Danish Energy Agency

South Africa: The Danish SISYFOS model assists South Africa in forecasting the security of electricity supply

The Danish Energy Agency is engaged in a project that assess how system adequacy and the need for reserves may develop in the future for the South African electricity system. A part of the analysis uses the Danish Energy Agency's very own SISYFOS model, which was presented at a workshop on stochastic analysis and system adequacy hosted by the Danish Energy Agency and EA Energy Analysis in Johannesburg from 22-23 February.

Denmark has in several years experienced 99.9% security of electricity supply. In order to sustain the high degree of electricity supply in the future the Danish Energy Agency has developed the advanced SISYFOS calculation model that can forecast the capacity adequacy up towards 2025. The stochastic SISYFOS (Simulation of the Security of Supply of Systems) model is a Monte Carlo simulation model which simulates different outcomes for power plants and/or power lines in a large interconnected electricity system. Using hourly series for electricity demand, wind power, photovoltaic power, etc., the model looks for (rare) combinations of events which can lead to capacity shortages and affect the security of electricity supply.

As part of the Danish-South African Renewable Energy Program, the Danish Energy Agency assists South Africa's Department of Energy and ESKOM in assessing South Africa's system adequacy and reserve margins with increasing levels of variable generation. The overall project is led by EA Energy Analysis and the project team also includes the Danish Technical University, EOH EnerWeb as well as Energinet.dk.

As part of the project, scenarios for the South African power system has been developed assessing how system adequacy and the need for reserves may develop in the future. The assessment uses the Danish Energy Agency's

stochastic model SISYFOS, which for the South African project has been updated to the SISYFOS-R model with faster simulation time by EA Energy Analysis.

From the 22-23rd of February the Danish Energy Agency together with EA Energy Analysis held a very successful workshop on Stochastic Analysis and System Adequacy in South Africa. The workshop was attended by representatives from ESKOM, Department of Energy, IPP Office, CSIR, and Sanedi. At the workshop the Danish Energy Agency presented the results of the new publication *"Security of Electricity Supply in Denmark"*, which focuses on the experiences and forecasts of capacity adequacy in Denmark based on the SISYFOS model. Initial results of the proposed model for the South African grid was presented by EA Energy Analysis leading to a good and very relevant discussion of input assumptions and numeric results and their interpretation and application to the South African system adequacy situation. At the workshop hands-on experience with the SISYFOS-R model was likewise given to the participants.

The project on system adequacy and reserve margins in South Africa is expected to be finalised in June 2016 and will include results of system adequacy scenarios of the South African electricity system in 2015, 2020 and 2025, based on the simulations in the SISYFOS-R model.

You can read the "Security of Electricity Supply in Denmark" here and "Capacity Adequacy Calculations using the SISYFOS Model" here.

More on the Danish - South African cooperation here.

Security of Electricity Supply in Denmark, Capacity Adequacy Calculations using the SISYFOS Model, About the Danish-South African Cooperation

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