# Minutes of Meeting

| | |
|---|---|
| VGB-Technical Committee: | Generation and Technology |
| VGB-Technical Group: | PGMON<br>Power Generation Maintenance Optimisation Netzwork<br>**59th Meeting on 17/18 October 2019 in Karlovy Vary** |

**Participants:**

| | | |
|---|---|---|
| Andrejkowic | Milan | CEZ |
| Galant | Arkadiusz | ESB |
| Hoffmann | Martin | CEZ |
| Le Bris | Yves | EDF |
| Nejedly | Michal | CEZ |
| Opplt | Daniel | Seven |
| Panday | August | EDF |
| Spalenka | Milos | CEZ |
| Wels | Henk | DNV GL |

**VGB Secretariat:**

| | | |
|---|---|---|
| Göhring | Sven | VGB |

**Agenda**

**Welcome (Henk Wels)**

TOP 1: Tusimice & Prunerov Powerplants
Milan Andrejkovic, CEZ

TOP 2: Generator failures
Martin Hoffman, CEZ

TOP 3: a) Report on progress in condition monitoring at PGMON, being the result of our 2-yearly meetings up to now
b) Paper on Quality of Big data to present at ESREDA 23-23 of October at Valencia
Henk Wels, Dekra

TOP 4: Approach to the Decommissioning & Demolition projects in CEZ
Michael Nejedly, CEZ

TOP 5: Modernization of small heating plants
Milos Spalenka, CEZ

TOP 6: Introduction of the Sev.En Energy Group
Daniel Opplt, Sev.En

TOP 7: Thermal deconstruction experience in EDF group
Yves Le Bris, EDF

TOP 8: Place and date of next venue

**TOP 1: Tusimice & Prunerov Powerplants**
**Milan Andrejkovic, CEZ**

The introductory introduction introduced the organizational unit of ČEZ - Tušimice and Prunéřov power plants, where the first day of the meeting took place.

The history of Tušimice 1, 2 and Prunéřov 1, 2 power plants, their development over time, the renewal of Tušimice 2 and Prunéřov 2 power plants and their current status were presented.

**TOP 2: Generator failures**
**Martin Hoffman, CEZ**

Present portfolio of operated generators was introduced. Portfolio of generators types corresponds with the historical development of generators in Czech Republic. CEZ currently operate 7 major types of generators with nominal range of 50 to 660MW with different types of stator and rotor cooling system.

In next part of presentation, the general failure statistics were presented. Furthermore, sources of unavailability were also presented from historical point of view. From this point of view, the key parts of machines are stator and rotor windings.

The main part of the presentation was devoted to introduction with latest failures of generators and exciters. The experiences and approaches of individual members were discussed.

In conclusion, CEZ presented its own corrective measures including the overall change in maintenance approach, with very proactive intervals of preventive maintenance, combined with on-line monitoring systems as tools of predictive maintenance.

**TOP 3: a) Report on progress in condition monitoring at PGMON, being the result of our 2-yearly meetings up to now**
**b) Paper on Quality of Big data to present at ESREDA 23-23 of October at Valencia**
**Henk Wels, Dekra**

As dismantling of power stations is on the PGMON agenda, an interview was held at EPZ. That company at present is having its coal fired plant BS12 dismantled, next to its nuclear plant. Reference is also given to the website (in Dutch only, https://epzkolencentrale.nl/).

The works started at the beginning of 2019, with preparations starting in 2014-2015.. Before dismantling, the installation is cleaned as much as possible. Where this is not possible, the dismantling takes special measures. When noise and dust are applicable, measures are also taken such as sound screens and spray or appy water mists against dust.

The installation is to be dismantled from the inside as much as possible. Only at a final stage a building itself is demolished. That also delivers less sound and dust. In 2022 there should be a green meadow again.

In February the first works were started, with contractor Combi (Schotte/Meuva) starting to prepare and dismantle. From abroad, there was an interest in taking over the complete coal plant after disassembly. However, as the plant was taken out of business because of environmental objectives, this was not shareholder policy. Closure of a number of coal-fired power stations, including those in Borssele, was one of the agreements made in the “Energy Agreement for sustainable growth” that was agreed to by more than forty organizations in the autumn of 2013.

The coal power plant was taken out of operation at the end of 2015. Since that time, EPZ has taken ample time to prepare for decommissioning. The installation has been readied. Oil and other chemicals in the process and auxiliary systems were removed. The plant has also been cleaned as much as possible. Ash and dust are removed as much as possible.

Much attention was paid to unbundling and disconnecting the infrastructure around the coal plant. Both the coal power plant and the nuclear power plant jointly used a number

of auxiliary systems that were present at the area of the coal-fired plant (water, sewer, electricity, auxiliary systems). This time-consuming job has now been completed.

The years 2017/18 mainly focused on the tendering of the decommissioning and the finalization of the dismantling contract with the contractor. The works have started with the removal of components at the coal yard, including the conveyor belts over public roads. The area of the coal power plant itself is divided into demolition-areas. One can work in multiple areas at the same time. Zone 5 is perhaps the most appealing: the chimney. With a height of 170 meters and a diameter of 8 to 15 meters, this is a separate project. At first the surrounding buildings and installations are removed. A hydraulic concrete crusher is then mounted that “nibbles” the chimney down from top to bottom. The debris are mainly falling into the chimney. Debris that fall outward, fall on a sand bed. At higher wind speeds debris will fall outward and when thunderstorms are probable, in these cases work is stopped.

In Zone 6 the demolition of the over sixty meters high steam boiler is a project In itself. Demolition takes place as much as possible from within the boiler house. Only at the last stages the building will be disassembled. In this way, the environment is minimum affected.

The boiler is entirely hanging from its own construction support frame. The load is taken over by so-called 'strand jacks ', that is huge hydraulic jacks that hang on an auxiliary construction that is placed on the boiler frame. The load is always safe against being inadvertently lowered. The 'strand jacks ' are supplied and operated by a specialized company that performs this kind of decommissioning projects often. It is a well-known, safe and controlled way to lower heavy loads.

Because the boiler is freely suspended in the strand-jacks, it can be dismantled from the bottom upwards. This is done with cutting flame burners in parts of about four meters high. The freed material is first removed from under the boiler, next the specialist firm lowers the boiler again four meters. This will continue until the boiler has been completely removed in fifteen stages. Only afterwards the building will be demolished.

The coal power plant will be dismantled, however reusable parts and warehouse stocks are offered to the (process) industry.

## TOP 4: Approach to the Decommissioning & Demolition projects in CEZ
**Michael Nejedly, CEZ**

„Approach to the D&D projects in ČEZ” in general points out on the importance of Corporate Social Responsibility and D&D strategy. It describes key factors which influent D&D project goals and list of activities stipulated within four phases of the D&D project.

It is also devoted to the approaching end phase of coal power plants in ČEZ and participation in proposal Re-purposing Coal Power Plants during Energy Transition within RFCS program managed by the European Commission.

The main part deals with decommissioning planning of Prunéřov 1 Power Station. It especially describes activities that already have been done and future activities waiting to be done within decommissioning phase, different D&D scenarios regarding further reuse of the land as well as commitments with an impact to the scope, time and money. Decommissioning means on one side taking plant from its fully operational status to one where all live or charged systems are made dead or inert and are at the lowest possible hazard level, ready for dismantling; on the other side within decommissioning planning and decommissioning phase (or mothballing) there should be right approach in regard to get from decision “shut down” to decision “continue deconstruction” (it means collecting relevant data, preparing opportunities for further development, ensure skilled and motivated team or involving stakeholders, etc.).

## TOP 5: Modernization of small heating plants
**Milos Spalenka, CEZ**

The goal is to operate our heating plants economically regarding the environment in the long term.

Unfortunately, loss of competitiveness is evident in both main activities – in electricity generation and in heating generation. Fixed costs are high, and they are growing up. Variable costs are rising too, in particular, the cost of $CO_2$ allowances. Increasing costs combined with a strong competitive environment may cause further decrease in heat consumption as a result of disconnecting consumers. Especially gas sources and heat pumps create pressure on disconnection from the district heating system.

The optimization measures helped to extend the life cycle; they have (temporarily) improved the economy of operation, which give us time to prepare for future solutions.

However, to keep the heat market with competitive price, we need to think about new modern sources.

Transformation of the unit in Dvůr Králové have already started - there is a stable portfolio of consumers, heat network is practically new with minimal losses and back-up sources have been solved.

Operating modes in several alternatives was simulated and evaluated then a decision was taken to change the coal source to biomass and gas. In this ecological solution we can see a lot of benefits and keeping competitive heat prices for future operation.

**TOP 6: Introduction of the Sev.En Energy Group**
**Daniel Opplt, Sev.En**

**TOP 7: Thermal deconstruction experience in EDF group**
**Yves Le Bris, EDF**

EDF’s collective experience in decommissioning and deconstruction of thermal plants (including France and England) is presented including an overview of our expertise, services and references.
A number of thermal plants including oil and coal have been shut down in France in the last decade. EDF’s thermal engineering business unit based in Paris has developed specific techniques and built a dedicated team to support more than 6000 MW of plant which has been managed to safe decommissioning and deconstruction since 2008. The methodology and organization deployed by EDF is presented in this paper including the management of key risks such as asbestos and the soil remediation process.

EDF Energy UK in presently in the process of decommission a 2000 MW coal fired Power Plant in England. An overview of this project is shared along with specific requirements associated with site separation.

**TOP 8: DS3 Ancillary Services Market and Plants improvements in finding a new market positions**
**Arkadiusz Galant, ESB**

At PGMON59 meeting ESB presented ancillary services market overview and how ESB is finding its market positions in the new approach to ancillary services.
The objective of DS3 was discussed together with all fourteen products available and how ESB adjusted flexibilities to extract the value from the products available. Number of example improvements were discussed in detailed together with importance of inertia and impact of ROCOF and high wind penetration.
DS3 Market and products were compared to other Electricity Markets such GB and Czech Republic.
An overview of the DS3 system discussed is shown in below figure:

| Operating Reserve |
|---|
| FFR – Fast Frequency Response (0-2 sec) |
| POR – Primary Operating Reserve (5 – 15 sec) |
| SOR – Secondary Operating Reserve (15 – 90 sec) |
| TOR 1 – Tertiary Operating Reserve 1 (90sec – 5mins) |
| TOR 2 – Tertiary Operating Reserve 2 (5 – 20 mins) |

| Ramping |
|---|
| RRS – Replacement Reserve (Sync'd) |
| RRD - Replacement Reserve (De-Sync'd) |
| RM - Ramping Margin (1,3,8) |

| Voltage Control |
|---|
| SSRP – Steady State Reactive Power |
| FPFAPR – Fast Post-Fault Active Power Recovery |
| DRR – Dynamic Reactive Response |

| Inertial Response |
|---|
| SIR – Synchronous Inertial Response |

The next steps involve further development of flexibility improvements for existing plants versus market cost-benefit calculations. Also possible future investment options analyses were being discussed.

**TOP 9: Place and date of next venue**

The next meeting will be held on 23./24. April 2020 in Riga/Latvia.