



D2Service

Design of 2 Technologies and Applications to Service

Tobias Thomsen
Project Coordinator

www.project-D2Service.eu
tobias.thomsen@next-energy.de

Programme Review Days 2016
Brussels, 21-22 November

PROJECT OVERVIEW



| Project Information | |
|-------------------------------------------------|----------------------------------------------------------------------------------------------|
| Call topic | FCH-02.9-2014 |
| Grant agreement number | 671473 |
| Application area (FP7) or Pillar (Horizon 2020) | Horizon 2020 - Energy |
| Start date | 01/09/2015 |
| End date | 31/08/2018 |
| Total budget (€) | 3,636,797.50 |
| FCH JU contribution (€) | 2,953,790.75 |
| Stage of implementation | 39% project months elapsed vs total project duration, at date of November 1, 2016 |
| Partners | Ballard Power Systems; Bosal; British Gas; Energy Partner; NEXT ENERGY; SOLIDpower; ZBT GmbH |

Slide 2

OGY(F)2

For FP7 projects (from calls 2008 to 2013):

- Transport and refuelling infrastructure
- Hydrogen production and distribution
- Stationary power and CHP
- Early markets
- Cross-cutting issues

For Horizon 2020 projects (from call 2014 onwards):

- Transport
- Energy
- Overarching projects
- Cross-cutting

ORTEGA GARCIA Yanaris (FCH), 16/02/2016

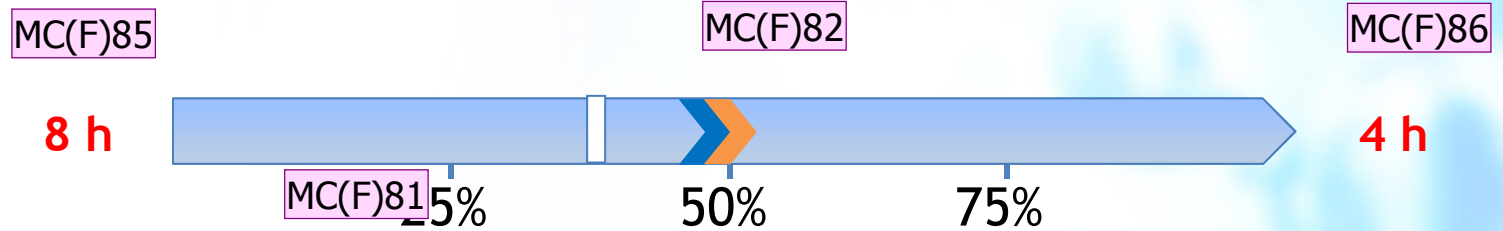
PROJECT SUMMARY





- Simplification and Standardization of Components of two CHP Systems for different Applications in the Power Range of 2 - 2.5 kW_{el}
 - Residential,
 - Small and Medium-sized Enterprises,
 - Supplemental Power
- Reduction of
 - Time on Machine
 - Costs
 - Maintenance
- Prolong Service Intervals
- Development of useful Manuals including
 - Recommendations for Operation as well as
 - Maintenance and
 - Installation Instructions
- Increasing the Distribution of Energy-efficient Technologies and Proof of Concept by installing both Units in Europe

PROJECT PROGRESS/ACTIONS - Aspect 1

 Achievement to-date
 % stage of implement.



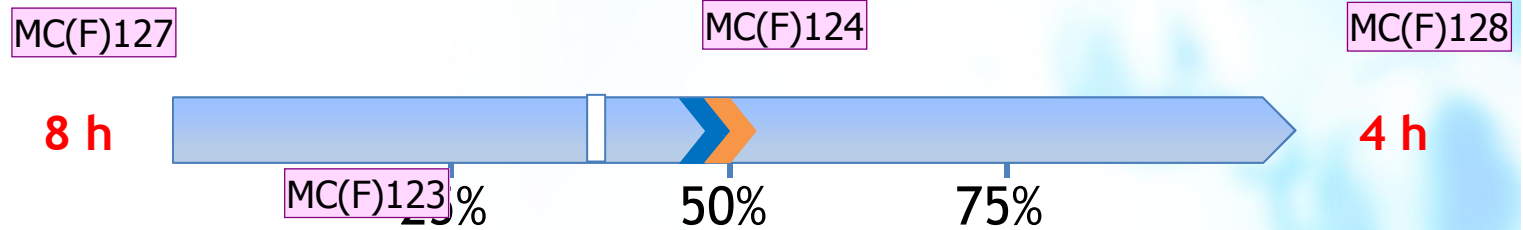
| Aspect addressed | MC(F)83 Parameter (KPI) | Unit | SoA 2016 | MC(F)84 FCH JU Targets | | |
|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------|----------|---------------------------|------|------|
| | | | | Call topic | 2017 | 2020 |
| Down-time reduction  | <u>SOLIDpower</u> : Service time – presence time of maintenance technician | h | > 8 | < 4 | < 4 | |
| Presence time  | <u>Ballard</u> : Service time – presence time of maintenance technician | h | > 8 | < 4 | < 4 | |



Slide 4

- MC(F)81** Position white cursor according to % project stage of implementation at date of 01/11/2016
The position of the white cursor should remain the same throughout the presentation
MARENCO Claudia (FCH), 15/02/2016
- MC(F)82** Position red cursor according to achievement to date (Oct/Nov 2016) (in scale between starting point and target value) + indicate achieved value and unit.
If another parameter monitored in the project addresses the same aspect, add a second arrow in a different colour.
Repeat for any additional paramaters addressing the same aspect.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)83** Please refer to the objectives/targets/KPIs set in the multi-annual work plans (MAIP or MAWP) or in the topic description for the call for proposals to which you successfully applied (see the relevant annual plan - AIP or AWP - for reference).
- Please add extra rows in case you have more than one objective/target/KPI adressing the same aspect
MARENCO Claudia (FCH), 08/09/2016
- MC(F)84** Indicate the targets defined in the specific call topic to which you had originally applied and/or in the multi-annual programmes (MAIP/MAWP)
MARENCO Claudia (FCH), 16/02/2016
- MC(F)85** Indicate here the value of the parameter monitored at the beginning of the project and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)86** Indicate the project target value for this parameter and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016

PROJECT PROGRESS/ACTIONS - Aspect 1

 Achievement to-date
 % stage of implement.



| Aspect addressed | MC(F)125 Parameter (KPI) | MC(F)126 Future Steps |
|--------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Down-time reduction  | <u>SOLIDpower</u> : Service time – presence time of maintenance technician | <ul style="list-style-type: none"> • Reduce complexity to ensure simple and accurate service • Using of standard tools or quick connector • Error-Matrix for fast fault detection • Manual to allow not highly specialised installers/technicians service and installation |
| Presence time  | <u>Ballard</u> : Service time – presence time of maintenance technician | |

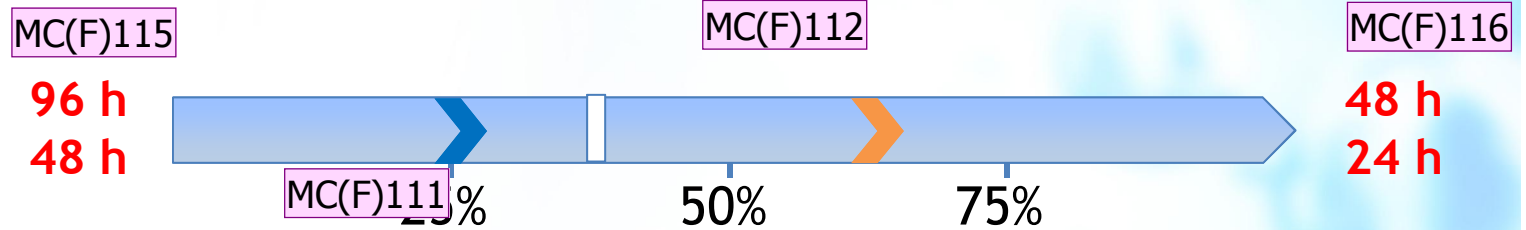
Slide 5



- MC(F)123** Position white cursor according to % project stage of implementation at date of 01/11/2016
The position of the white cursor should remain the same throughout the presentation
MARENCO Claudia (FCH), 15/02/2016
- MC(F)124** Position red cursor according to achievement to date (Oct/Nov 2016) (in scale between starting point and target value) + indicate achieved value and unit.
If another parameter monitored in the project addresses the same aspect, add a second arrow in a different colour.
Repeat for any additional paramaters addressing the same aspect.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)125** Please refer to the objectives/targets/KPIs set in the multi-annual work plans (MAIP or MAWP) or in the topic description for the call for proposals to which you successfully applied (see the relevant annual plan - AIP or AWP - for reference).

Please add extra rows in case you have more than one objective/target/KPI adressing the same aspect
MARENCO Claudia (FCH), 08/09/2016
- MC(F)126** Indicate the targets defined in the specific call topic to which you had originally applied and/or in the multi-annual programmes (MAIP/MAWP)
MARENCO Claudia (FCH), 16/02/2016
- MC(F)127** Indicate here the value of the parameter monitored at the beginning of the project and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)128** Indicate the project target value for this parameter and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016

PROJECT PROGRESS/ACTIONS - Aspect 2

 Achievement to-date
 % stage of implement.



| Aspect addressed | MC(F)113 Parameter (KPI) | Unit | SoA 2016 | MC(F)114 FCH JU Targets | | |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|------|----------|----------------------------|------|------|
| | | | | Call topic | 2017 | 2020 |
| Down-time reduction  | <u>SOLIDpower</u> : Total down-time of equipment for service | h | 96 | < 48 | < 72 | 48 |
| Equipment down-time  | <u>Ballard</u> : Total down-time of equipment for service | h | 48 | < 48 | 24 | |

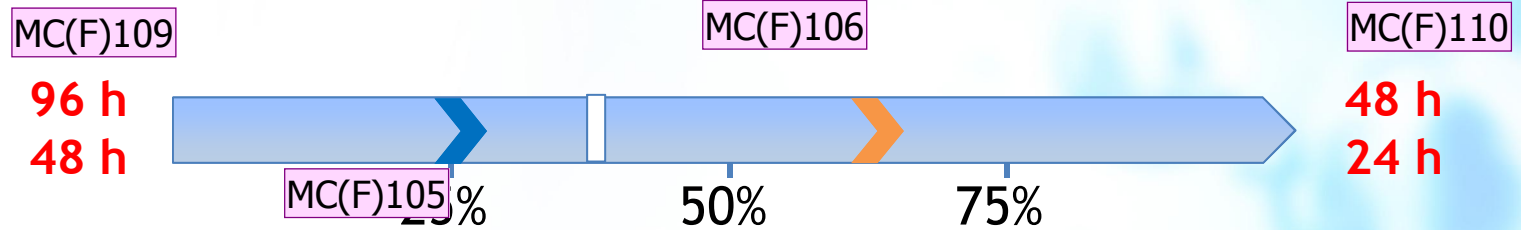
Slide 6



- MC(F)111** Position white cursor according to % project stage of implementation at date of 01/11/2016
The position of the white cursor should remain the same throughout the presentation
MARENCO Claudia (FCH), 15/02/2016
- MC(F)112** Position red cursor according to achievement to date (Oct/Nov 2016) (in scale between starting point and target value) + indicate achieved value and unit.
If another parameter monitored in the project addresses the same aspect, add a second arrow in a different colour.
Repeat for any additional paramaters addressing the same aspect.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)113** Please refer to the objectives/targets/KPIs set in the multi-annual work plans (MAIP or MAWP) or in the topic description for the call for proposals to which you successfully applied (see the relevant annual plan - AIP or AWP - for reference).
- Please add extra rows in case you have more than one objective/target/KPI adressing the same aspect
MARENCO Claudia (FCH), 08/09/2016
- MC(F)114** Indicate the targets defined in the specific call topic to which you had originally applied and/or in the multi-annual programmes (MAIP/MAWP)
MARENCO Claudia (FCH), 16/02/2016
- MC(F)115** Indicate here the value of the parameter monitored at the beginning of the project and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)116** Indicate the project target value for this parameter and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016

PROJECT PROGRESS/ACTIONS - Aspect 2



 Achievement to-date
 % stage of implement.



| Aspect addressed | MC(F)107 Parameter (KPI) | Depending on planned or unplanned and what kind of service: MC(F)108 |
|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Down-time reduction  | <u>SOLIDpower</u> : Total down-time of equipment for service | Shut down (1-2 d) and start up (1 d) procedure takes more time than servicing |
| Equipment down-time  | <u>Ballard</u> : Total down-time of equipment for service | Technologically shut down and start up time is much faster compared to high temperature systems |

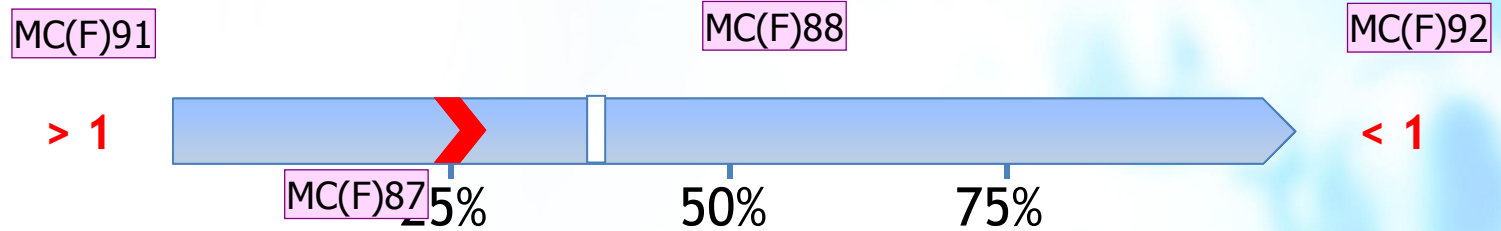
Slide 7

- MC(F)105** Position white cursor according to % project stage of implementation at date of 01/11/2016
The position of the white cursor should remain the same throughout the presentation
MARENCO Claudia (FCH), 15/02/2016
- MC(F)106** Position red cursor according to achievement to date (Oct/Nov 2016) (in scale between starting point and target value) + indicate achieved value and unit.
If another parameter monitored in the project addresses the same aspect, add a second arrow in a different colour.
Repeat for any additional paramaters addressing the same aspect.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)107** Please refer to the objectives/targets/KPIs set in the multi-annual work plans (MAIP or MAWP) or in the topic description for the call for proposals to which you successfully applied (see the relevant annual plan - AIP or AWP - for reference).

Please add extra rows in case you have more than one objective/target/KPI adressing the same aspect
MARENCO Claudia (FCH), 08/09/2016
- MC(F)108** Indicate the targets defined in the specific call topic to which you had originally applied and/or in the multi-annual programmes (MAIP/MAWP)
MARENCO Claudia (FCH), 16/02/2016
- MC(F)109** Indicate here the value of the parameter monitored at the beginning of the project and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)110** Indicate the project target value for this parameter and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016

PROJECT PROGRESS/ACTIONS - Aspect 3

 Achievement to-date
 % stage of implement.



| Aspect addressed | MC(F)89 Parameter (KPI) | Unit | SoA 2016 | MC(F)90 FCH JU Targets | | |
|------------------|--------------------------------|------|----------|---------------------------|------|------|
| | | | | Call topic | 2017 | 2020 |
| Service Interval | Increase service interval time | a | > 1 | < 1 | < 1 | |

Future steps:

Prolong duration of

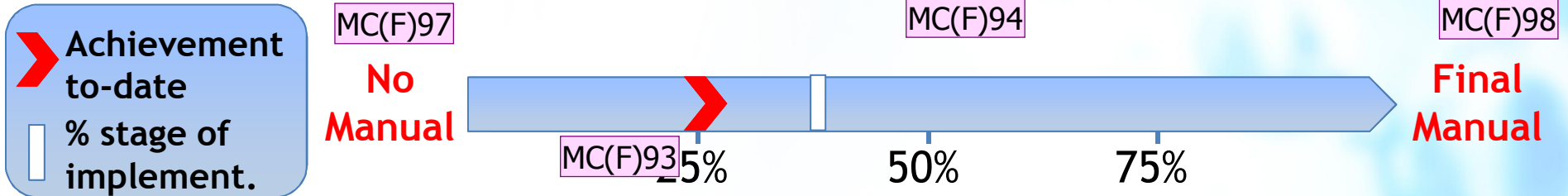
- *Water clean-up by optimized ion exchange resins and*
- *Desulphurisation by using HDS Material*

Slide 8

- MC(F)87** Position white cursor according to % project stage of implementation at date of 01/11/2016
The position of the white cursor should remain the same throughout the presentation
MARENCO Claudia (FCH), 15/02/2016
- MC(F)88** Position red cursor according to achievement to date (Oct/Nov 2016) (in scale between starting point and target value) + indicate achieved value and unit.
If another parameter monitored in the project addresses the same aspect, add a second arrow in a different colour.
Repeat for any additional parameters addressing the same aspect.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)89** Please refer to the objectives/targets/KPIs set in the multi-annual work plans (MAIP or MAWP) or in the topic description for the call for proposals to which you successfully applied (see the relevant annual plan - AIP or AWP - for reference).

Please add extra rows in case you have more than one objective/target/KPI addressing the same aspect
MARENCO Claudia (FCH), 08/09/2016
- MC(F)90** Indicate the targets defined in the specific call topic to which you had originally applied and/or in the multi-annual programmes (MAIP/MAWP)
MARENCO Claudia (FCH), 16/02/2016
- MC(F)91** Indicate here the value of the parameter monitored at the beginning of the project and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)92** Indicate the project target value for this parameter and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016

PROJECT PROGRESS/ACTIONS - Aspect 4



| Aspect addressed | MC(F)95 Parameter (KPI) | MC(F)96 Explanation |
|------------------|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Service Manual | provide guidelines for writing service manuals that are easily understandable for maintenance technicians | Development of a pictographical service manual including: <ul style="list-style-type: none"> • Installation recommendations • Error matrix • Maintenance: step by step • Considering country specifics |

Future steps:

Implementation of test scenarios to find installation limitations, fault conditions and error states. Preparation of manual based on CAD data.

Slide 9

- MC(F)93** Position white cursor according to % project stage of implementation at date of 01/11/2016
The position of the white cursor should remain the same throughout the presentation
MARENCO Claudia (FCH), 15/02/2016
- MC(F)94** Position red cursor according to achievement to date (Oct/Nov 2016) (in scale between starting point and target value) + indicate achieved value and unit.
If another parameter monitored in the project addresses the same aspect, add a second arrow in a different colour.
Repeat for any additional paramaters addressing the same aspect.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)95** Please refer to the objectives/targets/KPIs set in the multi-annual work plans (MAIP or MAWP) or in the topic description for the call for proposals to which you successfully applied (see the relevant annual plan - AIP or AWP - for reference).

Please add extra rows in case you have more than one objective/target/KPI adressing the same aspect
MARENCO Claudia (FCH), 08/09/2016
- MC(F)96** Indicate the targets defined in the specific call topic to which you had originally applied and/or in the multi-annual programmes (MAIP/MAWP)
MARENCO Claudia (FCH), 16/02/2016
- MC(F)97** Indicate here the value of the parameter monitored at the beginning of the project and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016
- MC(F)98** Indicate the project target value for this parameter and the corresponding unit.
If another parameter monitored in the project addresses the same aspect, add a second value in a different colour.
MARENCO Claudia (FCH), 08/09/2016

Installation at NEXT ENERGY

SOFC

PEM-FC

SOLIDpower
EnGen-2500

2.5 kW_{el}

2.0 kW_{th}



Ballard Power
Systems

2.0 kW_{el}

4.3 kW_{th}

SYNERGIES WITH OTHER PROJECTS AND PROGRAMMES



Interactions with projects funded under EU programmes

FCpoweredRBS

Lessons learned: Analysis of reliability, service cost, service time, spare part cost, typical failure modes etc. Ballard Power Systems is involved in this project

(ene.field)

Report should be considered but was published only afterwards

Interactions with national and international-level projects and initiatives

Callux

Official documents were used

Chrisalide

SOLIDpower is involved in this project

Danish Micro CHP

Ballard Power Systems is involved in this project

DISSEMINATION ACTIVITIES



Public deliverables OGY(F)26

- D1.1 Project website
- D1.2 Annual data reporting 2016
- D2.2 Report with proposals deducted from the fuel cell μ CHP field trials
-
-

Conferences/Workshops MC(F)80

- 1. Hannover Fair 2016
- 2. World of Energy Solution 2016

Social media MC(F)64

Publications:

MC(F)67

- Abstract submitted: DLR - 7th International Conference on Fundamentals and Development of Fuel Cells “Development of high-resolution reference load profiles for scientific evaluation of CHP systems in buildings”
- Abstract submitted MC(F)63 - Energiemanagement 4.0 “Hochaufgelöste Referenzlastprofile zur techno-ökonomischen Analyse von Energietechnologien in Gebäuden”

Slide 12

- OGY(F)26** Indicate the full name of up to 5 public deliverables
ORTEGA GARCIA Yanaris (FCH), 16/02/2016
- MC(F)63** Specify the number of patents and give reference to up to 2
MARENCO Claudia (FCH), 16/02/2016
- MC(F)64** Project presence on social media:
Create a hyperlink to the relevant project page (Youtube, LinkedIn, Facebook, Twitter, Instagram). Delete the icons that are irrelevant because the project is not present on the social media concerned.
To create a hyperlink: right click on the icon, select "hyperlink" and paste the url in the "address" field
MARENCO Claudia (FCH), 08/09/2016
- MC(F)67** Specify the number of publications and give reference up to 2 most relevant ones
MARENCO Claudia (FCH), 22/02/2016
- MC(F)80** Indicate the number of conferences/workshops organised by the project and that the project has attended
MARENCO Claudia (FCH), 08/09/2016

Thank You!

Coordinator: tobias.thomsen@next-energy.de