Minutes of Meeting

VGB-Technical Committee:	Generation and Technology
VGB-Technical Group:	PGMON Power Generation Maintenance Optimisation Netzwork **53rd Meeting on 10/11 November 2016 in Hamburg**

Participants:

Andrejkowic	Milan	CEZ
van den Bos	Adjan	NUON
Dezaunay	Gregory	EDF
Jasik	Agata	CEZ, Poland
Krickis	Otto	Latvenergo
Wels	Henk	DNV-GL

VGB Secretariat:

Grimmelt	Heinrich	VGB

Absent:

Stronge	Martin	ESB
Santos Silva	Joaquim	EDP

Guest:

Fisch	Holger	Vattenfall

Agenda

Welcome (Henk Wels)

TOP 1: Asset management
Arjan van den Bos, NUON

TOP 2: Commercialisation of NPS components
Holger Fisch, Vattenfall

TOP 3: Rising forced unavailability
Milan Andrejkovic, CEZ, Henk Wels, DEKRA

TOP 4: Deaerated water protection against dissolved oxygen concentration rising with hermetic liquid
Otto Krickis, Latvenergo

TOP 5: Creep wave measurement of HR3C cracking at several power plants
Henk Wels, DEKRA

TOP 6: Introduction Polish assets: CHP Skawina (Elektrownia Skawina S.A.) and Chorzow (Elektrociepłownia Chorzów S.A.)
Agata Jasic, CEZ Polska

TOP 7: Adapting the maintenance policy of thermal assets to the current energy market
Gregory Dezaunay, EDF

TOP 8: Topic List
Heinrich Grimmelt, VGB

TOP 9: Place and date of next venue

TOP 1: Asset management
Arjan van den Bos, NUON

TOP 2: Commercialisation of NPS components
Holger Fisch, Vattenfall

A team of the nuclear Vattenfall goup is merchandising components, spare parts, semifinished parts and materials on behalf of the nuclear power plants Brunsbüttel and krümmel. On demand, an extensive documentation is provided.
They offer a demand-based and fast transaction of the request by s well-functioning sales-team.

TOP 3: Rising forced unavailability
Milan Andrejkovic, CEZ, Henk Wels, DEKRA

VGB Technical-Scientific Report Availability of Power Plants 2016 shows long-term upward trend unplanned unavailability of units included in the VGB Kissy database. New external conditions of Central Europe market (electricity price development, BAT implementation etc.) in combination with units aging led to update strategic approach to each power plant/unit.
We divided power plants/units into four groups (A, B, C, S) with different length-term of operation.
For each group was established different maintenance and investments approach, unplanned unavailability is kept at different levels.
Group A: long term operation. Unplanned unavailability is held within projected values. Typically, there are failures of various systems without their repetition.
Group B: middle-term operation. Maintenance strategy is primarily condition based. Failures have repetitive character.
For group C: controlled using components lifetime. Periodic preventive maintenance work is minimized, run to failure mode dominated. This group is struggling with the highest unplanned unavailability. Group C is also used for cycling.
Group S: units with special regime given by external conditions (typically contractual obligations).
Rising forced unavailability is linked to different strategy attitude to particular units. Unplanned unavailability for group A is steady, for group B, C and S is controllably increasing. The main task for maintenance strategy is: perspective units are maintained within projected values of unavailability, for the others in safety and economic reasonable range. Key task for all of groups is to ensure safe operation.

The normal forced unavailability of power plants is about 4 % (unplanned, not postponable) according to VGB’s KISSY database. The latest report indicates that this appears to be rising to 12 % with the trend still increasing. It is known that without investments into planned maintenance, forced unavailability values of 20 – 30 % are

possible as shown for the last years of operation of specific coal fired plants based on information publically available (REMIT data).

Typically assessments on the risk of blackouts are based on historical values or values delivered to the regulator (Tennet). The report “Monitoring Leveringszekerheid” already has indicated that some values are optimistic. One of the conditions for a possible high forced unavailability, namely minimal maintenance due to low electricity prices will also be present for Dutch power plants. Many gas fired power plants are now mothballed. They should be un-mothballed when large coal fired is taken out of operation (which is already the case for the ageing coal fired plants G-13, BS12 and A-81 and in 2017 will be the case for Maasvlakte 1 & 2). It is possible that teething problems for un-mothballed plants will be present as many systems have not operated for prolonged periods and the crew is again unfamiliar with the plant. Large windfarms will cause more volatility from the production side.

The keyword for the situation is volatility. Clearly the same influence factors are present for Dutch plants similar to the plants contributing to KISSY, however a significant fraction of Dutch plants consists of combined cycles (some older, some new, some mothballed). It is proposed that the Dutch plants should be investigated further and a realistic assessment of the forced unavailability should be made INCLUDING the factors that may cause or have caused larger forced unavailability. The next step could be that DNV-GL runs their PLEXOS model for the European situation. This model fully takes into account the production situation (renewable together with fossil) and grid constraints (including connections abroad). New forced unavailability estimates should be inputted in the model to assess the probability on a blackout / brownout as well as investigate the market conditions (dispatch per plant, energy price).

TOP 4: Deaerated water protection against dissolved oxygen concentration rising with hermetic liquid
Otto Krickis, Latvenergo

During reconstruction phase of the auxiliary part of the Riga TPP-2, were proposed several possible solutions for make-up dearated water storage (two tanks with capacity 1500m3 each) protection against dissolved oxygen concentration rising. Decision making process was difficult, due to several facts: oxygen concentration and quality of make-up water are monitored by municipality’s company (heat distributor), tight budget for this part of the project, old water storage tank with thin walls and without reinforced roof.

All these forth mentioned factors were taken into account during the process of the evaluation of the best solution. Because of that following technologies were considered: nitrogen blanketing, steam blanketing, as well as hermetic liquid. The comparison of these methods is shown in Table 1.

Table 1. Dearated water protection technologies comparison table.

Nitrogen blanketing	***Steam blanketing***	***Hermetic liquid (AG-4I)***

Pros: • At the base of the system is inert gas (nitrogen); • At the stabilized make-up water regime the excess pressure of nitrogen in the tank will be 10 mbar; Cons: • Risk of the tank's "breathing" valve failure; • For old tanks should be performed internal basic structure reinforcement; • In case of application of liquefied nitrogen tank (Dewar) are expected additional losses of nitrogen to the atmosphere; • Necessity to compensate the water level fluctuations in the tank with nitrogen	Pros: • For deaerated water protection is used on-site produced steam; • Lower cost comparing with nitrogen blanketing technology; Cons: • Is possible steam condensation at water surface with following tank's structure elements deformations (for old tanks); • For old tanks should be performed internal basic structure reinforcement; • For wide range of make-up water should be integrated complicated pressure regulating train; • Possible fail of "breathing" valve can cause the destruction of deaerated water storage tank; • Is necessary to compensate the water level fluctuations in the tank with steam supply	Pros: • For old tanks should NOT be performed internal basic structure reinforcement; • Minimal declared life time of liquid is 4 years (real 20-25 years); • Applicable for the old tanks and not necessary to install special "breathing" valves; • Hermetic liquid do not depend on make-up water amount. Cons: • Requires special utilization technique prior to the end of life time (approximately 250 Eur/ton); • Is necessary to install additional technical equipment.

Taking into account maintenance and initial expenses, as well as the colleagues' experience in the Baltic states, was decided to select hermetic liquid (AG-4I). Hermetic liquid implementation implies the special mechanical system in the water storage tank for district heating network protection against mineral oil (see Figure 1.).

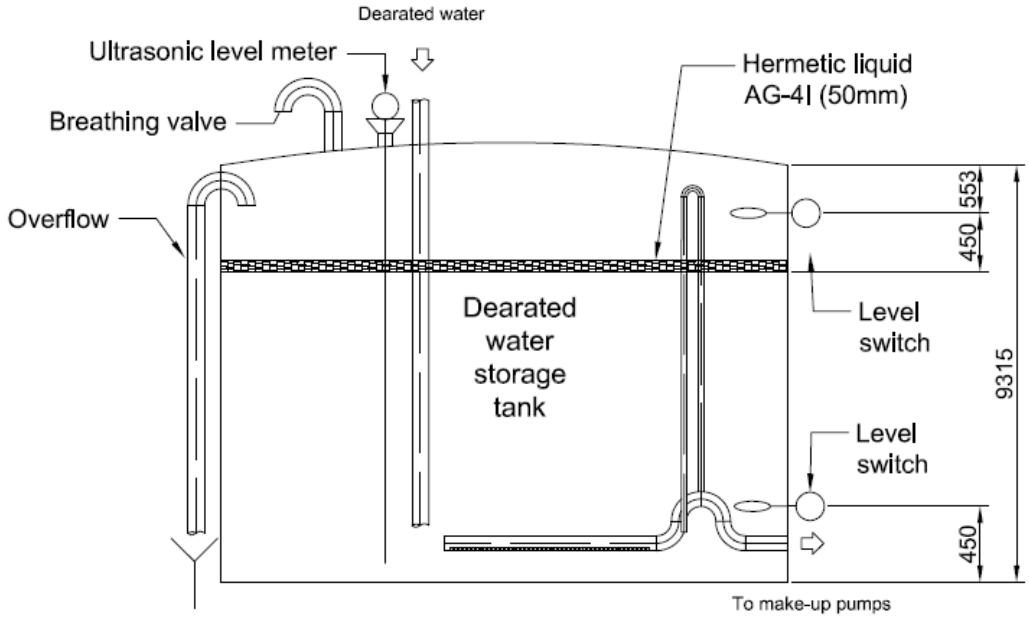

Figure 1. Water storage tank's auxiliary equipment for the safe operation of the hermetic liquid.

TOP 5: Creep wave measurement of HR3C cracking at several power plants
Henk Wels, DEKRA

To be added later

TOP 6: Introduction Polish assets: CHP Skawina (Elektrownia Skawina S.A.) and Chorzow (Elektrociepłownia Chorzów S.A.)
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Heinrich Grimmelt, VGB

The mission of the group is to Increase maintainability and availability by maintenance optimisation as a function of the operation conditions.

In details the group works on the following topics

Asset management
Use of data basis
Low merit operation and flexibility
Mothballing
Decommissioning of power plants
Ageing and lifetime aspects
Maintenance strategy including spare parts management and LTSA
Condition monitoring and component health indication
Renewal and reconstruction of the equipment
Process and plant safety
Maintenance aspects from burning biomass and byproducts
Knowledge management
Influence of environmental regulations

TOP 9: Place and date of next venue

The next meeting will be held on 27./28. April 2017 in Paris.