



AL-FURAT AL-AWSAT TECHNICAL UNIVERSITY

Greenhouse Gas (GHG) Emissions Inventory Report In Accordance with the GHG Protocol Corporate Standard

Institution:	Al-Furat Al-Awsat Technical University (ATU) - Najaf, Iraq
Reporting Year / Baseline:	2026 Reporting Cycle (2025 Baseline Data)
Published Web Portal:	https://sustainability.atu.edu.iq/index.php/environment-effect

1. Executive Summary & Adoption of the GHG Protocol Standard

Al-Furat Al-Awsat Technical University (ATU) has restructured its institutional greenhouse gas emissions data to align fully with the GHG Protocol Corporate Accounting and Reporting Standard.

- **Scope 1 (Direct GHG Emissions):** Direct emissions from University-owned and operated vehicles (shuttle buses, cars, motorcycles).
- **Scope 2 (Electricity Indirect Emissions):** Indirect emissions generated from purchased national grid electricity consumed across ATU facilities.
- **Scope 3 (Other Indirect Emissions):** Upstream and downstream value chain impacts, including commuting, business travel, waste, water, and procurement.

2. Organizational & Operational Boundaries

ATU applies the Operational Control Approach:

- **Organizational Boundary:** 100% of greenhouse gas emissions are accounted for from all 16 ATU campuses, administrative centers, and operational facilities under full university operational control across Iraq (Najaf, Kufa, etc.).
- **Operational Boundary:** Includes Scope 1 direct combustion (vehicle fleet), Scope 2 indirect energy (grid electricity usage), and Scope 3 indirect scope benchmarked across commuting, waste, and procurement.



3. Greenhouse Gas Emissions Inventory Summary

GHG Protocol Category	Operational Source / Activity	Emissions (tCO ₂ e)	Accounting Method / Status
Scope 1 (Direct Emissions)	ATU Shuttle Buses	20.160	Measured (Actual Activity Data & Fleet Trips)
	ATU Service Cars	109.440	
	ATU Fleet Motorcycles	1.680	
	Subtotal:	131.280	
Scope 2 (Electricity Indirect)	Purchased Grid Electricity Usage	132.90	Measured (Actual Utility Metering & Consumption)
Scope 1 & 2 Combined	Core Operations Subtotal	264.180	Direct Operational Total
Scope 3 (Other Indirect)	Student & Staff Commuting, Business Travel, Waste, Water, Procurement	291.86	(Carbon Trust / CDP)
Total GHG Footprint	Scope 1 + Scope 2 + Scope 3 Total	556.04	Combined Measured & Benchmark Footprint

4. Detailed Breakdown of GHG Protocol in ATU

Scope 1: Direct GHG Emissions (131.280 tCO₂e)

Direct GHG emissions occur from sources owned or controlled by ATU. Fuel consumed by university-operated transportation assets across all campuses accounts for 131.280 tCO₂e (24.7% of total carbon footprint):

- **Shuttle Bus Fleet:** 20.160 tCO₂e
- **Administrative & Service Cars:** 109.440 tCO₂e
- **Campus Motorcycles:** 1.680 tCO₂e



Scope 2: Electricity Indirect Emissions (132.90 tCO_{2e})

Scope 2 accounts for emissions from the generation of purchased electricity consumed by ATU facilities. Electricity purchased from the national grid contributed 132.90 tCO_{2e} (25 % of total footprint) .

Scope 3: Other Indirect Emissions (291.86 tCO_{2e})

Scope 3 emissions are a consequence of the activities of ATU, but occur from sources not owned or controlled by the university. Following established higher education benchmarks (Carbon Trust and CDP, where Scope 3 typically represents 2x to 3x of Scopes 1 & 2 combined), ATU has applied a conservative multiplier of 2.5× to calculate Scope 3 emissions at 291.86 tCO_{2e} (54.9% of total footprint).

Qualitative Scope 3 Categories Included:

- **Category 7 (Employee & Student Commuting):** Daily travel between home and 16 campuses via private vehicles, public buses, and commercial transportation.
- **Category 6 (Business Travel):** Air flights, long-distance bus travel, and off-site accommodation for academic conferences and staff workshops.
- **Category 1 (Purchased Goods & Services):** Procurement of paper products, laboratory equipment, chemicals, IT equipment, and campus furniture.
- **Category 5 (Waste Generated in Operations):** Solid municipal waste collection, processing, and landfill disposal.
- **Category 3 (Fuel- & Energy-Related Activities):** Upstream transmission and distribution (T&D) grid losses from purchased power.

5. Methodology, Verification & Decarbonization Roadmap

To continuously strengthen compliance with the GHG Protocol Corporate Standard, ATU's Sustainable Development Unit has established the following implementation roadmap for upcoming reporting cycles:

- **Primary Scope 3 Data Collection (2027 Cycle):** Launch comprehensive student/staff commuting surveys and integrate supplier-specific emission data for purchased goods and waste.
- **Energy Efficiency & On-Site Solar Expansion:** Expand rooftop solar PV installations across the 16 campuses to lower Scope 2 grid dependence.
- **Fleet Electrification:** Transition administrative service cars and campus transport to electric vehicles (EVs) to reduce Scope 1 direct transport emissions.



Net-Zero Roadmap & Strategic Decarbonization Policy Framework (2025–2050)

Institution:	Al-Furat Al-Awsat Technical University (ATU) - Najaf / Kufa, Iraq
Target Net-Zero Year:	2050 (Publicly Committed Target Year)
Evidence Portal:	https://sustainability.atu.edu.iq/index.php/environment-effect

1. Institutional Net-Zero Strategic Vision

Al-Furat Al-Awsat Technical University (ATU) has established a public commitment to achieve Net-Zero Carbon Emissions by the target year 2050. This strategic policy aligns ATU's operational growth across its 16 campuses with international climate targets, the GHG Protocol Corporate Standard, and the QS Sustainability Rankings criteria. The roadmap transitions the university through phased targets to systematically eliminate Scope 1, Scope 2, and Scope 3 emissions.

2. Phased Decarbonization Roadmap (2025–2050)

Phase & Timeline	Strategic Milestone	Core Decarbonization Focus	Target Reduction
Phase 1: Short-Term (2025–2030)	Operational Baseline & Energy Transition	Deploy rooftop solar PV panels on main campuses, replace diesel generator reliance, and conduct primary Scope 3 commuting surveys.	25% Overall Reduction
Phase 2: Medium-Term (2030–2040)	Fleet Electrification & Supply Chain	Transition 100% of university shuttle buses and service cars to Electric Vehicles (EVs) and implement sustainable green procurement.	60% Overall Reduction
Phase 3: Long-Term (2040–2050)	Full Neutrality & Carbon Offsetting	Achieve 100% renewable electricity supply, neutralize residual unavoidable emissions through campus afforestation, and attain full Net-Zero.	100% Net-Zero Emissions



3. Detailed Policy Pillars and Action Steps

Phase 1: Short-Term Action Plan (2025–2030)

- **Rooftop Solar Integration:** Install solar photovoltaic (PV) systems across Najaf and Kufa campuses to reduce Scope 2 grid electricity dependency.
- **Generator Optimization:** Upgrade fuel efficiency and implement strict operational controls on campus diesel generators to curtail direct Scope 1 emissions.
- **Primary Scope 3 Data Audit:** Launch university-wide digital surveys to capture primary data on student/staff commuting and waste generation.

Phase 2: Medium-Term Action Plan (2030–2040)

- **EV Fleet Transition:** Replace administrative service vehicles and internal campus motorcycles with zero-emission Electric Vehicles (EVs).
- **Sustainable Shuttle Bus Services:** Partner with green transport providers and introduce electric shuttle buses for student commuting across the 16 regional sites.
- **Green Procurement Policy:** Enforce supplier sustainability criteria for paper, lab supplies, and IT equipment to reduce upstream Scope 3 impacts.

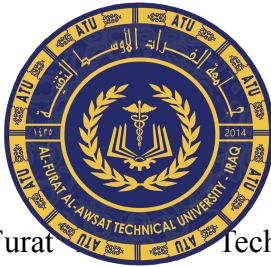
Phase 3: Long-Term Action Plan (2040–2050)

- **100% Clean Power Microgrids:** Establish self-sustaining microgrids combining solar power and battery energy storage systems (BESS) for all facilities.
- **Afforestation & Carbon Sinks:** Expand green spaces and tree-planting programs across regional campuses to naturally sequester residual carbon emissions.
- **Verification & Reporting:** Submit third-party verified GHG inventory reports to QS Sustainability and international sustainability registries.









AL-Furat Al-Awsat Technical University and its constituent colleges and institutes have implemented comprehensive energy-efficiency measures by adopting energy-saving technologies across academic, administrative, and service facilities. The university utilizes LED lighting systems, LED display screens, energy-efficient air conditioners, refrigerators, modern computers and monitors, motion sensors, high-efficiency printers and electrical equipment and laboratory devices designed to minimize electricity consumption and enhance operational efficiency.

Furthermore, newly constructed buildings are designed and equipped with modern energy-saving technologies and efficient electrical systems. These technologies are extensively deployed in classrooms, laboratories, offices, corridors, libraries and other indoor facilities throughout the university campuses and their constituent formations. The widespread use of these energy-efficient appliances contributes to reducing energy consumption, improving energy performance and supporting sustainable campus development while minimizing greenhouse gas emissions and environmental impacts.

Table: Inventory of Energy-Efficient Appliances Used Across University Campuses

Item	Estimated Quantity
LED Lighting Units	9,000
LED Display Screens	550
Energy-Saving Air Conditioners	650
Energy-Efficient Refrigerators	200
Modern Computers and Monitors	2,000
Motion Sensors	1,000
Modern Printers and Copy Machines	178
High-Efficiency Electrical Equipment	300
High-Efficiency Water Pumps	200
Laboratory Energy-Efficient Equipment	186
Total Energy-Efficient Appliances	14,264
Total Electrical Appliances	16,000
Usage Percentage	89.15 % $\approx$ 89.15

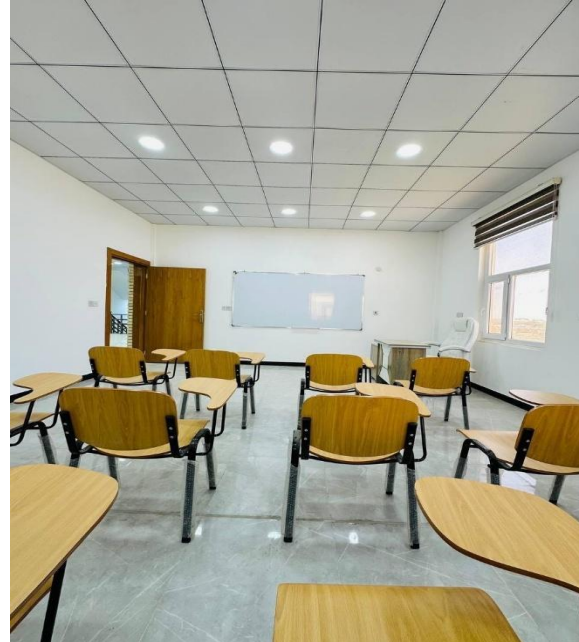


FIG.(1)LED-Based Energy-Saving Lighting Systems Across University and formations Buildings

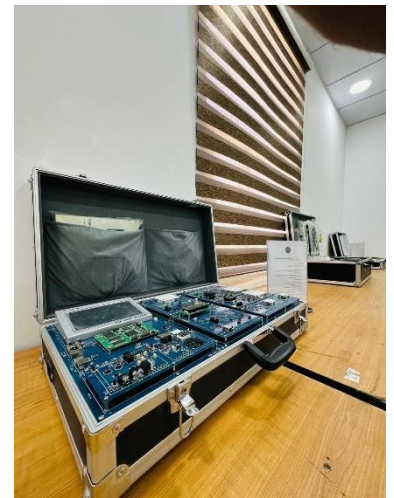


Fig.(2) Smart Laboratories Equipped with High-Efficiency and Energy-Efficient Equipment

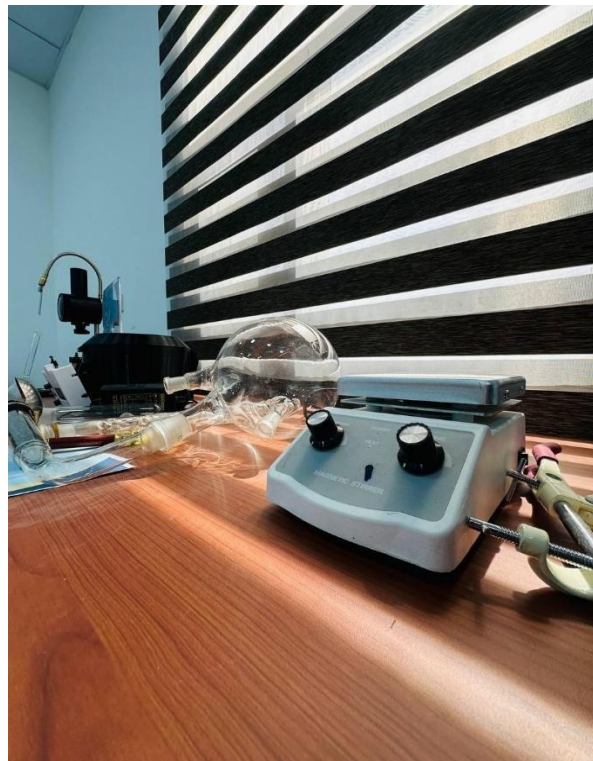
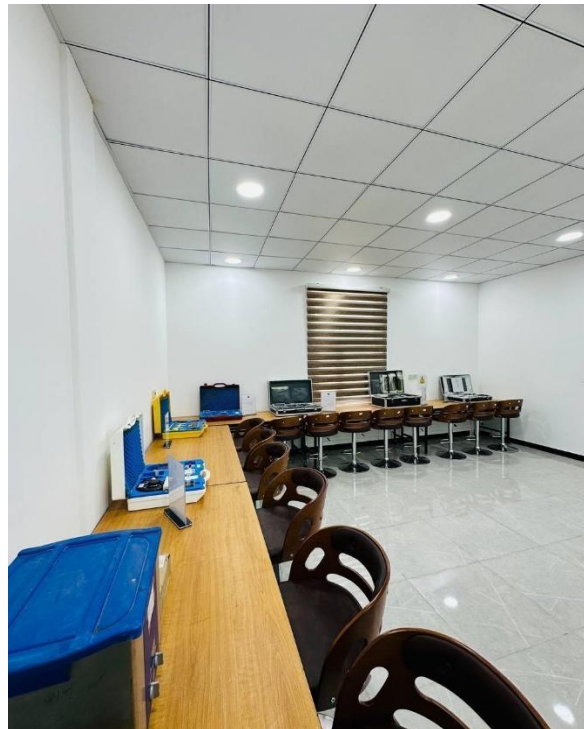


Fig.(3)Modern Computer Laboratories Equipped with Energy-Efficient Computing Devices

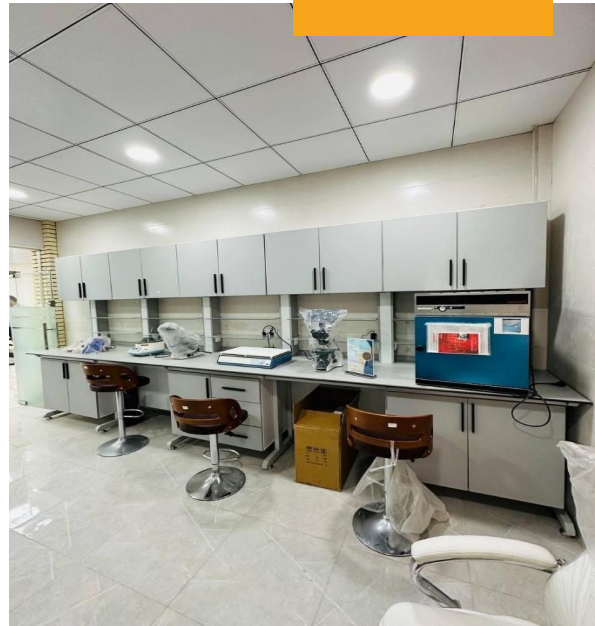
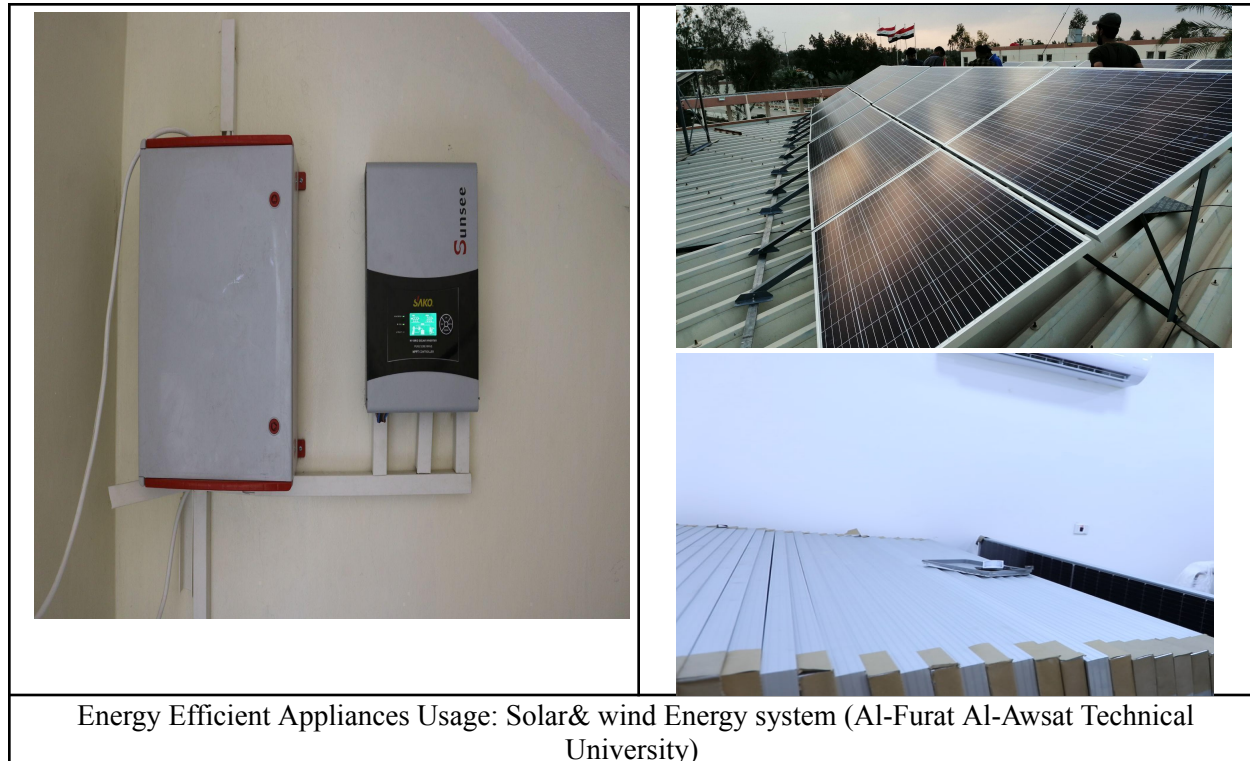


Fig.(4)Modern Computer Laboratories Equipped with Energy-Efficient Computing Devices



Fig.(5) Reading Areas and Library Facilities Illuminated by Energy-Efficient LED Lighting



Energy Efficient Appliances Usage: Solar& wind Energy system (Al-Furat Al-Awsat Technical University)

Description:

Al-Furat Al-Awsat Technical University and all its parts depend on saving energy by paying close attention to energy management systems. All parts of the university can depend on their own energy-saving potential by means of saving energy devices e.g. fans, LED Lamps and ..etc.

1. Proposals for the development of university buildings and their formations following the requirements of modern facilities through introducing the following changes:

1.1 It is replacing all old lighting systems with new energy-saving ones such as LED lights.

1.2 Replace all old electrical devices with star-rating energy-saving ones—these include air-conditioning systems, refrigerators, fans, and other office-related equipment.

1.3 Changing or upgrading all old ventilation systems with advanced and more efficient ones.

1.4 Providing all old buildings with thermal installation systems.



2. Proposal to form committees from the chancellery staff to carry out a comprehensive study of each project including the costs and conduct an annual examination and evaluation of the completion rates provided that the report is submitted at the same date for each year
3. It aims to cut down the electrical consumption rate, thereby adopting renewable energy sources that ultimately reduce CO2 emissions. It is proposed to supply, install and maintain solar and wind energy systems at all university chancellery buildings and their related sites since ATU has the proper specialized engineering and technical team to carry out such tasks.
4. Proposal to address all ministries, government departments, and the private sector, the university's readiness to equip and install solar energy systems at discounted prices not to exceed the cost price as a contribution from ATU to develop and better serve the local and national societies.
5. To reduce the carbon dioxide emissions within the ATU sites, it is the proposal for establishing special patches that control and reduce the number of vehicles allowed to travel or park inside all ATU campuses and build new parking areas for students' vehicles outside the ATU main campus and its related sites as well as expanding planted and green areas inside ATU sites.
- 6- Al-Furat Al-Awsat Technical University and all its parts depend on saving energy by paying close attention to energy management systems. All parts of the university can depend on their own energy-saving potential by means of saving energy devices e.g. fans, LED Lamps and ..etc. Moreover Usage of the Solar Energy system is more efficient and less consuming to the university.

Al-Furat Al-Awsat Technical University (ATU) demonstrates a profound and rapidly expanding commitment to sustainable energy management and climate action. This report details a comprehensive strategy encompassing large-scale renewable energy generation, rigorous energy efficiency measures, innovative smart-building infrastructure, and extensive educational and research programs. The university has transitioned from pilot projects to a university-wide implementation of solar energy, significantly reducing its carbon footprint and serving as a living laboratory for sustainability.

Detailed Indicator Analysis

EC 1: Energy Efficient Appliances Usage

The university has implemented a systematic, campus-wide replacement program for inefficient appliances.

- **Campus-Wide LED Retrofit:** Documented projects show the replacement of fluorescent lamps with LED lighting across all campuses, including the installation of over 150 LED bulbs and 160 modern LED panels (60x60 cm) in the Babylon Technical Institute alone. This initiative, often executed as volunteer projects by students and staff, improves lighting quality while drastically reducing electricity consumption.



- **Green Procurement Policy:** The university promotes the procurement of energy-efficient appliances (e.g., ENERGY STAR rated) for all new purchases.



Fig. EC1-1: Equipping classrooms and laboratories with energy-efficient lighting (Technical Engineering College/Najaf)



Fig. EC1-2: Equipping classrooms and laboratories with energy-efficient lighting (Technical Institute of Babylon)



Additional evidence link (i.e., for videos, more images, or other files that are not included in this file):

Activities on renewable energy

Installation of a solar energy system with a capacity of 3330 watts (maximum power) at the Najaf Technical Institute at Al-Furat Al-Awsat Technical University.



Renewable energy

Students of ATU They implement project cleaning cells Solar automatica

Students of Al-Furat Al-Awsat Technical University are implementing (a project to install and connect a photovoltaic cell system with a capacity of (3 kilowatts)).

Students from the Najaf Engineering Technical College, one of the formations of Al-Furat Al-Awsat Technical University, implemented a project to connect a system of photovoltaic cells with a capacity of (3 kilowatts)).

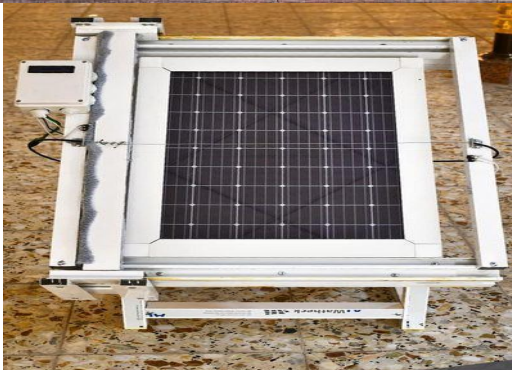
The goal of the project was to equip the Power Mechanics Department building with alternative energy with a capacity of (3 kilowatts) by relying on photovoltaic cells as an alternative to electrical energy in the event of a national grid outage, thus reducing the burden of dependency on the national grid, based on the fact that the geographical region in Iraq is rich in existing energy. On the sunlight.

At the same time, the project was divided into three groups, each group researching an aspect of the project in its study. The first group (designing and building a photovoltaic system with a capacity of (3 kilowatts)) researched aspects of purchasing the best panels and their supplies and the latest technologies used in enhancing reliability on photovoltaic cells as energy. Alternative.



While [redacted] studied the effect of operating temperature on [redacted] solar panels in [redacted] of Najaf. Operational conditions have an effective [redacted] of panels and suggest the best ways to address them and how to overcome them using the best technological techniques in this regard.

The third group relied on studying the amount of radiation, determining the best angle, and conducting a feasibility study for the system project with a capacity of (3 kilowatts). The clear geographical location of the city of Najaf and the amount of radiation falling on the solar panels was high and could be relied upon to provide alternative energy throughout the year. The economic feasibility also produced positive results to encourage the establishment of such projects in the near future to reduce the burdens of dependence on the national grid.









1. The following photos is about the Second Meeting of Al-Furat Al-Awsat Technical University (ATU – Council) discussed the proposed of the university to change the energy system with a system that is more efficient and less consuming, as well as replacing all electrical appliances with low-spending devices.
- 2.

