

ENERGY, ENVIRONMENT, AND WATER RESEARCH CENTER
Civil and Environmental Engineering Faculty, Near East University, Nicosia, North
Cyprus, 99138 (via Mersin 10, Turkey)

The Energy, Environment, and Water Research Center, EEWRC-2019, (Enerji, Çevre ve Su Araştırma Merkezi, ENÇESU-2019) is newly established in 2019 as the first research center of at Near East University. **EEWRC** research has been focused on analyzing of natural resource systems, modeling of spatial and temporal aspects of sustainable development and water-related issues with the main goal of solving real problems in water management, treatments and reuse, groundwater management, irrigation, and hydrological monitoring. Such goals can be achieved through fundamental and applied thematic research, which is of primary importance to arid and semi-arid areas such as Cyprus, where non-renewable energy and water resources are limited and demand is growing. *[The current situation is exacerbated by global climate change, a phenomenon projected to cause drastic impacts on the environment in the Mediterranean Sea basin including Cyprus.](#)* The EEWRC is designed to be and to act as the research arm for the energy and water-related ministries, departments, and authorities. The center has broadened its function to include the environmental, energy and water issues due to their interdisciplinary nature and to cope with energy-environment-water nexus as the core of sustainable development. There is also a need for joint energy-environment-water policies and a better understanding of the susceptibility of energy to water, energy to the environment, environment to water and vice versa.

The center concentrates on the following areas:

1). Water and Environment

That includes research and studies on the management and protection of the water resources, integrated water resources management, hydrological monitoring, groundwater, irrigation management, environmental issues, wastewater treatment, and reuse and environmental impacts. It will also provide services in the area of monitoring, environmental awareness, and environmental engineering design and participate in the development of environmental legislation, conferences, and seminars in the areas of water and the environment.

2). Energy and Environment

The research areas in energy include renewable energy such as solar, wind, and biofuel (biomass and biodiesel), energy storage in batteries and others, the efficiency of end uses such as in building and water uses, and energy economics and policies. Generally, it is covered the following Climate change/low-carbon economic development

- New/renewable energy development
- Energy efficiency improvement
- Environmental protection in rural and regional areas
- Energy and environment advisory

3). Energy and Water

100% renewable economy would give a lasting solution to the challenges raised by climate change, energy security, sustainability, and pollution. The conversion of the present transport system appears to be one of the most difficult aspects of such renewable transition. In such a transition, the conversion of the present transport system appears to be one of the most difficult aspects. At present, global transport is still heavily dependent on fossil fuels (mostly, oil), that is expected to decline within a few decades; furthermore, global transport produces a significant fraction of greenhouse gases, pollution in metropolitan areas, and is also a source of millions of accidents every year. Generally, it is covered the following topics

- Water transportation technology
- Electrical transportation technology
- Hydrocarbon transportation technology
- Infrastructure for transport
- Investment and energy cost of transport

4). Climate Change

ALTERNATIVE WRITE-UP

The International Panel on Climate Change (IPCC), suggests that the Mediterranean Basin is one of the most vulnerable areas to global climate change, worldwide. Based on IPCC SRES Scenarios using the global general circulation models, the Mediterranean & Middle East region including Turkish Northern Cyprus (TNC), will experience warmer and dryer climatic conditions compared to the global averages. Projected increases in the average atmospheric temperature, up to the end of the century (3.5-7.0 degree C), coupled with an expected drop of 20%-40% in precipitation will seriously impact the island's economy, water resources, agriculture, biodiversity, tourism and human health & welfare. Moreover, with the Mediterranean attaining conditions more similar to tropical or subtropical oceans, the regional marine ecosystem will be adversely impacted by decreasing nutrient availability and an overall deterioration of marine food webs and enhanced influx of tropical marine species. Also, due to an increase in anthropogenic activities & enhanced atmospheric transport of Sahara dust to the Mediterranean region, air quality will be adversely impacted by ambient air mineral dust & air pollutants including Inhalable Particulate Matter, surface ozone precursors & possibly photochemical oxidants. A number of these air quality pollutants are known as short-lived climate forcing pollutants (SLCPs). This situation may have serious human health implications & needs to be evaluated as a matter of urgency. At the present time climate change related research in TNC including baseline monitoring data, greenhouse gas (GHG) emission inventories, science of climate change, vulnerability, impact & mitigation measures etc. are scarce or completely lacking.

The newly established NEU EEWRC is an important initiative to address a portfolio of pressing environmental challenges facing TNC. Climate change is in the forefront of these issues. Taking into

consideration the above introduction, a work program consisting of priority areas is outlined below for the climate change division of the EEWRC . The work is to be considered at the shorter term & may be conducted in collaboration with in-house experts from the Water, Energy & Environment divisions & also with support from NEU & selected number of internationally & locally known scientists & climate change institutions. The suggested topics cover baseline modules including:

- (1) Develop TNC-based monitoring, reporting & verification national guidelines (MRVNG) for estimating emissions of GHGs & Criteria Pollutants (GHGs-CPs) at Tier 1, 2 & 3 for all economic sectors. The TNC-MRVNG development and implementation may be coordinated with a relevant government authority to serve as the competent authority & deals with the stakeholders during data gathering & policy implementation. Literature will be based on IPCC work, US EPA, EU & engineering best practices;
- (2) Using TNC-MRVNG construct/verify baseline sectoral GHGs-CPs national emission inventories & assess sustainable development mitigation opportunities using rational such as fuel efficiency, fuel switching, regulatory, tax& awareness measures etc.;
- (3) Using near-reference continuous air quality monitoring stations to be established at two selected cites; one on top of Kyrenia mountain& the other in an urban location (NEU Campus), hourly meteorological data of (T,P, Wind Speed& Direction, RH) & GHGs, CPs atmospheric concentrations (CO₂, CH₄, N₂O; O₃, SO₂, NO_x, PM, NMHC) shall be collected, analysed& stored in a database. The Kyrenia station data represent TNC background level; NEU station is for the urban environment;
- (4) Data generated from 3 shall be assessed to determine current levels & trends of GHGs-CPs, Meteorological parameters at TNC background & urban environment & assess the interrelationships with potential climate change impacts (particularly human health), mitigative measures &transboundary pollution transport assessment;
- (5) Use above databases in combination with appropriatedispersion modeling techniques &biomedical and public health expertise to assess climate-change-related threats to human well-being and support the management and possible containment of associated risks to public health, particularly with regards to SLCPs (ozone & PM);
- (6) Introduce regional climate change modelling techniques (down-scaling of IPCC general circulation models) to enable more accurate projections of climate change impacts on TNC;
- (7) Conduct cooperative initiatives with existing expertise in TNC e.g. Kyrenia University on monitoring & assessment of the impact of climate change on TNC marine environment and on effective adaptation & mitigation measures;
- (8) Utilize the above compiled data to prepare TNC government's climate change reports in response to the United Nation Framework Convention on Climate Change (UNFCCC), particularly the Paris Agreement and other UN & sustainable development organizations.

EEWRC team expertise in the key areas of Earth's climate: atmospheric, oceanic and terrestrial processes. We apply basic scientific principles to pressing questions on climate dynamics, global climate change, and extremes of weather and climate.

Our atmosphere research includes studies of large-scale dynamics, convection, radiation, climate feedbacks, and factors controlling precipitation changes and other meteorological impacts.

Our oceanographic research focuses on the ocean's role in the climate system: including large-scale physical oceanography, coupled climate models and regional ocean circulation, palaeoclimate dynamics, the ocean's thermohaline circulation, global biogeochemical cycles and climate changes in Earth's past.

On the land surface, we focus on modeling terrestrial processes in climate models, to develop our understanding of the effects of carbon dynamics, hydrology and vegetation processes on climate.

Vision

The vision of **The Energy, Environment, and Water Research Center** is to be sure that, energy is used in an efficient way and renewable energy is utilized as much as possible. In addition, that environment protected in a sustainable manner and water resources are used, managed, and protected in a more scientifically informed.

Mission

The mission of the center is to bring together talent from throughout the University to address complex issues through innovative interdisciplinary research, education, training, and public outreach programs. The center is committed to developing the basic knowledge, practical experience, and infrastructure required to respond to stakeholders' emerging issues.

Divisions

Research activities are carried out within the framework of one or more of **EEWRC's** three established Divisions, namely:

- Energy and Renewable
- Atmosphere and Climate
- Water Resources

Research at EEWRC strives to be interdisciplinary and issue-driven, embracing the physical, chemical, biological and human/socio-economic sciences. Research at EEWRC is related to three major focus areas:

- Achieving a low carbon economy via the adoption of measures for energy efficiency and the employment of renewable energies to reduce the dependence on hydrocarbon energy sources;
- Understanding environmental integrity and global/climate change through observations, analytical analyses, and numerical modeling to derive effective mitigation and adaptation strategies;
- Enabling sustainable management of water and other natural resources in arid and semi-arid environments.

Organizational Chart

Board Chairman



Prof. Dr. Hüseyin GÖKÇEKUŞ

Board Members



Prof. Dr. Derin
ORHON



Prof. Dr. Vahid
NOURANI



Prof. Dr. Azhari
AHMED



Assist. Prof. Dr.
Youssef KASSEM

Research Divisions

Water and
Environment

Energy and
Environment

Energy and
Water

Climate
change

Consultancy Board Memeber

1. Prof. Dr. Zekai Şen
2. Prof. Dr. İlay Salihoglu
3. Prof. Dr. SevalSözen
4. Prof. Dr. BülentKeskinler
5. Prof. Dr. Ahmet Kargündüz
6. Prof. Dr. Tarzan Legoviç

People and contact

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University of Near East

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Energy, Environment, and Water Research Center