



HTC/KME Research Conference 2019



- **Have you registered?**
- **Have you received the program?**
- **Safety & general info**





The
High Temperature
Corrosion Center

KME

CONSORTIUM MATERIALS TECHNOLOGY

for thermal energy processes



Welcome to the
HTC/KME
Research Conference
2019

Program 12th March, part 1

09:00 Registration and Coffee

10:00 Opening and welcome

Dilip Chandrasekaran
Kanthal

HTC and KME introduction

Jan-Erik Svensson & Jesper Liske
Chalmers

Bertil Wåhlund
Energiforsk

10:15 Energy research challenges towards a future energy system

Mattias Andersson
The Swedish Energy Agency

10:30 **Keynote:** Co-generation in an energy system perspective -
what can we expect from the future?

Håkan Sköldbäck
Profu

More efficient generation of heat and power & gasification

11:00 Critical corrosion phenomena in combustion of biomass
and waste in combined heat and power boilers

HTC1a

Introduction
Torbjörn Jonsson
Chalmers

How to model high temperature corrosion
Sedi Bigdeli
Chalmers

The effect of crack formation
Amanda Persdotter
Chalmers

The effect of alloying elements
Johan Eklund
Chalmers

KCl on the effect of secondary protection & GB's
Julien Phother
Chalmers

12:00 LUNCH



Program 12th March, part 2

Chairperson: Lars-Gunnar Johansson, Chalmers

13:00

Increased fuel flexibility and performance for boilers with challenging fuels
KME802

Rikard Norling
RISE KIMAB

13:15

Increased flexibility and power-production from biomass through material development and corrosion prediction
KME804

Torbjörn Jonsson & Loli Paz
Chalmers

13:35

Corrosion of high temperature materials in small scale wood-pellet fired boilers
HTC1b

Camille Pallier
RISE IVF

13:55

High temperature corrosion during gasification of biomass and waste
HTC1c

Rikard Norling
RISE KIMAB

More efficient generation of heat and power & gasification

14:15

Oxygen Carrier Aided Combustion for improved fuel conversion in FB plants with simultaneous recycling of alkali compounds

Fredrik Lind
Chalmers

14:40

COFFEE BREAK

Chairperson: Pamela Henderson, Vattenfall

15:10

New materials and Oxygen Carrier Aided Combustion for improved competitiveness of FB plants using renewable fuels
KME803

Jesper Liske & Julien Phother
Chalmers

15:30

HiPerCOAT – High performance coatings to combat erosion-driven damage in power plants
KME805 and about the project SCoPe – Superior Corrosion Performance of Coatings

Uta Klement
Chalmers

Program 12th March, part 3

15:50

Heavy section austenitic stainless steel for the future header and piping material in high-efficient biomass-fired power plants

KME801
Hugo Wärner
Linköping Universitet

16:10

Modelling of industrial thermal processes - The importance of input data

Anita Pettersson
Högskolan i Borås

16:30

End of today's seminar

Free time - Hotel checkin

17:30

Poster presentation & Mingel

19:30

DINNER

Poster session



- Best Poster award
- Drink tickets



- Pleasant mingel & Fruitful discussions

List of Posters

17:30

Poster presentations & Mingel

- Local Surface Phase Stability During Cyclic Oxidation Process
M. Calmunger, R. Eriksson, G. Chai, S. Johansson, J. Högberg, J. Moverare
- Oxidation of Fe-2.25Cr-1Mo in presence of KCl(s) - crack formation and its influence on oxidation kinetics
A. Persdotter, M. Sattari, E. Larsson, M. A. Olivas Ogaz, J. Liske, T. Jonsson
- Increased flexibility and power-production from biomass through material development and corrosion prediction
S. Aakjær Jensen, R. Shen, S. Selin, J. Hernblom, T. Jonsson, L. Paz, S. Bigdeli, H. Kinnunen, M. Montgomery, J. Hald, K. Vinter Dahl, B. Wahlund
- Investigation of high-temperature corrosion in biomass boilers using Calphad approach
N. Valli, S. Bigdeli, J. Liske, T. Jonsson, A. Pettersson, S. Andersson
- Equilibrium calculations in FeCrAl alloys to investigate high temperature corrosion
K. Renduchintala, S. Bigdeli, T. Jonsson, J. Liske
- Microstructural Investigations of Commercial and Model Alloys- Input to Thermodynamic Modelling
I. Hanif, J. Liske, J.-E. Svensson T. Jonsson
- The long-term stability of Ce/Co coated AISI 441 used as interconnects in solid oxide fuel cells
C. Göbel, R. Berger, M. W. Lundberg, J. Westlinder, J.-E. Svensson, J. Froitzheim
- The dual atmosphere effect - A degradation mechanism that affects interconnects used in solid oxide fuel cells
C. Göbel, P. Alnegren, R. Faust, K.O. Gunduz, J.-E. Svensson, J. Froitzheim
- Laboratory Studies on High Temperature Corrosion Behavior of FeCrAl Model Alloys - Influence of alloying elements
J. Eklund, B. Jönsson, T. Helander, J. Liske, J.-E. Svensson, T. Jonsson
- Concentrating Solar Power Plant: Prospects and Problems- Overview
E. Hamdy, C. Geers, J.-E. Svensson, L.-G. Johansson
- Challenging FeCrAl Alloys by Molten Salts Relevant for Next Generation CSP at 600 °C and Higher: Recent Results
E. Hamdy, C. Geers, J.-E. Svensson, L.-G. Johansson
- Improbred™ - from research to commercial operation
F. Lind
- The research facility - Chalmers Power Central
F. Lind
- Corrosion of carbon steel below lead/potassium chloride salt mixture
A. Talus, H. Kinnunen, R. Norling, S. Enestam
- Demonstration: Thermo-calc/Dictra using Calphad approach
S. Bigdeli



Program 12th March, part 2

Chairperson: Lars-Gunnar Johansson, Chalmers

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DINNER

Program 13th March

Chairperson: Jan-Erik Svensson, Chalmers

09:00

KEYNOTE: A revolutionary SteelCell technology for multiple product platforms

Subhashish Mukerjee
Ceres Power

09:30

KEYNOTE: Material issues in future solar power systems

Niklas Köppen & Torbjörn Lindquist
Azelio

Material challenges in energy technologies

10:00

New corrosion resistant materials for challenging process environments
- low oxygen activities and very high temperatures
HTC2a

Lars-Gunnar Johansson, Christine Geers
Chalmers

10:30

COFFEE BREAK

Chairperson: Thomas Helander, Chalmers

11:00

High temperature corrosion of materials and components produced by additive manufacturing
HTC2b

Mohammad Sattari
Chalmers

11:20

Corrosion and oxidation of FeCr alloys for solid oxide fuel cells and solid oxide electrolysis cells
HTC3a

Jan Freitzheim
Chalmers

11:50

High Temperature Corrosion in systems for heat storage corrosion in melts for concentrated thermal solar power
HTC3b

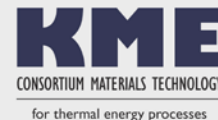
Lars-Gunnar Johansson, Esraa Mohamedin & Peter Dömstedt
Chalmers Chalmers KTH

12:10

Summary of the conference

12:20

LUNCH



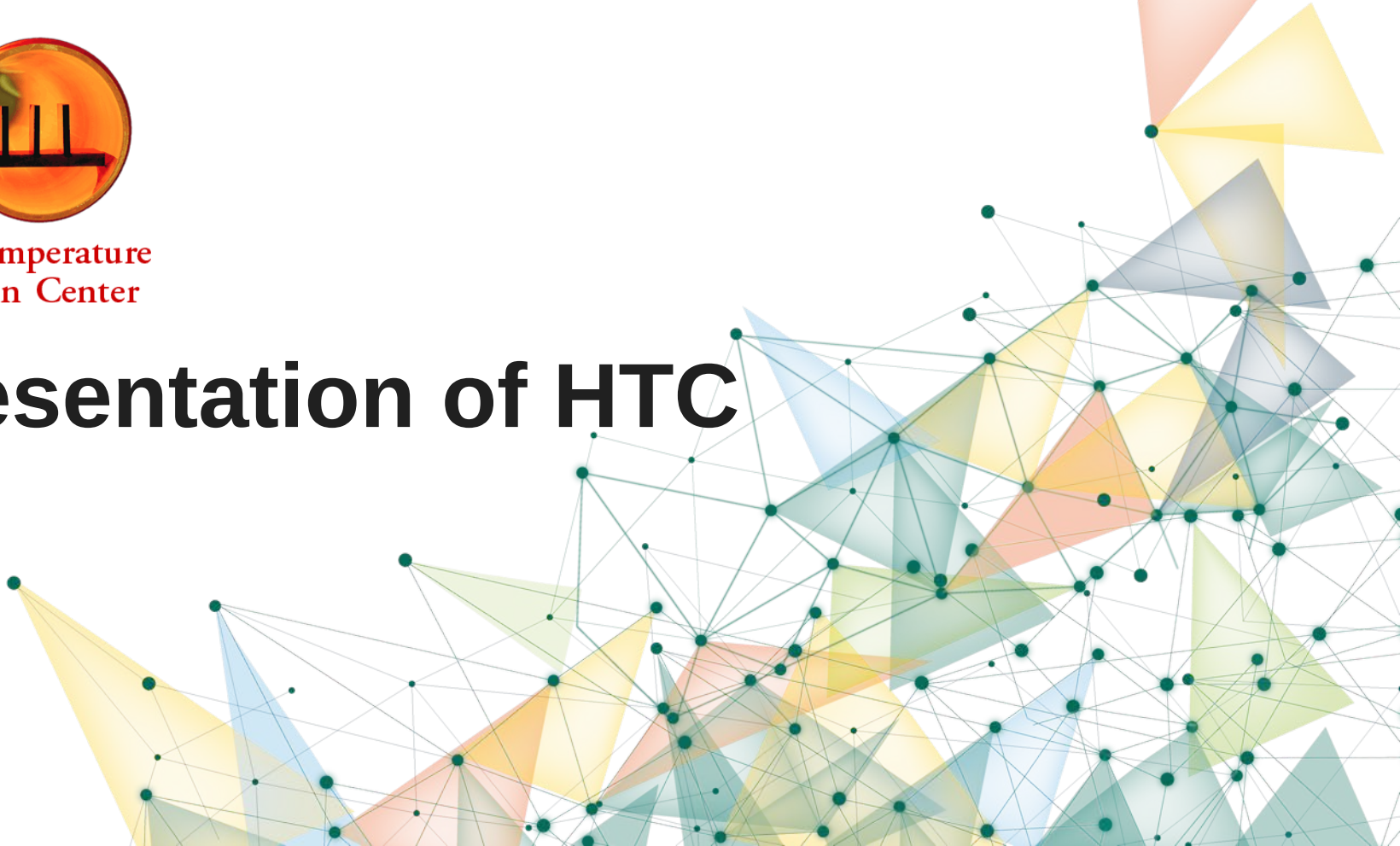
We would like to acknowledge all our sponsors:





The
High-Temperature
Corrosion Center

Presentation of HTC



HTC in the program period 2018-2021

18 (22) Companies

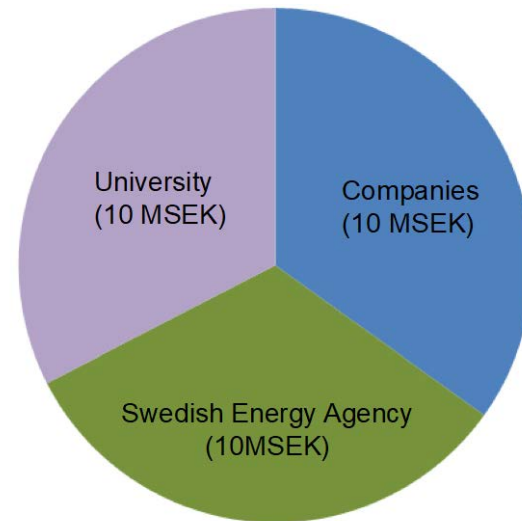
**Swedish Energy
Agency**



Chalmers

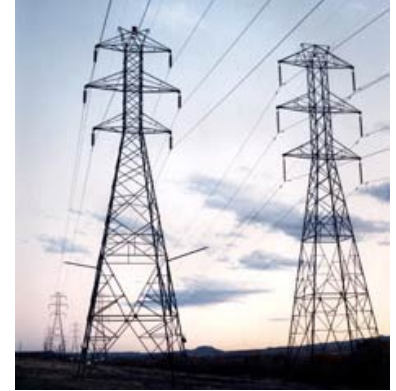
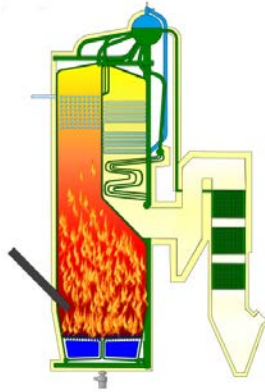
KTH

**RISE-KIMAB
RISE-IVF**



Total cash: 12.5 MSEK

The member companies



- Sandvik Materials Technology
- Kanthal
- *MH Engineering*
- *Smålands stålgjuteri*
- *Thermocalc*

- Valmet Technologies
- Babcox & Wilcox Völund
- Sumitomo SHI FW Energia
- Cortus
- Entech
- Janfire

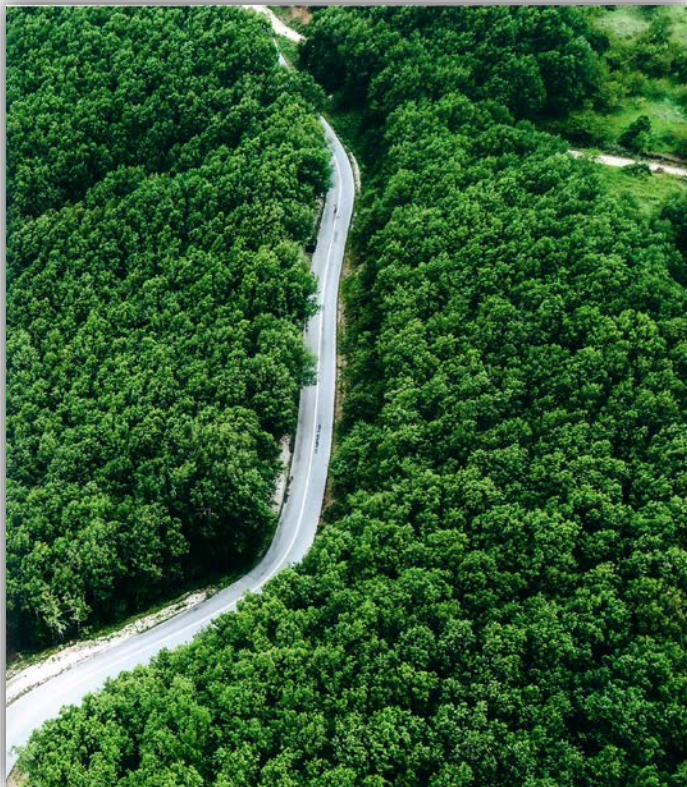
- NIBE
- Siemens Ind. Turbomachinery
- *Phoenix Biopower*
- *Azelio*
- *Ceres Power*

- Energiforsk representing:
 - EON
 - Stockholm Xergi
 - Mälarenergi
 - Linköping Tekn. V

- *Maabjerg Energy Center Holding*

Blue = new companies

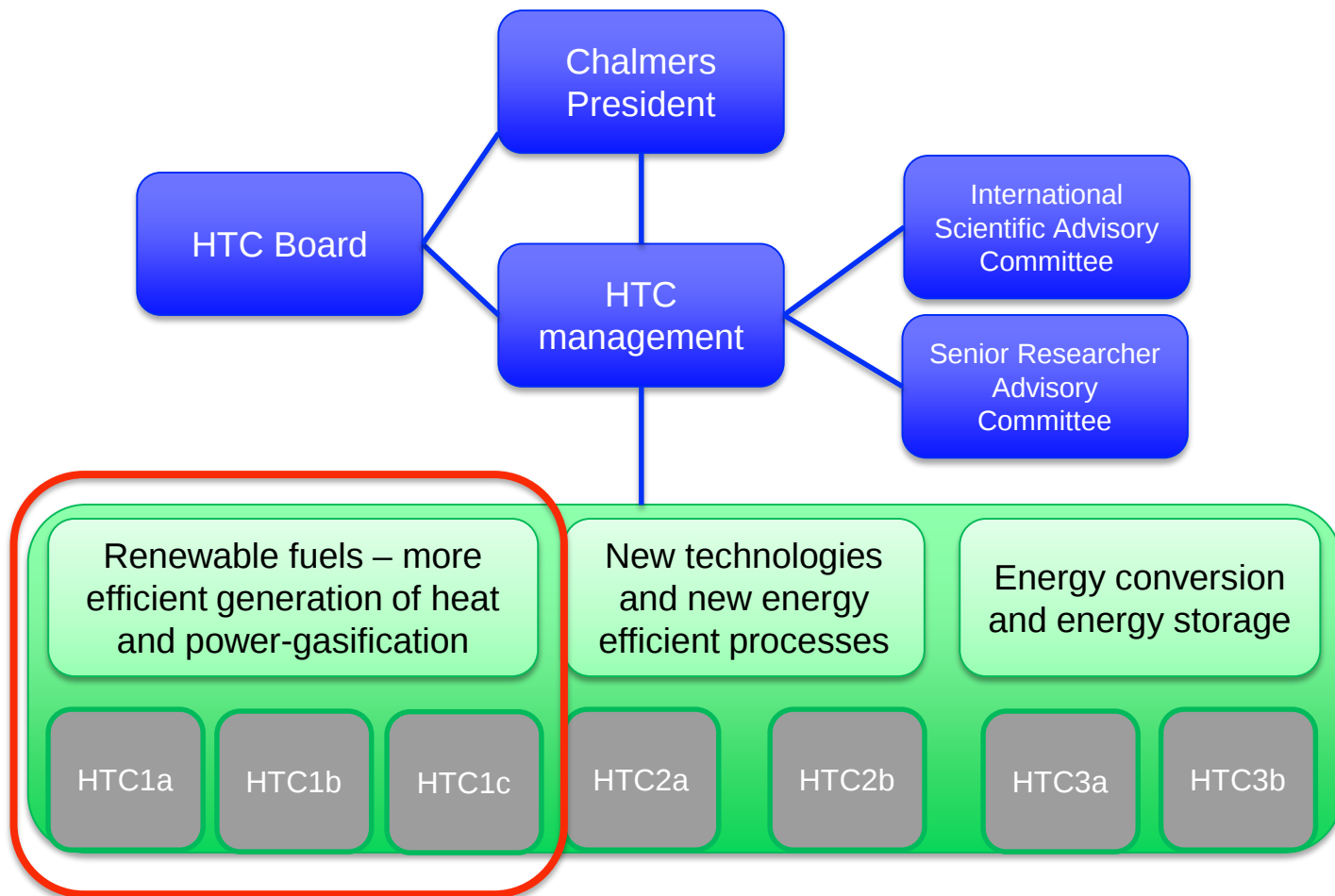
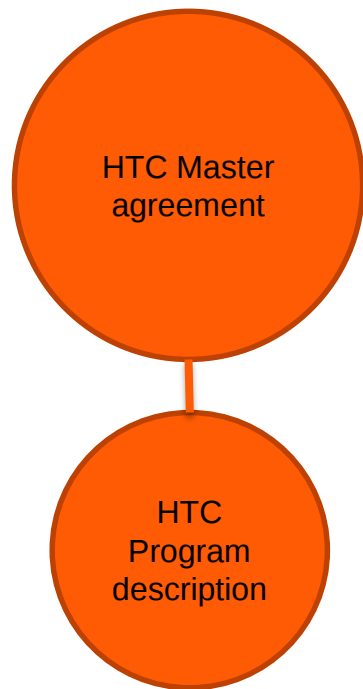
The HTC Program description 2018-2021



HTC Vision

HTC's world-leading research contributes to developing a sustainable energy system and to an increased security of energy supply.

HTC enables new energy efficient and environmentally sustainable processes that contribute to fulfilling Sweden's national energy and climate goals. HTC also contributes to global climate benefits and to the development of Swedish industry.



Research areas

- **1: Renewable fuels – more efficient generation of heat and power-gasification**
 - *Critical corrosion phenomena in combustion of biomass and waste in combined heat and power boilers*

Project manager: Jesper Liske, Chalmers

HTC1a

Research groups:



**RI
SE**

Participating companies:



Research areas

- 1: Renewable fuels – more efficient generation of heat and power-gasification

- Corrosion of high temperature materials in small scale wood-pellet fired boilers

Project manager: Camille Pallier, RISE IVF

Research groups:



Participating companies:



- High temperature corrosion during gasification of biomass and waste

Project manager: Rikard Norling, RISE KIMAB

Research groups:

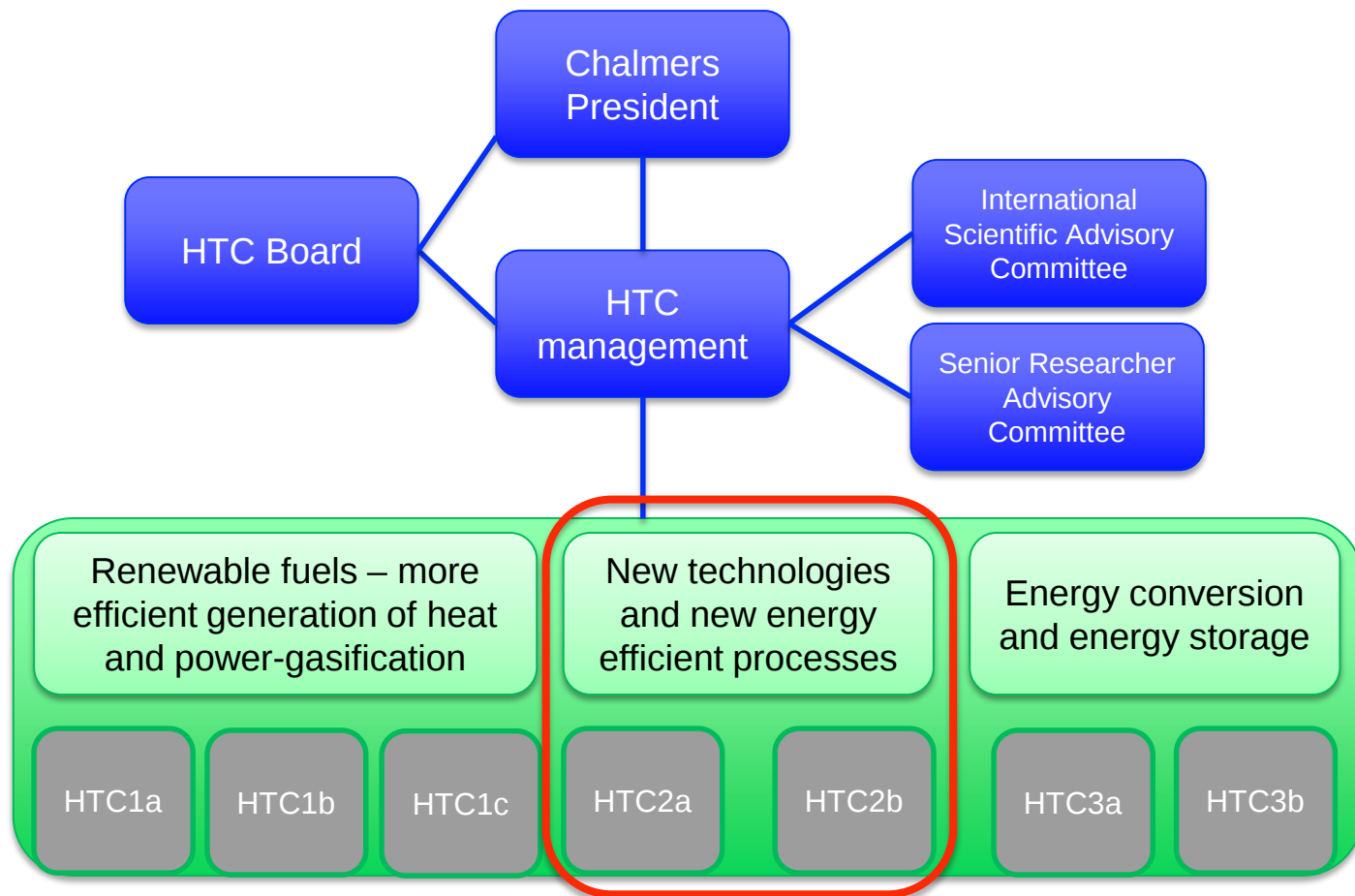
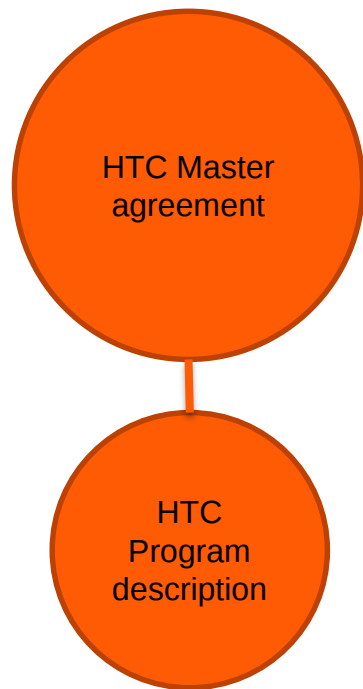


Participating companies:



HTC1b

HTC1c



Research areas

- **2: New technologies and new energy efficient processes**
 - *New corrosion resistant materials for challenging process environments – low oxygen activities and very high temperatures*

Project manager: Lars-Gunnar Johansson, Chalmers

Research groups:



Participating companies:



HTC2a

- *High temperature corrosion of materials and components produced by additive manufacturing (AM)*

Project manager: Mats Halvarsson, Chalmers

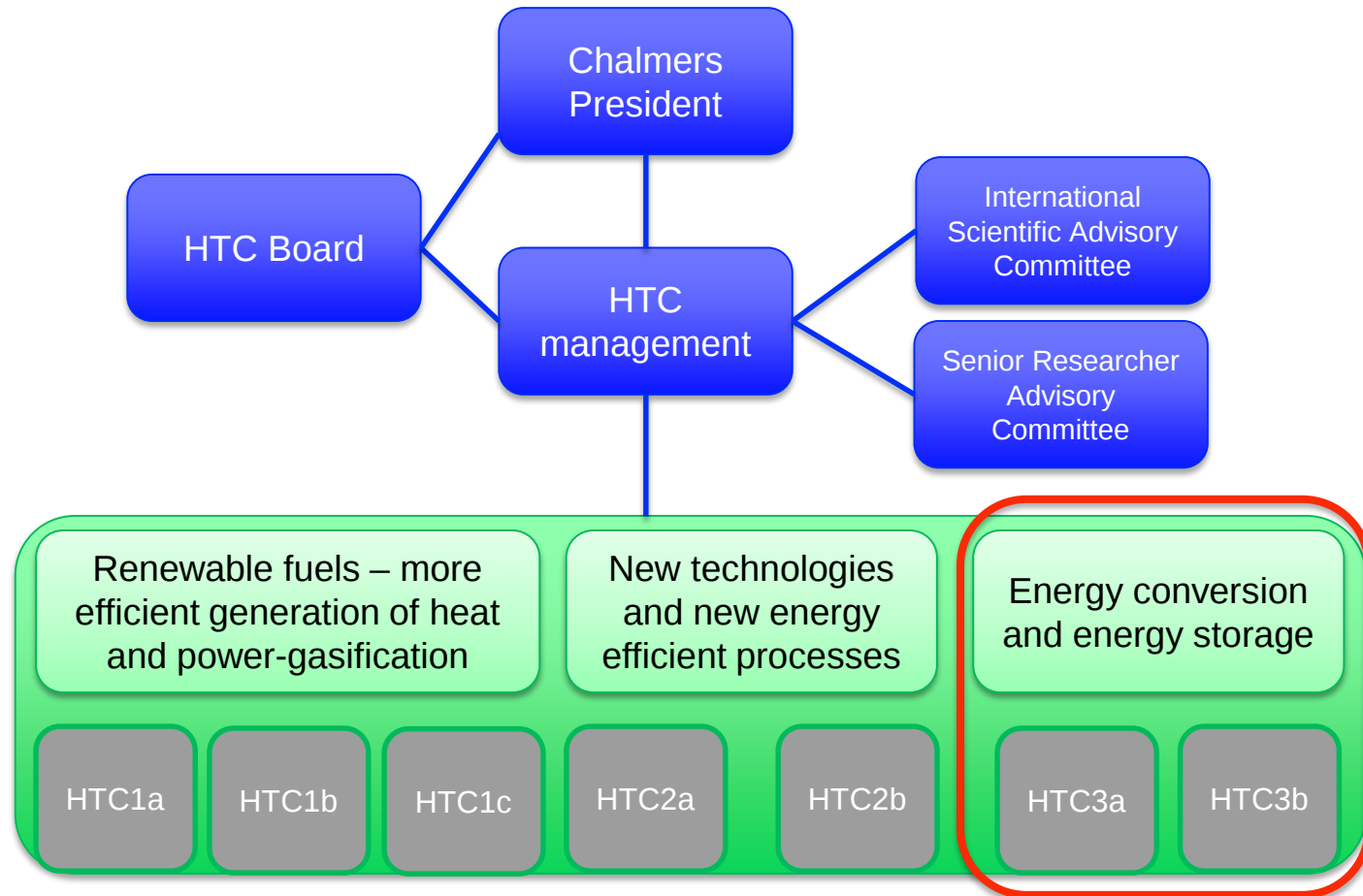
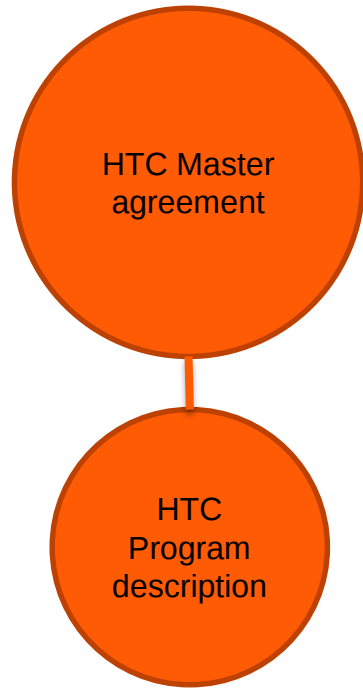
Research groups:



Participating companies:



HTC2b



Research areas

- **3: Energy conversion and energy storage**

- *Corrosion and oxidation of FeCr alloys for solid oxide fuel cells (SOFC) and solid oxide electrolysis cells (SOEC)*

Project manager: Jan Froitzheim, Chalmers

Research groups:



Participating companies:



HTC3a

- *High temperature corrosion in systems for heat storage (corrosion in melts for concentrated thermal solar power)*

Project manager: Lars-Gunnar Johansson, Chalmers

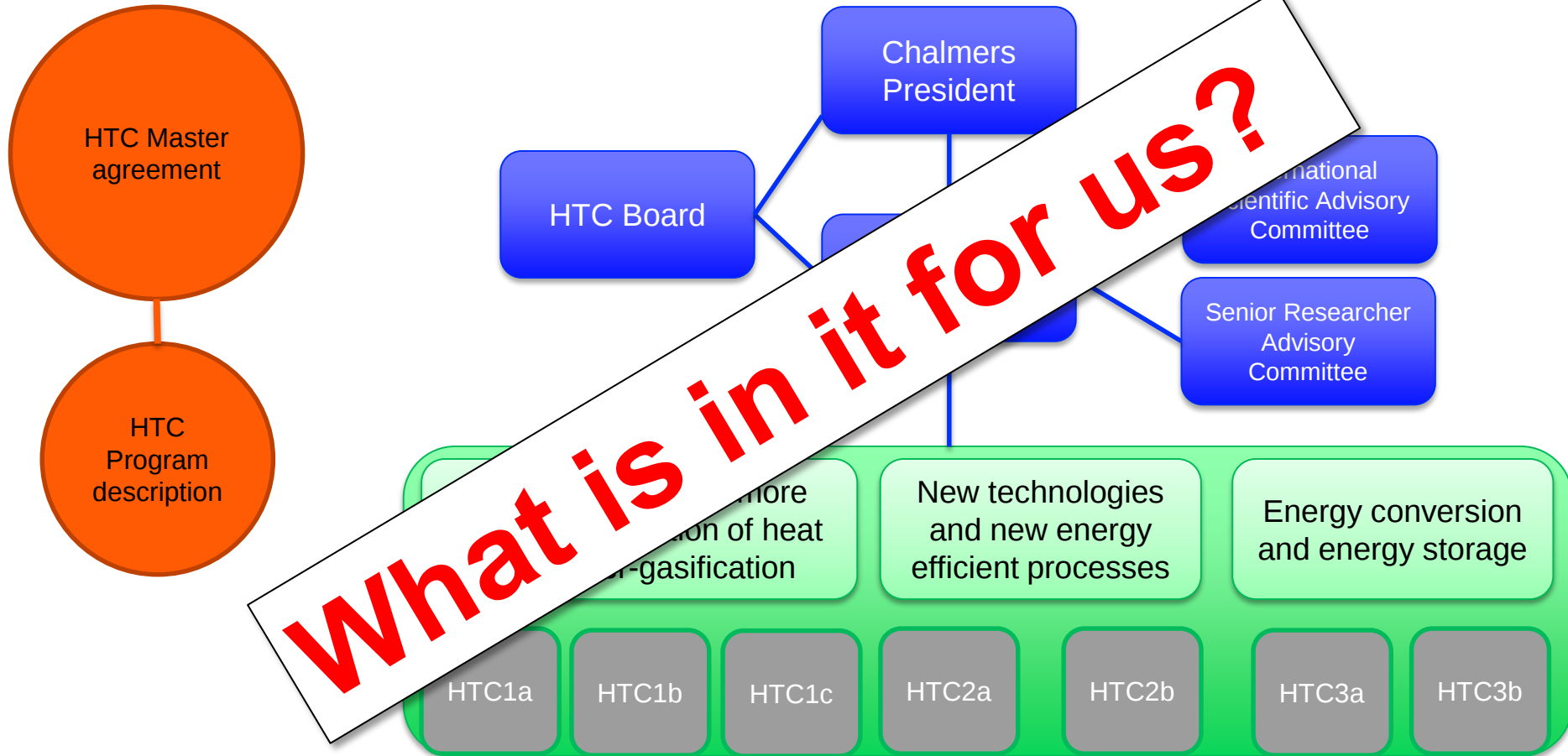
Research groups:



Participating companies:



HTC3b



We have printed a brochure

- General information about HTC
- *6 impact cases where HTC has contributed to the companies and to the society (utilization)*
- The research cluster in connection to HTC
- Contact info

*Finns på svenska
Available in english*

