



Expression of interest

Contact details

Country	TURKEY
Name of the organisation	SIEMENS SANAYİ VE TİCARET A.Ş.
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Short description of the organisation

Provide a short description of the equipment available, the relations with the industry, the profile of the main researchers

Siemens Aktiengesellschaft (AG) based in Munich, Germany is one of the world's largest technology companies. Our name stands for engineering excellence and innovation, for quality and reliability, for human creativity and drive, for stability and financial solidity and, last but not least, for good corporate citizenship.

Electrification

We are positioned along the value chain of electrification. Our products are designed to generate, transmit, distribute and utilize electrical energy with particularly high efficiency. Our roots are in electrification. We've been leaders in this field until now, and it's here where our future lies.

Automation

We have been successfully automating customer processes for years. In automation we have already captured leading market positions worldwide. We intend to maintain and expand these positions.

Digitalization

We want to exploit the opportunities offered by digitalization even better. We want to be a trendsetter in this area because added value for our customers lies more and more in software solutions and intelligent data analysis.

Across the areas of electrification, automation and digitalization, there are concrete growth fields – fields in which we see major business potential. We are rigorously aligning ourselves to exploit this potential in order to achieve long-term success. Our setup reflects this aspiration.

Founded by Werner von Siemens in Germany in 1847, Siemens started its operations in Turkey shortly thereafter upon the Ottoman Empire's decision to introduce the telegraph system to the country. Then named Siemens Halske, the company started its first project in Turkey by establishing the Istanbul Telegraph Centre. Siemens' investments continued during the following years, and the construction of the telephone infrastructure continued even in times of war.

Siemens has been the first to introduce many innovative technologies to Turkey in the fields of energy, infrastructure, electrification, automation, digitalization, and healthcare. Using its experience and knowledge gained over 161 years, Siemens Turkey today guides the country in Industry 4.0 initiatives. With more than 3,000 employees, Siemens Turkey's indirect employment reaches 40,000 people.

Investing heavily in R&D, Siemens opened its 14th R&D center in Turkey. Siemens Turkey's investment of approximately TRY 60 million in R&D in 2015 is 1.6 times the average in the country.



Siemens AG and its local subsidiary Siemens Sanayi ve Ticaret A.Ş. (Siemens A.Ş.) have a long history in Turkey and have been significantly contributing to the positive development of the Turkish economy in many areas. We are also proud to have achieved a high level of R&D activities with more than 650 R&D engineers in our three R&D facilities; Siemens Kartal R&D Center and METU Technopark Ankara and İzmir.

In the **Siemens Advanta Development in Turkey**, our R&D activities are mainly focused on software development for Digitalization of Industry, IoT/cloud and Edge computing technologies, Grid Simulation, Energy Storage, AI/ML, Industrial Communication Networks, and Digital Twin technologies.

Specific skills related to the project

Indicate the specific skills and competence in relation with “ HORIZON-CL5-2022-D3-02-01: Digital Solutions for defining synergies in international renewable energy value chains (RIA) topic

Siemens Advanta Turkey in three R&D centers, the organization continues its R&D activities on the areas of Automation and Digitalization, Industrial Communication, Grid Simulation & Control, Energy Storage, Motion Control, Full Stack Application Development for Industry (IoT/Cloud/Web/Edge Apps), Digital Integration for Industry, IoT/Data Analytics AI/ML, Factory Automation, Energy Distribution Systems, Digital Twin with their expert R&D engineers and researchers.

Proposed activities for the project

Indicate which activities you would like to implement during the project

- Data Driven Outage Management in Renewable Energy Chain
- Industrial AI/ML/DL solutions
- Grid Simulation & Control
- Full Stack App Development for Industry (IoT/Cloud/Web/Edge Apps)
- Mindsphere Cloud App Solution (Mindsphere Connectivity / Edge)
- Factory Automation (Controller, HMI Panels, TIA Portal, Automation Engineering Workbench)
- IoT/Data Analytics
- Industrial Communication
- Remote Communication and Security
- Machine Vision Products
- Electronics Assembly Automation
- Digital Enterprise Suit,
- 3D Visualization for Industrial Applications
- Digital Integration for Industry
- Process and Plant Simulation
- Digital Twin



Expression of interest

Contact details

Country	TURKEY
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Short description of the organisation

ODTÜ/METU (Middle East Technical University, Ankara) is one of the top engineering schools in Turkey. In particular METU Electrical and Electronics is very active in renewable energy and smart grid areas. This expression of interest letter summarizes the research interests and experiences of one faculty member:

- Dr. Murat Göl: <https://scholar.google.com/citations?user=iTfkN4oAAAAJ>

METU has active projects on smart grid applications, integration of renewable energy systems and battery storage systems, modelling of electric car user habits and degradation characteristics of electric car batteries, as well as cyber-security systems and AI applications. METU has a wide range of existing equipment and laboratory infrastructure to be used in the validation of the methods developed by project partners. Dr. Göl has industrial relations with the electric distribution companies in Ankara and across Turkey.

Existing Infrastructure:

METU Electrical Machines and Power Electronics Laboratory has equipment and infrastructure listed below and shown in the figures below.

- A grid connected 25 kW + 50 kW roof-top PV systems
- 2 electric car charging stations connected to the PV systems (with OCPP support and internet connection)
- 1000V, 60 A, DC supply/PV simulator (can be used to simulate various PV power generation levels)
- 12kVA 3-phase grid simulator (can be used to simulate grid faults, OV/UV conditions)
- Li-Ion and LiFePO4 battery banks
- 12 kW wind turbine emulator (PM motor coupled with IG, with grid connected inverters)
- 600 kW car-park PV system with 4 electric car charging stations (to be completed in 2022)



Fig -1: 25 kW rooftop grid connected PV systems and 2 electric car charging stations.



Fig -2: 1000V, 60A PV Simulator, 12 kVA Grid Simulator, Lithium Ion Battery Pack (3x2.25kWh, 30A)



Fig -3: 600 kW grid-connected car-park PV system with electric car chargers (to be completed in 2022)



The proposed use-case scenario by Siemens Advanta Development Turkey and METU for the target call is given as follows.

Data Driven Outage Management System in Renewable Energy Chain

Business Context / Key Pain Points

- Lack of energy sources and increase in consumption leads to some planned/unplanned outages all around world.
- A Data Driven Outage management system should be implemented considering renewable energy sources.
- Siemens will focus on the implementation of prototype using AI/ML algorithms into Renewable Energy Chain for creating Decision Supportive/ Predictive Outage Management System
- Siemens will implement algorithms developed by METU EEE to generate accurate result set for Outage Management System

Solution Description

- Implement a system that stores outages in a secure way from all DSOs
- Implement a Monitoring UI Dashboard for Regulating Authority to monitor outages for all distribution companies
- Implement a decision support system that produces a set of supportive decisions by considering renewables, energy storage systems, outages, etc.
- Implement a predictive maintenance system to estimate possible weakness in system
- Integration tests, Final tests and Deployment

Key Performance Indicators

- Report on definition and requirements analysis of business scenario
- Software development, integration and testing.
- Analysis of renewables, energy storage systems, outages in energy chain for AI/ML approaches
- Prototype Implementation for demonstration
- Report outcomes of investigation for sustaining renewable energy share

Key Stakeholders

- Siemens Advanta Development Turkey
- Metu EEE Department

Key Benefits

- Provide a decision support mechanism for promoting the increase of the global renewable energy share by decreasing outage time.
- Control/Report predictable/unpredictable outages to Regulating Authority
- Enabling AI/ML-based algorithms to improve reliability of system components, advanced and automated functions for data analysis, diagnosis and fault detection, maintenance planning and/or reporting.

Deployment Plan

- Definition technical requirements and features provided by prototype
- Prototype setup development
- Testing, debugging and demonstration