18TH CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS

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BOOK OF ABSTRACTS

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Coupling a Simulation Planning Tool with the Power Flow Calculation Tool: Case Study of the Republic of Serbia

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Abstract

The planning of the national energy system by looking at alternative investment decisions through annual simulations (using the EnergyPLAN tool) due to its (combinatorial) complexity leaves little room for explicit network modelling and therefore there is a need to look at the power flows. The investment decisions that are made remain with a degree of vagueness in the technical aspect, which can be removed with this coupling. The CASE tool is used for numerous system calculations of power flows, short-circuit currents, series faults, stability to small disturbances and transient stability. Calculations based on the calculation of power flows are also implemented: network reduction, security (N-1 and N-X), NTC and OTDF/PTDF. The coupling of the CASE and EnergyPLAN programs was achieved through the output text file of EnergyPLAN, which contains the total production of power plants separated by plant type, the total consumption of the system divided into several groups, export and import from the regulatory area hour-by-hour, chronologically throughout the year. CASE tool reads the output file of EnergyPLAN and separates the total production by power plant types to each individual power plant in the system according to predefined distribution coefficients, while the total consumption is distributed proportionally to the existing loads by network nodes. Thus, a model of the power flow calculation system is performed for each hour (1 to 8784) of the year. Calculation results for each hour are stored in the operative memory of the CASE program and can be sorted by the most loaded element of the system, the largest exchange of the observed regulation area, losses in the regulation area, production by a certain type of power plant, consumption, etc. In this way, it is possible to efficiently analyse the operation of the system according to different criteria. The goal of this work is first of all the realization of the coupling of two software tools, which has not been realized until now, as well as the presentation of some of the most significant results selected from among the numerous options of state sorting. The result of the work is the integration of software tools that serve the benefit of planning activities in terms of their technical feasibility, that is, to examine more precisely whether a prospective scenario is realistic from the aspect of power flows in networks.