

Consortium Materials technology for thermal energy processes – minutes board meeting no 4/17

Date	November 28, meeting time 13.00-15.00	
Place	Chalmers, Gothenburg	
Participants	Erik Skog (chair) Anna Jonasson Dilip Chandrasekaran Bo Jönsson Marie-Aude Porter Erik Dahlén Vesna Barišić Lars Mikkelsen Søren Aakjær Jensen Matti Huhtakangas Annika Stålenheim Sonja Enestam Hanna Kinnunen Mikko Uusitalo Rikard Norling Oliver Rod Pamela Henderson Jan-Erik Svensson Jesper Liske Bertil Wahlund (secr.)	Erik Skog AB E.ON Värme Sverige Kanthal/Sandvik Heating Technology Kanthal/Sandvik Heating Technology Siemens Fortum värme Sumitomo SHI FW (SFW) B&W Vølund Ørsted (Dong Energy) MH Engineering Vattenfall (telephone) Valmet (new stakeholder) Valmet (new stakeholder, telephone) Valmet (new stakeholder, telephone) Swerea KIMAB Swerea KIMAB (co-opted) Vattenfall (telephone) Chalmers Chalmers (co-opted) Energiforsk
Prevented	Eva-Katrin Lindman Jukka Meskanen Thomas Norman Jesper Ederth Andreas Borg Christoph Gruber Sebastian Kaiser Johan Moverare Edgardo Coda Thomas Hojer Conny Nilsson	Fortum värme Fortum B&W Vølund Sandvik Materials Technology GKN Aerospace Andritz Andritz Linköpings universitet Sumitomo FW Calderys (new stakeholder) Calderys (new stakeholder)

Distribution	participants, prevented and	
	Sven Andersson	B&W Vølund/Götaverken
	Per Kallner	Vattenfall
	Andreas Sundlöf	Söderenergi
	Erik Westman	Söderenergi
	Heike Martinsson	Söderenergi
	Henrik Lindståhl	Tekniska verken i Linköping AB
	Mikael Fransson	Tekniska verken i Linköping AB
	Ulf Hagman	Göteborg Energi AB
	Erika Antonsson	Göteborg Energi AB
	Toni Holkko	Gävle Energi
	Lucas Enström	Gävle Energi
	Ulf Lindqvist	Jämtkraft AB
	Dag Wiklund	Jämtkraft AB
	Jesper Baaring	Öresundskraft
	Johan Thelander	Karlstads Energi AB
	Magnus Eriksson	Mälarenergi AB
	Per Tunberg	Mälarenergi AB
	Patrik Schneider	Kraftringen
	Jasmin Aspen	Kraftringen
	Lars Hammar	Kraftringen
	Erik Thornström	Swedenergy

1 Agenda

The distributed agenda was approved.

2 Person to approve minutes

VB, SFW, was elected to approve minutes (next present person/company on participants list).

3 Minutes from board meeting 3/17

The minutes from board meeting 3/17 was approved without comments.

- A reminder, the report *High temperature corrosion in used-wood fired boilers*, KME-708, can be downloaded from KME member pages, where the coming reports will be published
<http://www.energiforsk.se/program/kme/member-area/project-descriptions-status-reports-and-final-reports/>

4 Notifications

4.1 Coming dissertations

Upcoming dissertations

Nooshin Mortazavi, Title of PhD thesis: *Novel Insights into the Oxidation of High Temperature Alloys - The Role of Environment, Microstructure and Reactive Elements*, December 21, Chalmers.

Recently defended dissertations

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4.2 Coming conferences and workshops

KME/HTC programme conference 2018, March 20-21, Stockholm

Boiler days (Panndagarna, Värme- och Kraftföreningen), April 17-18, Örebro

The 27th International Conference on the Impact of Fuel Quality on Power Production and the Environment, September 24–28th, 2018, Lake Louise, Canada. <http://blogs2.abo.fi/fuelqualityimpact/>

5 Budget

BW showed the updated budget follow. Follow up is made of funds used, requested cash and reported in-kind. The reporting follows the plan in most cases and two projects reports in-kind contribution over 100 %. Updated budet in annex 1.

In the following projects deviations from plans are identified:

- KME-707, *Improved Steam Turbine Design for Optimum Efficiency and Reduced Cost of Owership* is nearly finalised and will not use all SEA funds, and the outstanding balance will be re-disbursed to SEA.
- KME-703, *Durable MCrAlX Coatings for demanding applications in gasturbines*, low industry in-kind contribution. New report of in-kind contribution from Siemens, shows that the project is on track.
- KME-717, *Boiler corrosion at lower temperatures – influence of lead, zink and chlorides*, low industry in-kind contribution. Project leader RN check the status at the industries.
- KME-720, *The effect of increased fractions of waste wood on water wall- and superheater corrosion*, low industry in-kind contribution, se item 6 below for discussion.

A reminder about the reporting dates for industry in-kind:

- March 31 the following year for the period July-December
- September 30 for the period January-June.

6 Follow up of project

Several of the project status reports are delayed. Within short the reports will be published at the KME web pages.

Project KME-720 has encountered new problems with the water wall probe. During installation of the probe, there was a leakage of glowing sand. The installation was thus stopped, due to risk and safety reasons, and project will not be able to make water wall tests. This will give implications of project and some of the goals will not be fulfilled, and the industry in-kind contribution will be lower than agreed. It is important that costs at Chalmers are adjusted accordingly. The situation including a revised plan and goals should be presented in the status report.

7 Next KME programme 2018-2021

BW updated the status of the planning for the new programme.

As informed at previous meetings, there are two parallel processes, one for respective Energy Agency programme from which KME will apply research grants with consortium applications; *Steam based processes*, from now called *Biopower*, and *Turbines for future technologies*.

Turbines for future technologies

The programme *Turbines for future technologies* is already ongoing and KME continues to discuss with SEA on how and when materials technology research could be included in the programme. For the ongoing PhD students in the programme, separate applications for funding of the transitional period will have to be submitted to SEA during January. The applications should describe new goals and research questions and plan for one year's extension.

New projects will not be possible until approximately one year from now; SEA plan to open the next call during autumn 2018. BW/KME continue the dialogue with primarily GKN and Siemens, and the researchers, and SEA on the way forward.

Biopower – thermal conversion of biofuel to power and heat (previously called Steam based process)

The programme is now formally decided at Swedish Energy Agency (EUN, Energiutvecklingsnämnd). 87 MSEK state matching funds over the years 2017-2021 is allocated to the programme (state matching funds in current KME projects amount to approx. 25 MSEK). The topics in the programme seems in line with what KME would like to achieve: fuel flexibility, operating flexibility for biofuel and waste. First call is said to be opened within short.

A press release was published regarding the biopower programme:

<http://www.energimyndigheten.se/nyhetsarkiv/2017/ny-satstning-pa-biokraft-med-fokus-pa-framtidens-hallbara-energisystem/>.

SEA has informed that the call will most probably be open to all project areas directed towards the programme goals. The amount in the call is not known. BW distribute information about the call as soon it is published.

Due to the one month delayed decision at SEA, the KME time plan is updated accordingly (prelaminar, can be further changed):

- 16 November, EUN (Energiutvecklingsnämnd, at the at Swedish Energy Agency) decided the Biopower programme.
- Week 49 or 50, the call opens:
<http://www.energimyndigheten.se/utlysningar/>
- 15 February 2018, final project descriptions sent to KME, for compilation to a "consortium application", a project package.
- 15 March 2018, Consortium application submitted to the Swedish Energy Agency. Call closes.
- 1 July 2018, project start of approved projects.

7.1 Project proposals to programme

Six new initiatives submitted. One more initiative is discussed by Valmet and Ørsted, potential project leader Chalmers/HTC.

7.1.1 Increased fuel flexibility and performance for boilers with challenging fuels

Proposal from Swerea KIMAB as project leader and Mälarenergi, Valmet, EON, Vattenfall, Fortum, Sandvik/Kanthal, MH Engineering, Calderys as project partners.

RH presented the project.

Comments:

- Are goals of the project reflecting on a possibility to predict the status of refractory, and is it relevant to investigate what are the reasons behind poor performance of certain refractories, is it related to manufacturing procedures, or something else?
- Task 1 formulated very general, should be more precise.
- Task 4, should connect to previous projects, so it is clear that the project starts from what is known today.
- Project plan should describe as much as possible, including planned tests
- Falun interested in the project and has joined the discussion.
- There are two new projects dealing with water walls corrosion and it is important to formulate these projects differently and that different aspects will be investigated in the respective projects. The projects should be written so they complement each other. Project leaders shall safeguard this.

7.1.2 Materials development towards Loop seal and water wall corrosion

Proposal from Chalmers/HTC as project leader and EON, Krafrtingen, Sumitomo FW, Sandvik/Kanthal, Sandvik MT, MH Engineering, Vattenfall, Fortum as project partners.

JL presented the project.

Comments:

- Despite the problems with water wall tests in the current project KME-720, it will still be possible to proceed with water wall tests in this new project.
- Vattenfall interest alkali chloride on line monitoring of flue phase. The project could use the equipment installed in Krafrtingen. (Vattenfall will not perform material testing)
- Important to build on and relate to what has been done before. References is needed.
- Increased steam temperature in sand seal SH is relevant for SEA in such way that it leads to increased efficiency. As a research question, it may also be relevant and what it means for the materials and corrosion and what it could bring about in the future when high electrical efficiency could be more relevant (focus not only on current problems, it is also looking into future).
- A potential result of increased temperature in the loop seal SH could be that the SH can be used more than the conventional SH in future, steam temp therefore relevant in that perspective too.
- The phenomena cavitation should be considered (right terminology is important).
- There are two new projects dealing with water walls corrosion and it is important to formulate these projects differently and that different aspects will be investigated in the respective projects. The projects should be written so they complement each other. Project leaders shall safeguard this.

7.1.3 Thick-walled austenitic stainless steel for the future header and piping material in high-efficient biomass-fired power plants

Proposal from LiU as project leader with Sandvik MT as project partner. The project is a continuation and extension of KME-701.

Comments:

- It should be motivated clearly why Sanicro 25 is relevant for a specific project focusing mainly only this material. It should be described why this project and its topic is interesting and relevant, including the relevance for an energy utility.
- The applications of materials and components considered should be further described (components, high steam data, conventional biofuel boilers or supercritical, etc). It was uncertain if austenitic stainless steels would be relevant for headers.
- Must be clarified that other materials than Sanicro 25 will be investigated and that Sanicro 25 will be compared with commercially available reference materials (P91, P92) to check if it is a new candidate for high steam data (critical and ultra-supercritical boilers).
- Super critical and ultra-supercritical biofuel boilers relevant for boiler manufactures, but relevance for Swedish utilities is more uncertain.
- The project should consider stress relaxation and would it be possible to study and suggest inspection methods.
- After the project was sent to KME, Sumitmo has joined the project.
- This project deals with austenitic steels while another project deals with martensitic/ferritic steels. It must be clarified in under what condition and in what application the respective material has advantages compared to the other. Writing must be coherent and that the projects complement each other. Project leaders shall safeguard this.

7.1.4 Design of a new generation of 12 % chromium steels

Proposal from Chalmers as project leader with Siemens as project partner. The project is a continuation of KME-710.

Comments:

- It is written in results implementation that knowledge can be applied different applications; an explanation on how it can be applied would be good and how to translate the results to other applications.
- Clarify the global potential for power generation if it would be possible to improve the 12 % Cr steels and make them commercial.
- The steel offer thermal properties suitable for flexible operation, but it should also be matched with mechanical properties.
- This project deals with martensitic/ferritic steels while another project deals with austenitic steels. It must be clarified under what condition and in what application the respective material has advantages compared to the other. Writing must be coherent and that the projects complement each other. Project leaders shall safeguard this.

7.1.5 Protective coatings for boilers

Proposal from Chalmers and Högskolan Väst.

Comments:

- No references in draft. Similar projects conducted within Energiforsk programme SEBRA; references needed.
- Similar project, funded via KK, directed towards applications and boilers with less complicated fuel is ongoing with Sandvik/Kanthal, MH Engineering as partners. Clarify what new in this project.
- HVOF is the next generation of coating technology. Interesting topic.
- MH Engineering is interested to participate in project. Sandvik/Kanthal and Ørsted (Dong) could also be potentially interested.
- Höganäs has after the submission of draft proposal shown a great interest in project as well as participate in KME

Decision:

- The potentially new stakeholders Höganäs shall be invited to next KME board meeting (to the part of meeting dealing with the new programme period and project discussions).

7.1.6 Flexible and renewable mid- and large-size powerplants with district heating capacity

Proposal from Lund and KTH.

Comments:

- Interesting topic as such. However, there are many initiatives in the area that needs to be considered. For example, there is a whole programme dealing with flexibility in Finland.
- The project could be relevant as an "umbrella" project similar to project KME-601 *Reference power plant* with the aim higher electrical efficiency conducted in last programme period, but instead with flexibility as subject. But then it must work as a glue to combine the projects.
- Project at a very early stage so difficult to judge, project need to be further elaborated.

8 Programme conference HTC/KME

The 2018 conference will be held **March 20-21, 2018**, at Spårvagnshallarna, Stockholm.

9 Others

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10 Next meetings

2017 meeting

- It was decided that there was no need for an extra board meeting during 2017. Instead, as soon as the call is published, BW invites the project leaders to a workshop with the purpose to analyse the call text, and discuss how the projects could best be formulated. Interested board members are welcome to join.

2018 meetings – the dates for meetings will be planned according to the dates in call. Tentative plan, doodle poll will be distributed to set the dates:

- Telephone meeting in end of February or beginning of March, mainly to discuss the consortium application
- Physical meeting in April/May, Stockholm

2018 conference

- KME/HTC programme conference 2018, March 20-21, Stockholm

Minutes by

Bertil Wahlund

Minutes approval

Vesna Barišić, SFW

Minutes approval

Erik Skog, chairperson

Annex 1

2018-12-04

Projects

Budget follow up, total costs

Programme budget [kSEK]	Programme and project financing				Funds used, kSEK					
	Total	SEA	%	Industry	Cash SEA, req		Industry total			
					kSEK	%	In-kinds	cash	%	
For projects	115 000	46 000	40,0%	69 000						
Programme management	8 950	3 800	42,5%	5 150						
Sum:	123 950	49 800	40,2%	74 150						
Decided projects										
KME-701 (39297-1)	7 180	2 872	40,0%	4 308	1863	65%	4124		96%	
KME-702 (39279-1)	14 435	5 735	39,7%	8 700	4791	84%	8791		101%	
KME-703 (39296-1)	5 447	2 167	39,8%	3 280	1771	82%	1805		55%	
KME-705 (39298-1)	1 000	400	40,0%	600	250	63%	593		99%	
KME-706 (39283-1)	12 500	5 000	40,0%	7 500	2148	43%	5828		78%	
KME-707 (39281-1)	7 238	2 895	40,0%	4 343	2252	78%	3692		85%	
KME-708 (39270-1)	7 383	2 963	40,1%	4 420	2963	100%	4849	15	110%	
KME-709 (39287-1)	10 612	4 245	40,0%	6 367	3643	86%	5814		91%	
KME-710 (39286-1)	2 000	800	40,0%	1 200	700	88%	1137		95%	
KME-711 (39299-1)	12 460	4 984	40,0%	7 476	3833	77%	5876		79%	
KME-713 (40038-1)	2 400	960	40,0%	1 440	321	33%	0		0%	
KME-714 (40118-1)	7 590	3 036	40,0%	4 554	1932	64%	3399		75%	
KME-715 (40040-1)	2 361	944	40,0%	1 417	518	55%	1389		98%	
KME-717 (40892-1)	4 491	1 796	40,0%	2 695	590	33%	1383		51%	
KME-718 (41515-1)	2 633	1 053	40,0%	1 580	261	25%	1158		73%	
KME-719 (40893-1)	9 102	3 500	38,5%	5 602	1638	47%	3800		68%	
KME-720 (41048-1)	5 205	2 082	40,0%	3 123	658	32%	933		30%	
Programme management, tot	8 950	3 800	42,5%	5 150	3686	97%	2849		55%	
Tot. for projects:	114 037	45 433	39,8%	68 605	30132	66%	54571	15	80%	
Remaining budget:	963	567	58,9%	396	3 686		2849			
Share decided, %	99,2%	98,8%		99,4%						
Share remaining budget, %	0,8%	1,2%		0,6%						

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