Minutes of Meeting

VGB-Technical Committee:	Generation and Technology
VGB-Technical Group:	PGMON Power Generation Maintenance Optimisation Netzwork **51st Meeting on 13/14 October 2015 in Praha**

Participants:

Andrejkowic	Milan	CEZ
Linkevics	Olegs	Latvenergo
Lundstrom	Henning	Vattenfall
Staes	Tom	Laborelec
Wels	Henk	DNV-GL

VGB Secretariat:

Grimmelt	Heinrich	VGB

Absent:

van den Bos	Adjan	NUON
Stronge	Martin	ESB
Santos Silva	Joaquim	EDP

Agenda

Welcome (Henk Wels)

TOP 1: Challenges in maintaining geothermal wells
Henning Lundstrom, Hofor

TOP 2: 1st Line Early Fault Detection
Tom Staes, Laborelec GDF Suez

TOP 3: Achieving new emission standards at CEZ coal power plants
(IED/new BREF)
Milan Andrejkovic, CEZ

TOP 4: Prognostic - Conzept und practical Examples
Dr. Kirschnick, Cassantec AG

TOP 5: Teething troubles in power plants
Henk Wels, Dekra

TOP 6: Maintenance of plants that do not operate much
(CCGT unit maintenance technologist)
Milan Andrejkovic, CEZ

TOP 7: Opflex upgrade results of GE 9FB turbine to improve flexibility
Antons Kotovs, Latvenergo

TOP 8: Position paper Hard-coal mono block
Recommendations for organizational structure, personnel qualification and number of employees
Heinrich Grimmelt, VGB

TOP 9: Place and date of next venue

TOP 1: Challenges in maintaining geothermal wells

Henning Lundstrom, Hofor

Background

The HOFOR heat and power Company in Copenhagen operates a 10 year old geothermal well system. The well system was built to get operational experience. Design data are: 15 MW heat, 270 m^3/s. The water temperature is 70 ˚ and the content of salt is 18 %. After passing the heat exchangers the temperature is adapted to the district heating system in the greater Copenhagen area.
As the injectivity of the return well during a period has been decreasing down to 50 % of the design capacity it was decided to have a comprehensive workover of the well to restore the injectivity. More consulting companies have been involved to define the tasks to be performed.

The presentation focuses on the planned and the some necessary non planned activities.

The objective of the workover was to restore the design capacity as much as possible, as the wells also will be used for future test purposes with large electrical powered heating pumps. To estimates future values of heat capacity, flow resistance, etc. a simulation model for the underground reservoir has been sat up.
The workover comprises many activities distributed between lots of different service companies specialized within use of their tools – scrapers, test sampling, camera inspections, undersea welding, etc. a challenging contracting method for our power company.
After cleaning the injection well the final activity will be a re perforation in the bottom of the well to reduced the flow resistance. The re perforation is performed with a gun tool – black powder in a cylinder accelerate projectiles through the flow liner and into the underground structures.
The service companies in question have most of their tasks for the oil industries. From an insurance point of view this was challenging as the oil industries has “knock – for – knock” as a standard concept.
To prove the results of the workover the production pump (ESP) as well as the return pump must run full loaded. Unfortunately also the production pump had a reduced capacity and the pump had to be substituted with the spare pump. Camera inspection of the flow liners close to the production pump discovered surprisingly large amounts of deposits – a black substance containing a high content of lead.
The lead is a natural occurring metal dissolved in the water from the geological structure. When the water conditions changes towards the ground surfaces the lead does not remain dissolved and deposits are formed at the walls of the flow liners.
To reduce future deposits an inhibitor will be added to the geothermal water.

TOP 2: 1st Line Early Fault Detection

Tom Staes, Laborelec GDF Suez

To be added later

TOP 3: Achieving new emission standards at CEZ coal power plants (IED/new BREF)

Michal Kapr, CEZ

CEZ Group is established corporation which operates its energy assets mostly in Central and Southeastern Europe. The largest shareholder with approximately 70% stake is Czech Republic. Main scope of business is power and heat generation including its distribution, trading and coal mining. CEZ Group also owns subsidiary companies dealing in telecommunication, informatics, nuclear research, construction and maintenance of energy facilities and processing energy by-products.
CEZ Group is operating a fleet of lignite and coal power plants that are facing a challenge in near future which is represented by new emission standards BREF LCP. Recently the power plants are mostly signed in Transitional National Plan that postpones the effect of IED 2010/75/EU to 7/2020. The new BREF emission standards will come to an effect soon after that date. CEZ Group is about to use this period for modernizing the power plants already for reaching BREF standards.
The power plants are divided in four categories. First group represents CEZ flagship power plants which are renewed, being renewed or have newly commissioned power unit. These power units with exceptions do not require major modifications to reach new BREF. Second group is represented by power units which require substantial technological modifications to reach new BREF standards. The third and fourth category represents CHP plants that are different in recent district heating demand.
For each power plant there are recent and future (BREF) emission values. To each emission value there is possible technological solution offered. Solutions are in full compliance with BREF LCP recommendations.
Recent emission reduction projects are briefly introduced as well as their preliminary reviews.

TOP 4: Prognostic - Conzept und practical Examples

Dr. Kirschnick, Cassantec AG

Cassantec is an independent provider of condition-based **Prognostic Solutions** for industrial asset management, using a unique, protected technology. The **Cassantec Prognostic Report** enables asset operators to understand when in the future a malfunction is likely to occur.
While the Cassantec Prognostic Report offers the same benefits as established products in the diagnostic segment,
it provides superior value by including an **explicit prognostic horizon** and **providing an explicit risk profile**.
This way the following questions can be addressed:
When will an asset's condition become critical?
When will we get a warning, alert, or alarm?
When will be the best time to fix problems?
Will we reach the next scheduled maintenance?
Will other units in the fleet have the same issue?

TOP 5: Teething troubles in power plants

Henk Wels, Dekra

As for instance in Germany new CCGTs are being built as the result of policy decisions, it makes sense to check what we already know on teething problems (the early years of the reliability bathtub curve).

Typically public data like to state reliability in 99.9 % etc. However, 100 % - 99.9 % = 0.1% is more meaningful and such a value averaged over a few years may be found impossible to reach. By fitting a so called Crow AMSAA model one is able to derive a bathtub curve even from public data. For new plant, the OEM should be asked for failure data of the dominant components and major OEM firms would be able to answer this as a result of their data gathering. ORAP is a good example of a database that can be contacted. VGB KISSY data, with plants being anonymous, can be used also to advantage.

The DEKRA AIM (Asset Integrity Management) department and its predecessors at KEMA, DNV and NRG have gathered failure data going back to 1977. Comparison between early data and more recent data, for instance VGB KISSY data, show for some components the early data are still valid and valuable especially when components do not fail often. The data show that also for identical machines due to chance differences in failure rate and forced unavailability may occur. This can be conveniently be described by an exponential distribution. Both for CCGT as well as conventional coal fired & lignite fired plants in the first years, a forced unavailability of up to 30 % may be present. Crow AMSAA plotting and regression analysis allows quantitative forecasting. Normally, when teething troubles are present, it takes hard work and 3 – 5 years to arrive at the bottom of the bathtub curve. When a utility is the first and only client that bought a new machine, this may even take longer.

For fossil plants, a sort of roller coaster curve may be present with a hump at about 20 – 25 years, expected to be related to boiler problems. However, recent KISSY data do not show the large problems that new coal & lignite fired plants have at present because of new materials applied (T24, P91, other materials). This is due to these large problems occurring before the start of commercial operation and the problems may not be over yet. DEKRA is involved in NDT and further investigations into these problems.

The way forward to reduce teething problems could be that any construction, material, etc. on which there is less than 5 years practical experience cannot be trusted and should be investigated further by exchange of user information and, if necessary, detailed investigations. If the risk is high, sharing this with an OEM is an interesting option.

TOP 6: Maintenance of plants that do not operate much (CCGT unit maintenance technologist)

Ondřej Soukup, CEZ

The Combined Cycle Power Plant Počerady (ČEZ company) is situated in Northern Bohemia region, cca 1 hour away from Prague (Praha), inside original location of Coal/Lignite Power Plant Počerady.
The Power Plant has been preliminary accepted for operation (PAC) in October 31, 2014. The power output is 840 MWe divided into multishaft arrangement of two gas turbines (Siemens) and one steam turbine (Škoda Power). Whole power plant has been supplied as turnkey project under EPC contract by Škoda Praha Invest.

The organization chart describe Maintenance department with one Head of Power Plant and three administrators/technologists. The Operations department is made by 5 shifts (1 shift = 1 leader + 2 operators + 1 electrician + 1 I&C).

The operations regime is influenced by gas and electricity market price. Current regimes cover just peak load (market demand) or grid deviation (production balance of ČEZ sources). Since January until September the Power Plant started 20 times with output of 205,3 GWh.

Main maintenance costs are for energy consumption and regular checks & controls of technologies, e.g. analyzers & measuring devices calibration, firefighting systems functional tests, legal technologies revision, GT & ST & HRSG protection tests, water treatment etc. Further maintenance ongoing actions follow EPC contract warranty periods, contract synergy of Term Service Agreements, LTSA Renegotiation, Internal Resource Management, Best Known Methods Assessment or Technology Trends Follow-Up.

Various conservation/preservation regimes allow the power plant be readiness for operation within one hour, or 24 hours alternatively 48 hours according to standstill request. The wet and dry conservation/preservation applications were developed and installed, e. g. dried air, compressed dry air, nitrogen, chemical dosing or space heaters. All main technologies such as GT, ST, GEN, HRSG or Feed Water Tank have been covered.

TOP 7: Opflex upgrade results of GE 9FB turbine to improve flexibility

Antons Kotovs, Latvenergo

To be added later

TOP 8: Working paper Hard-coal mono block

Recommendations for organizational structure, personnel qualification and number of employees

Heinrich Grimmelt, VGB

A VGB member is planning to shut down some coal fired blocks so that there is only one single block per plant in operation. They asked the technical group maintenance management, how much personal is needed for the operation of such a plant. The technical group created a working paper in which the number and qualification of the staff is described.

TOP 9: Place and date of next venue

The next meeting will be held on 20/21 April 2016 in Linkebeek.