

# A Project on Modernization of Earthing Practices for Turkish Electricity Transmission System

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## **Layout of Presentation**

- Introduction
- Aim of the Project
- Project consortia
- State of the Art?
- Expected outcomes
- Conclusions

## **Background and Motivation**

- Changes in National health and safety regulations
- Changes in Turkish earthing regulations
- Limited awareness on the earthing
- Urban encouragements
- Increase in the fault current levels
- Figures on the Turkish National Grids
- Limitations on current practices

## **Aims of the project**

- To implement contemporary earthing practices for Turkish national grid
- To revise current earthing tender documents
- To establish earthing policy documents
- To develop impedance/resistance measurement practices in live substations
- To undertake safety evaluation on selected substation
- Increase awareness on the earthing issues

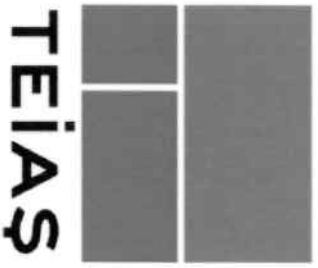
TÜRKİYE ELEKTRİK İLETİM  
ANONİM ŞİRKETİ

TEİAŞ

## Project Consortium

CLIENT

CONTRACTOR



INFORMATION

DELIVERABLES



CONSULTANCY

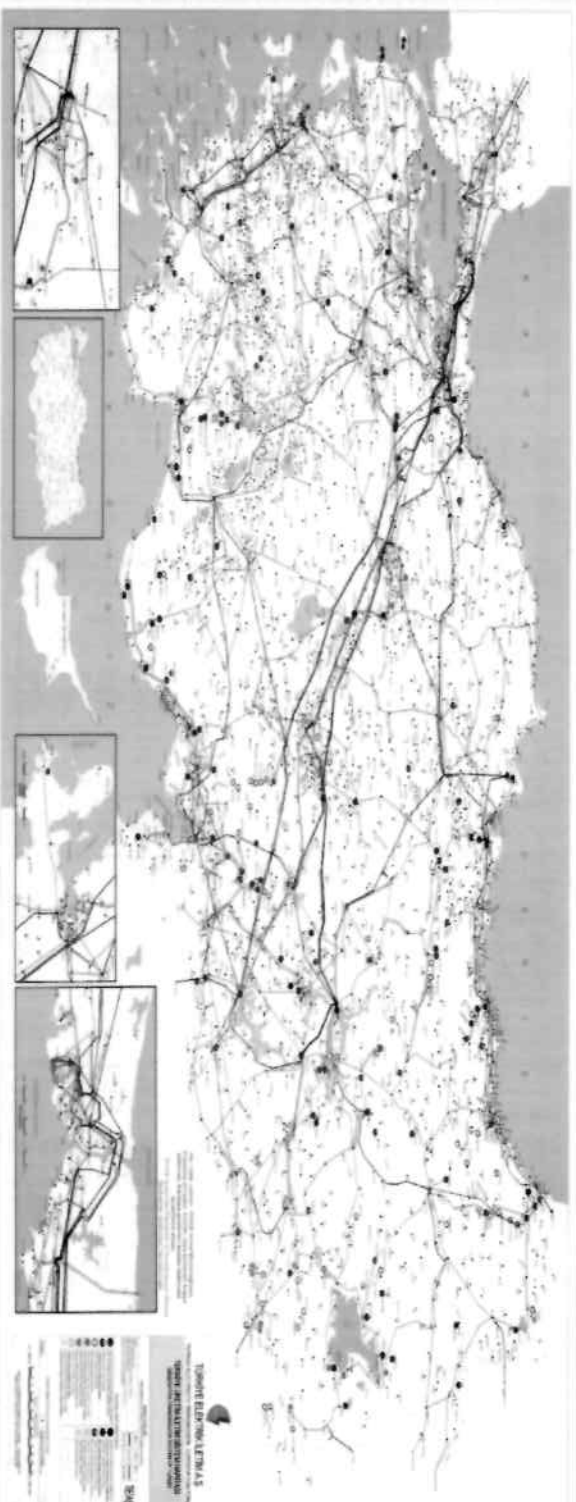


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## TURKISH ELECTRICITY TRANSMISSION SYSTEM



- 100 nos. 400 kV SUBSTATIONS
- 1 nos. 220 kV SUBSTATIONS
- 589 nos. 154 kV SUBSTATIONS
- 11 nos. 66 kV SUBSTATIONS
- 701 nos. SUBSTATIONS (139.051 MVA)

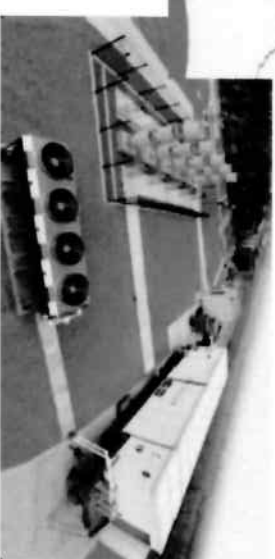
- 19070,9 km of length 400 kV OVERHEAD LINE
- 37496,0 km of length 154 kV OVERHEAD LINE
- 84,5 km of length 220 kV OVERHEAD LINE (Georgia, Armenia)
- 139,7 km of length 66 kV OVERHEAD LINE
- 336,76 km of length 154, 400 and 66 kV UNDERGROUND CABLE LINE
- 56791,1 km of length TOTAL TRANSMISSION LINE

## TUBITAK

### The Scientific and Technological Research Council of Turkey

#### Projects conducted with MRC

- Design and development of analyses, hardware and software systems for improved power quality and energy efficiency
- Modelling and verification of power systems and controllers for transmission systems
- Short and long term demand forecasting for transmission systems, transient and steady state stability analyses
- FACTS devices such as TSC, SVC, STATCOM, Active Filter
- Wide area monitoring and control systems
- Protection-coordination analyses and special protection systems
- Master plans and security analyses for transmission grid
- Power system monitoring and control systems
- Electrical grid information systems



## **ELTEMTEK**

**ELTEM-TEK** founded by national and international shareholders

### **AREAS OF ACTIVITIES:**

- **ENVIRONMENTAL SERVICES**
- **SUBSTATION PROJECTS AND DESIGN SERVICES**
- **GRID DESIGN AND ANALYSIS SERVICES**
- **POWER LINES AND SURVEYING SERVICES**
- **POWER PLANTS SERVICES**
- **RENEWABLE ENERGY SERVICES** (Solar power plants, Windpower plants, Geothermal energy plants, Biomass)
- **CONSULTANCY**
- **R & D**



## Gebze Technical University

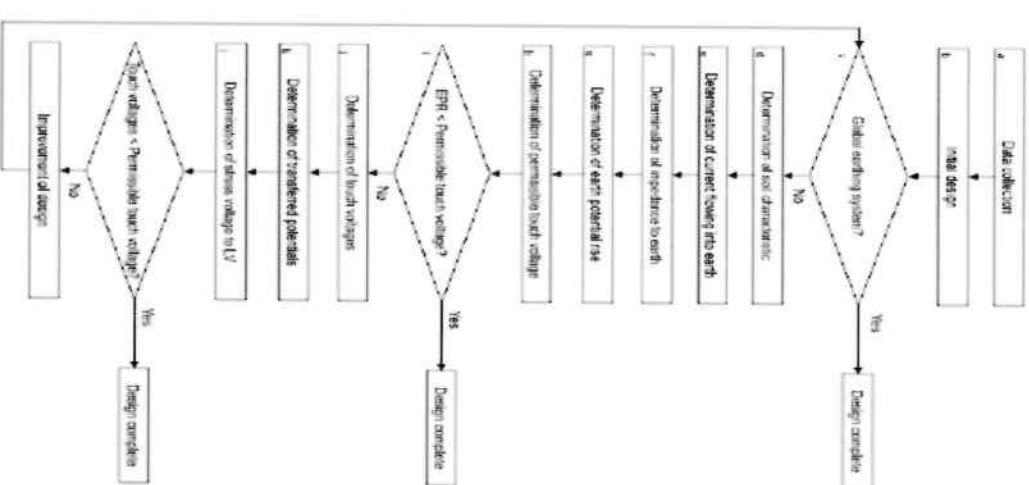
- \* Gebze Technical University is a state funded University
- \* Mainly focused on post-graduate studies
- \* Working group is specialized on power systems modeling and simulation
- \* Involved various earthing related projects
- \* Close proximity on TUBITAK

## Current practices

- Design based on IEEE Standard 80 or National standards
- Zone of Influence (ZOI) is neglected
- Transfer potential treated as a single value?
- Earth resistance measured with FOP method
- Touch and step potentials measured by current injection

## Expected Outcomes

- Design procedure based on IEC/European standards
- ZOI
- Detailed transfer potential scenarios
- Earth impedance measurements
- Evaluation based on simulation



## Conclusions

- Current earthing practices are revised
- An earthing working group is established
- Awareness on the earthing systems is significantly increased
- Project will start by September 2016

**Any Questions  
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