MCFC-CONTEX

MCFC catalyst and stack component degradation and lifetime: Fuel Gas CONTaminant effects and EXtraction strategies

Kick-off Meeting Report and appointment of Project Steering Committee (PSC)

Meeting held in München, Germany, 25/01/2010

Due date of deliverable: 31/01/2010
Actual date of delivery: 08/02/2010

Start date of project: 01/01/2010
Duration: 36 months

Project coordinator name: A Moreno (Administrative Coordinator), S. McPhail (Scientific Coordinator)

Project coordinator organisation name: ENEA

Name of lead organisation of this deliverable: ENEA

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<tr>
<th>Beneficiary Number</th>
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<th>Beneficiary short name</th>
<th>Country</th>
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<tr>
<td>1</td>
<td>Italian Agency for New Technologies, Energy and Sustainable Economic Development</td>
<td>ENEA</td>
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<td>2</td>
<td>MTU Onsite Energy</td>
<td>MTU</td>
<td>Germany</td>
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<td>3</td>
<td>Ansaldo Fuel Cells</td>
<td>AFC</td>
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<td>4</td>
<td>Technical University Munich</td>
<td>TUM</td>
<td>Germany</td>
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<td>5</td>
<td>TUBITAK Marmara Research Centre</td>
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<td>Turkey</td>
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<td>6</td>
<td>University of Genoa – DICAT department</td>
<td>UNIGE</td>
<td>Italy</td>
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<td>7</td>
<td>Royal Institute of Technology</td>
<td>KTH</td>
<td>Sweden</td>
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<td>OVM-ICCPET Institute</td>
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<td>Romania</td>
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<td>9</td>
<td>Joint Research Centre</td>
<td>JRC</td>
<td>Belgium</td>
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Document Dissemination Level

- **PU**: Public
- **PP**: Restricted to other programme participants (including the Commission Services)
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- **CO**: Confidential, only for members of the consortium (including the Commission Services)

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1 Introduction and objective

The collaborative project MCFC-CONTEX is a truly cross-cutting enterprise between industry, academia and research institutions, tackling an important and highly topical problem in MCFC system application. Cooperation between different technological areas towards a common goal is the challenge that this project aims to bring to a successful conclusion. To this effect, the kick-off meeting is an important first step, and the present document reports on the key points that were discussed. These included an overview of the project, presentation of the partners, discussion of the Work Packages, the Consortium Agreement, adoption of common procedures and standards.

2 Participants

Present at the meeting were – see Table 1.

Table 1: Meeting participants

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Participants</th>
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<tbody>
<tr>
<td>ENEA</td>
<td>Angelo Moreno, Stephen McPhail, Giulia Monteleone</td>
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<tr>
<td>MTU</td>
<td>Uwe Würtenberger, Marc Bednarz, Marc Wilke</td>
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<td>AFC</td>
<td>Flavio Federici</td>
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<tr>
<td>TUM</td>
<td>Christoph Haisch, Reinhard Niessner</td>
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<td>MAM</td>
<td>Namik Unlu</td>
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<td>UNIGE</td>
<td>Barbara Bosio</td>
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<td>KTH</td>
<td>Carina Lagergren, Ivan Rexed</td>
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<td>OVM</td>
<td>Josef Karl Dumele</td>
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<td>JRC</td>
<td>Georgios Tsotridis</td>
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3 Presentation

The presentation of the EC DG-RTD, forwarded by Ms. Mirela Atanasiu “FCH-JU: The rules of the game” was given by Angelo Moreno after the general welcome. After a summary of the project and the activities at
hand by Stephen McPhail, a brief presentation of the partners’ institutions and their affinities with the project was given by each of those present.

4 Appointment Project Steering Committee

Taken from the Description of Work of MCFC-CONTEx:

The overall responsibility for the project lies with the Project Steering Committee, which acts as the decision-making body within the project Consortium. The PSC will be comprised of a representative from each Consortium partner (one seat each) and the Project Coordinator. The PSC will be appointed at the Kick-off meeting at the beginning of the project. If a partner wishes to replace a representative, they shall make it known to the Coordinator one week before the change is to take place.

The specific responsibilities of the PSC are to:

- Oversee the overall project achievements in relation with the planning and take appropriate measures to adjust, if necessary. This includes decisions on scope changes if research outcome should give cause for such a change.

- Approving major modifications to project plans.

- Oversee the overall quality of the deliverables in relation to the detailed implementation plan and take appropriate measures to adjust. This includes adjustment of detailed implementation plans, internal financial adjustments and replacement of a Consortium partner. With quality oversight, also overseeing ethical issues and the promotion of gender equality is included.

- Leading the scientific and technological development of the project.

- Dealing with non-performing partners.

- Consideration of long-term exploitation issues, including licensing and patenting.

- Training aspects.

- Financial issues.

- Establishment of collaboration with other projects for knowledge exchange.

All official communication to the European Commission shall be carried out through approval by the PSC, via the Coordinator.

The PSC shall meet regularly to take part in ordinary project meetings. These meetings shall take place at 6-month intervals and, if deemed necessary, when a major milestone is reached. The agenda for these meetings typically will contain the following subjects: scientific and technological issues, review of the deliverables, overall progress report, financial and administrative issues as well as a detailed implementation plan for the next phase.
The PSC shall therefore be comprised of one member per partner plus the Project Coordinator. The following persons have been appointed – see Table 2.

### Table 2: Project Steering Committee

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<thead>
<tr>
<th>Organisation</th>
<th>Representative</th>
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<tr>
<td>Coordinator</td>
<td>Angelo Moreno</td>
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<tr>
<td>ENEA</td>
<td>Stephen McPhail</td>
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<td>MTU</td>
<td>Stefan Rolf</td>
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5 Discussion of Work Packages

The technical WPs (WP1-4) were discussed by the corresponding WP Leaders, referring to actions to be undertaken, material and procedures to be shared, deliverables to be submitted.

5.1 Work Package 1 (ENEA)

The hub of the promotion and dissemination activities for the project will be the MCFC-CONTEX internet portal. Apart from links to partners’ descriptions and key project documents, a schedule will be published of affiliated or topical conferences, workshops etc. The possibility will be considered of organizing a dedicated Workshop after the first concrete results emerge from the project (as from year 2), possibly in combination with a workshop on Fuel Quality organized by JRC.

All partners will contribute by reporting significant events and any internal meetings or visits in the frame of the project. In October 2010 there will be the FCH-JU General Assembly and the project could be presented as an example of a truly joint undertaking.

An important aspect will be the utilization of a harmonized format of reporting of results that are fit for publication.
5.2 Work Package 2 (AFC)

Through the presentation of a detailed breakdown of Tasks and Deliverables, the action plan for WP2 was set out. The first step is to evaluate and select the gases (both on fuel and oxidant side) and corresponding contaminants that will be the object of study in the project, and will act as an input to WP3 and WP4.

Regarding the characterization of cells, it will be necessary to supply the “independent” partners KTH and JRC with material for testing. To this effect, MTU and AFC should send specifications of their cells (pictures, sizes, rated power, gas consumption, and other relevant info) as soon as the Consortium Agreement is finalized and signed, to allow the test partners to prepare their facilities.

The procedure for testing will be as follows:

1. A reference material (cell) will be provided respectively by MTU and AFC for benchmarking.

2. Tests will be carried out according to a pre-established protocol to benchmark the reference cell, which will consist of:
   
   a. Pre-test analysis and microstructural characterization
   
   b. Cell testing in reference conditions (with/without contaminants at given duration, following where applicable the FCTESQA procedures for single cell testing)
   
   c. Post-test analysis

3. After satisfactory qualification of the test rigs and test procedure, Step 2 will be repeated for specific cells, again to be supplied independently by MTU and AFC

Since the two industrial partners MTU and AFC have proprietary components, clear indications will have to be given as to who tests what. How testing will take place will be a single, commonly agreed procedure. The decision of this procedure, as well as the definition of the list of gases and contaminants will be led by MTU and AFC, with input from UNIGE, who are responsible for creating the numerical simulation tool.

As an input to this process, ENEA will circulate the FCTESQA procedures for single cell testing of MCFCs for comment by the partners involved. The final, univocal, jointly established protocol will be provided to the Coordinator for insertion in the Project Master Document (PMD) – Delivery date April 2010. In Month 5 (May 2010) the specification of the components to be tested will be defined (Deliverable 2.2), including the allocation of the different single cells. By Month 6 (June 2010) the fuels, gases and contaminants to be tested will be defined (Deliverable 2.1).

Single cell and button cell tests will be executed by KTH, JRC, ENEA, MTU and AFC. In particular AFC will study the effects of the contaminants in the cathode gas also to evaluate the performance when the fuel cells are fed with a typical exhaust gas composition from combined cycle.

5.3 Work Package 3 (TUM)

Accurate and sensitive gas analysis is a crucial tool for the success of the project. TUM will be leading the WP dedicated to this, and will develop a custom-built, on-line gas analysis device, based on Raman and Laser-Induced Breakdown Spectroscopy (LIBS). To do this, all partners involved in system component
testing (cell, stack, reformer or gas cleaning unit) will have to supply details regarding the required gas component measurements at that particular stage of the system chain:

- Components to be measured
- Required sensitivity
- Fluctuations and required precision
- Required time resolution
- Gas flow volume
- Atmospheric conditions

According to these details, for each stage in the system chain requiring gas analysis, TUM will propose solutions for satisfactory measurement of gas compositions. These solutions may also be commercially available.

TUM emphasized that no referencing or calibration of the newly developed gas analysis system can be carried out on their premises, as this was not budgeted for. Therefore, this will take place in one or more of the Consortium partners’ laboratories equipped with GC-MS (Gas Chromatography-Mass Spectrometer) or other suitable equipment. To this effect TUM will provide the necessary technical and practical guidelines for the required calibration. Candidates are OVM, MAM and JRC (JRC is equipped with a number of gas impurity measuring devices, since it is involved in standardizing H₂ fuel impurities for ISO). Transfer of this activity is possible because the gas analysis device will be designed for a 19” rack and therefore relatively easily transportable. Qualification of the calibrated system in the labs of other Consortium partners will be considered. Also the TUM-based operator will have to be considered in these exchanges.

5.4 Work Package 4 (MTU)

As soon as the list of fuels and contaminants is defined in WP2, as well as the operating conditions at the different stages of the system chain, the respective definitions of “clean gas” will be established. These will be the objective of WP4. This can be achieved through different strategies, which have to be defined in detail:

- The abatement of contaminants can take place through reactive and adsorptive mechanisms or a combination thereof.
- It is to be evaluated whether a multi-stage process will be necessary, in order to separate the levelling of concentration spikes, bulk cleaning and fine cleaning.
- Different stages might also be necessary to handle different contaminants in the same gas stream.
- Also the different MCFC technologies considered in this project will have to be considered (Internal Reforming and External Reforming) as they will dictate different gas compositions and purity levels.

MTU and AFC will be involved in the definition of requirements, in close collaboration with ENEA, in charge of adsorptive cleaning technologies. For the development of the lab-scale gas cleaning unit prototype (activity to be carried out by OVM, who have capacity for approximately 1 kW of gas to be cleaned), the
different MCFC technologies will have to be taken into account, which means probably 2 units will have to be developed and tested.

6 Consortium Agreement

A discussion about the issues left open in the Consortium Agreement (CA) took place. MTU’s lawyer provided juridical input for the technological experts to refer back to their respective legal departments. The open issues are:

- Maximum aggregate liability: The industrial partners want to maintain a maximum aggregate liability which does not exceed the amount of funding. Economical considerations impose this safety margin, which is not applicable to governmental organizations, since the State can be considered – in most cases – solvent. However, industry benefits from insurance coverage.

- Withdrawal of a Party from the project at its sole discretion: Objections were raised regarding the clause put forward by the industrial partners that a Party should be able to leave the project at its sole discretion after 12 months. Stock-market dynamics are the justification for this request. However, evident difficulties would arise for the other Parties due to the strong interconnection of tasks in this project. Also the funding of PhD students by a Party that decides to leave prematurely would be jeopardized. This should be clearly formulated in a similar contract of employment. Through appropriate wording and the inclusion of certain guarantees to be given by a withdrawing Party (e.g. as pointed out in Article II.35.6 of the Grant Agreement) regarding fulfilment of their tasks and their obligations to other Parties, it is hoped to provide satisfaction to all parties.

- Intellectual Property Rights and Access Rights: Due to the confidential nature of the know-how detained by the industrial partners (which is generally not categorized in patents due to their visibility and relative transparency), the granting or withholding of Access Rights to Background has to be described in very broad wording. Thus it is at the discretion of the industrial partners to fulfil or deny access to a specific item of Background without detailed explanation. However, smooth progress of the tasks prescribed in the project should be facilitated as much as possible to meet the delivery requirements by the funding body (European Commission).

- Access Rights after withdrawal of a Party: for the reasons described above, it is requested to reduce the time limit for requesting/granting Access Rights to 3 months (was 6 months) after a Party’s withdrawal from or termination of participation.

- Granting licenses to third parties: It is requested by MTU to be able to grant exclusive – rather than non-exclusive, as specified in Art. 8.1 of the CA – licenses of jointly owned Foreground to specific third parties. It is doubtful whether this will be an issue within the time frame of this project. Perhaps this can be granted by adapting the conditions for compensation of the joint owners. Furthermore, it is requested by MTU to be able to exclude a specific party from the transfer of Foreground generated in the project, as an addendum to Attachment 6 of the CA ("List of Third Parties to which transfer of Foreground is possible without prior notice to the other Parties")
MTU’s lawyer will provide a rephrased version of the CA by February 3rd for a final round of revision. It is sincerely hoped that conclusive agreement can be achieved on the above issues.

7 Next Meeting

The next meeting will be among the PSC members plus any additional technical experts brought by the PSC members for a first round of progress evaluation. The place has been fixed in Stockholm, Sweden, either in the week 28/6-2/7/2010 or in the week 5-9/7/2010.