Sustainable Water Management Doctoral Programme (Water4All)

Title of the PhD Project	Development of smart and grid-independent irrigation systems using renewable energy in water stressed areas
Acronym	ENE-1
Research Fields of the Project	Sustainable and smart irrigation systems powered by renewable energy
Keywords	Renewable energy, smart irrigation, sustainability, innovation irrigation systems
Host Institution, Department and Campus Location	Izmir Institute of Technology, Energy Engineering Engineering Department, Urla, İzmir
PhD Awarding Institution and Graduate Programme	Izmir Institute of Technology, Graduate School, PhD in Energy Engineering
Name and Affiliation of Main Supervisor	Ferhat BİNGÖL, Associate professor (IZTECH)
Name and Affiliation of Co-Supervisors	Kıvılcım YÜKSEL ALDOGAN, Associate professor (IZTECH)
Research Environment and Infrastructure	The Izmir Institute of Technology (IZTECH) has been distinguished as “one of the Top 5 Research Universities” out of 200+ higher education institutions in Türkiye, ranking first in terms of the number of peer-reviewed articles per faculty member. One of the strategic goals of IZTECH is to advance its position to a leading academic institution in water research in European Research Area. IZTECH Campus is in Urla, İzmir and has an area of 232.30 hectares of land (the third largest campus area in Türkiye).

	Being an English medium university, IZTECH currently has Engineering, Science, and Architecture faculties with 19 departments (engineering 10, science 5 and architecture 5), with 18 undergraduate, 29 master's (9 interdisciplinary) and 15 doctorate (4 interdisciplinary) programs in 19 majors. IZTECH has 354 laboratories, 80% of which are for R&D purposes and 20% of which are for educational purposes. All laboratories contain the appropriate technology for education, teaching and research in various fields. Importantly, the Integrated Research Center (IRC) of IZTECH is one of the most-equipped and competent research centers in Türkiye, located on 6,250 m2 area. IRC incorporates eight different Application and Research Centers (ARCs) including Environmental Development ARC, Geothermal Energy ARC, Biotechnology and Bioengineering ARC, National Mass Spectrometry ARC, Wind Energy Meteorology ARC and Continuing Education Center. The equipment and analysis portfolio are accessible through a website that was designed considering online-shopping perspective. Furthermore, the academic supervisor of ENE-1 is the head of Wind Energy Meteorology Center in IZTECH.
Scientific Context of the Project	This project, at the intersection of agricultural technology and renewable energy, aims to develop innovative irrigation solutions for water-stressed regions, utilizing wind turbines, solar panels, and hybrid energy systems.
Brief Workplan	**0 – 2 years:** PhD candidate will take classes from partner universities Analysis of the state of the art Design and develop smart irrigation systems powered by renewable energy sources such as solar panels and wind turbines. **0.5 – 2.5 years:** Explore and integrate hybrid energy systems combining solar and wind power for optimal efficiency in off-grid settings. **1.0 – 3 years:** Conduct simulations and field experiments to assess the performance and sustainability of the developed irrigation systems. Collaborate with experts in renewable energy, agriculture, and environmental engineering

	Congress and article publishing. Analyze data to optimize water and energy use and publish research findings in leading journals. Present research outcomes at international conferences and workshops. **2.5 – 3 years**: Thesis report, dissemination activities.
Innovative Aspects of the Project	Innovative aspect of the project is design and develop smart irrigation systems powered by renewable energy sources such as solar panels and wind turbines.
Training Opportunities of the Project	Doctoral schools and courses from the leading academic institutions in Türkiye, namely, Izmir Institute of Technology (IZTECH-beneficiary) in İzmir, İstanbul Technical University (ITU) in İstanbul, Gebze Technical University (GTU) in Kocaeli, and Middle East Technical University (METU) in Ankara.
Interdisciplinary Aspects	The main modules of the Water4All project are identified as Environment, Electronics, Planning, Material Science and Energy, and each has different angles of training on research and expected outcomes. In this respect, academic training of PhD student in Water4All is constructed in a modular approach that is interdisciplinary by nature. ENE-1 project will be at the intersection of renewable energy systems and innovative irrigation systems for sustainable environment.
Intersectoral Mobility **☒ Short Visit** **☐ Secondment**	TBD

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International Academic Secondment	-

Sustainable Water Management

Doctoral Programme (Water4All)

Main Supervisor	
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Co-supervisors	
Brief CV	**Assoc. Prof. Dr. Kivilcim YÜKSEL ALDOGAN** **E-mail:** kivilcimyuksel@iyte.edu.tr **Academic Degrees** Ph.D. Electromagnetism and Telecommunications, University of Mons, Belgium 2011 M.Sc. Electromagnetism and Telecommunications, University of Mons, Belgium 2006 M.Sc. Electronics Engineering, Ege University, Türkiye 2000 B.Sc. Electronics Engineering, Dokuz Eylül University, Türkiye 1995 **Professional Networks** Google Scholar: https://scholar.google.com/citations?user=rq9hCjsAAAAJ&hl=tr ResearchGate: https://www.researchgate.net/profile/Kivilcim-Yueksel

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