Safety, Chem. Hany Mahmoud, Director-General of



Operations, Mr. Abdul Latif Nazrah, Director-General of Public Relations. The delegation was welcomed in PUA's Council Hall in 3rd floor by Prof. Dr. Mahmoud Mohy El Din, PUA's President, Prof. Dr. Ramadan Abu El Ella, Vice-President for Community Service and Environment Development, Prof. Dr. Abbas Anwar, Head of Petrochemical Engineering, Prof. Dr. Mohammad Yehia Al Mekki, Lecturer in the Faculty of Engineering, Chem. Hossam Anwar, Lecturer in Petrochemical Engineering Department, and Dr. Fathy Lecturer in Petrochemical Engineering Department.

Both parties discussed the possibilities of mutual cooperation in the training field and participation in solving the technical issues, to which PUA can help find practical solution. Further, both parties agreed on the necessity of optimal utilization of the possibilities available to each respective party in conformity with the state's strategy in terms of connecting the industrial institutions with production sites, and the Egyptian scientific and academic institutions to achieve the developmental objectives of the Egyptian society. To this end, both parties agreed on a protocol on cooperation that was signed by Prof. Dr. Mahmoud Mohy El-Din, as PUA President and Chem. Salah Gaber Bahnasy, as Chairman and Managing Director of ANRPC.



Evidence url:

<https://www.pua.edu.eg/protocol-on-cooperation-between-pua-and-anrpc/>



10) Pharos University has a protocol for cooperation in the field of renewable energy use with the New and Renewable Energy Development and Use Authority.

Evidence url:

https://drive.google.com/file/d/1xxdDBbFjvPUzyYEd_OJfvQ-1jkNGkz3q/view

11) Third International Conference on New Trends in Sustainable Energy (ICNTSE-2021):

PUA's Faculty of Engineering organizes the Third International Conference on New Trends in Sustainable Energy (ICNTSE-2021) on 1-2 March 2022 via online conference. It is also worth mentioning that the Journal of King Saud University – Engineering Sciences (JKSUES) will publish a special edition for a selected group of the conference's research, which meet the journal's publishing requirements.

For more information, please click on the conference's link below: <https://www.pua.edu.eg/faculty-of-engineering/conferences-2/icntse-2021/>



Evidence url:

<https://www.pua.edu.eg/third-international-conference-on-new-trends-in-sustainable-energy-icntse-2021-online/>



12) Publications address energy:

No	TITLE/YEAR/AUTHORS	DOI
1.	[HTML] Performance evaluation of continuous solar still water desalination system	10.1007/s10973-020-09547-5
2.	[HTML] Hybrid renewable energy/hybrid desalination potentials for remote areas: selected cases studied in Egypt	10.1039/d1ra00989c
3.	Novel sea water desalination unit utilizing solar energy heating system 2020 ElHelw, M. El-Maghlany, W.M. El-Ashmawy, W.M. Alexandria Engineering Journal	10.1016/j.aej.2020.03.019
4.	Enhanced solar desalination units 2020 Tayeb, A.M. Farouq, R. Shehata, A.Z. Othman, R.H. Proceedings of Institution of Civil Engineers: Energy	10.1680/jener.19.00065