

WORK PROVISION OF IT PERSONNEL DURING POWER OUTAGES: A CASE STUDY

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In late 2022 – early 2023, companies operating in the Ukrainian IT services market faced an acute problem that arose as a result of targeted attacks by Russian aggressors on Ukrainian energy infrastructure facilities and of power outages at random times for an indefinite (sometimes significant) duration. In this regard, the task of ensuring the work of IT companies' personnel in blackout conditions with minimal loss of working time has become extremely relevant.

There is a wealth of experience in the application of the system dynamics (SD) simulation methodology for the analysis of energy supply problems, including those of blackouts. Only in 2018–2022 about 20 papers on related topics were presented at International conferences of the System Dynamics Society (which are held every year in different countries of the world) – for example [1, 2]. These works testify, in particular, to the effectiveness of the SD concept of simulation in reflecting the relevant processes and justifying decisions making.

An analysis of the activities of a particular Ukrainian IT company in the context of a sudden power outage allowed the authors to formulate a problem statement for its subsequent formalization based on SD simulation concept.

The main assumptions of the model are as follows:

IT employees can work online from homes or from the office. Each group of employees is characterized by the number of employees and the average travel time to the office. Some employees working from home may have electricity outage at any time. In the office there are charged power banks, thanks to which one can continue working. Coming to the office makes sense if there are at least 2 hours left before the end of the working time. In addition to the office, there is a network of co-working spaces with diesel generators and Star links.

In the basic SD model, the moments of power outage and its duration are set, respectively, as a random event and a random variable. If the electricity restoration forecast is within working hours, taking into account the travel to the places of backup power supply, an employee can continue working with the loss of time only for travel. The response function in the model is a mean value of cumulative losses of working time. Experiments with the model envisage scenarios both of simultaneous total blackout, and of dependent or independent shutdowns for different groups of workers.

References (translated):

1. Dyer D. et al. *Severe Energy System Disruptions: An analysis of the 2021 Texas Winter Storm Blackout*. – in: System Dynamics (SD) Conference proceedings (26–30.06 2021, Chicago, USA)
2. Kubli M. *Co-Creating Energy Solutions*. – in: SD Conference proceedings (19–22.07 2022, Frankfurt, Germany).