

Blackouts - Case study: Analysis and consideration with regard to future technological developments

Task:

1. Describe the crucial events that occurred in case of the blackout and explain the sequence of events! Rely on technical reports, then describe sequentially what happened and explain why it happened that way.

In doing so, examine the processes described with respect to the content of the PSOS lecture, particularly with respect to the following questions:

- a. Which processes (including data transmission, certain data evaluation procedures, automated or manual interventions) take place in network control technology and power system operation?
 - i. at process, bay and station level
 - ii. at system control level
 - b. To what extent were the various types of stability violated during the blackout? What countermeasures were taken?
2. Evaluate the countermeasures taken in this case!
 3. What measures could have prevented this blackout? Consider one of the following new technologies (base this on scientific papers, e.g. to be found at IEEEExplore):
 - a. Control of decentralized generation plants such as PV or wind power plants as well as CHP (combined heat and power plant) units
 - b. The installation and use of wide-area measurement systems with PMUs and increased wide-area communications.
 - c. the use of MVDC or FACTS
 - d. Integration of controllable local substations

In addition, select one more technology you have researched as a potential countermeasure for this blackout.

4. What risks and dangers for grid operation arise from current changes in the electrical power supply? Explain one problem and possible solutions!

Specifications

- Duration of the presentation: 20 minutes and 10 minutes for discussion.
- The presentation slides should contain as little text as possible.
- The presentation slides should have a uniform format (use template!)
- A scientific presentation should be sober and objective
- Check for spelling and expression errors!
- The presentation time is divided equally among the group members
- Be critical!
- **Literature references are to be listed**

Dates

- Presentations: End of January
- Submission of the presentations: until 2 p.m. on Friday before the presentation. Send PowerPoint-file via mail to Svenja.joseph@tu-dortmund.de AND Christian.nerowski@tu-dortmund.de

Literature sources

- Google Scholar
- IEEEXplore
- Reports from energy system operators (TSO, DSO) or similar
- Others...