

**e-balance**  
**Deliverable D1.16**  
Periodic Report 4

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*Abstract*

This Deliverable provides a brief summary of the progress of work and the management aspects of the e-balance project in the period M37-M46

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## Table of Contents

Table of Contents .....	3
List of Abbreviations.....	4
1 Publishable Summary.....	5
2 Progress of technical work and achievements.....	6
2.1 WP2 - Use cases and socio-economic aspects (M1 – M44) .....	7
2.1.1 The WP2 results in Y4.....	7
2.1.2 Task 2.4 Validation of the proposed Use Cases an Business Models (M6 – M40).....	8
2.1.3 Task 2.5 Use Case, Market and Requirements Restatement (M6-M44) .....	9
2.1.4 Deliverables in WP2 the consortium worked on in Y4 .....	10
2.2 WP3 – System specification (M1 – M44).....	11
2.2.1 The WP3 results in Y4.....	12
2.2.2 Task 3.3 Architecture and Specification Restatement (M15 – M44) .....	12
2.2.3 Deliverables in WP3 the consortium worked on in Y4 .....	13
2.3 WP4 – Communication Platform (M3 – M44) .....	13
2.3.1 The WP4 results in Y4.....	14
2.3.2 Task 4.5 Communication Platform Restatement (M12 – M44).....	14
2.3.3 Deliverables in WP4 the consortium worked on in Y4 .....	15
2.4 WP5 – Energy Management Platform (M3 – M44).....	16
2.4.1 The WP5 results in Y4.....	16
2.4.2 Task 5.6 Energy Management Platform Restatement and Revision of the System Models (M12 – M44) 16	
2.4.3 Deliverables in WP5 the consortium worked on in Y4 .....	17
2.5 WP6 – System Integration and Evaluation (M12 – M45).....	18
2.5.1 The WP6 results in Y4.....	19
2.5.2 Task 6.2 Integration and set-up of the prototypes (M12 – M26).....	19
2.5.3 Task 6.3 Deployment of the demonstrators (M22 – M33) .....	20
2.5.4 Task 6.4 Validation and evaluation of the results (M26 – M45) .....	21
2.5.5 Deliverables in WP6 the consortium worked on in Y4 .....	21
2.6 WP7 – Dissemination and Exploitation (M1 – M46) .....	23
2.6.1 The WP7 results in Y4.....	24
2.6.2 Task 7.1 Communication Plan (M1 – M46) .....	25
2.6.3 Task 7.2 Dissemination (M1 – M46).....	26
2.6.4 Task 7.3 Exploitation and contribution to standards (M1 – M46).....	29
2.6.5 Task 7.4 Guide Book (M1 – M46) .....	30
2.6.6 Deliverables in WP7 the consortium worked on in Y4 .....	31
3 Project management and administrative issues .....	33
3.1 Status of Deliverables and Milestones .....	35
3.2 Resources and Spending .....	37
3.3 Project Meetings and other Key Events .....	39
3.4 Deviations and Delay .....	39
Annex A .....	41

## List of Abbreviations

CMU	Customer Management Unit
DER	Distributed Energy Resources
DSO	Distribution Service Operator
FAN	Field Area Network
HAN	Home Area Network
KPI	Key Performance Indicator
LV-FAN	Low Voltage Field Area Network
LVGMU	Low Voltage Grid Management Unit
MU	Management Unit
MV-FAN	Medium Voltage Field Area Network
MVGMU	Medium Voltage Grid Management Unit
SGAM	Smart Grid Architecture Model
TLGMU	Top Level Grid Management Unit
TSO	Transmission Service Operator
WAN	Wide Area Network

# 1 Publishable Summary

The aim of the e-balance project is to investigate and develop an energy management system for balancing energy production and consumption that considers also non-technical aspects related to the socio-economic and legal context it shall be deployed within. The general technical solution shall thus be realized as a holistic approach, also covering the security and privacy aspects. It employs a hierarchical architecture of the management units that corresponds to the structure of the energy grid and enables decentralised control decisions.

Within the fourth reporting period, technical and scientific work was focused on six work packages:

- WP2 addressed further the validation of the identified use cases and business ideas defined and processed in the previous reporting periods. In the current period this activities were intensified further, including business related work as well as additional social studies and the preparation and execution of the social research within the both real-life demonstrators.
- WP3 mainly focused on the analysis of the influence of the knowledge gathered during the period on the system architecture. The results of the implementation, integration and evaluation of the system components led to several updates.
- WP4 focused on the restatement activities of the communication part of the ICT solution. The communication platform is responsible for efficient and secure data exchange and management of the network of management units. The middleware that is the major part of the communication platform hides the communication details from the main energy management logic.
- WP5 addressed the finalisation of the integration of the energy balancing mechanisms, as well as the energy resilience mechanisms that constitute to the energy management platform. The platform also includes the security and privacy related modules. This period was mainly devoted to restatement of the energy management platform.
- WP6 addressed the evaluation of the project results. In the third reporting period we finalized integrating the prototypes, deployed them and evaluated their working.
- WP7 addressed all communication requirements of the European Commission, including maintenance and refurbishment of the project website (<http://www.e-balance-project.eu/>), update of dissemination material, edition of 5 videos, 2 additional newsletters and preparation of news and LinkedIn posts about the e-balance project. The project partners have participated in 9 events (workshops, conferences, expositions, publications), which they have presented 7 scientific papers (2 journals), and 8 presentations. In addition, during this period the consortium has prepared papers and dissemination material for 4 events in 2017 (two of them after the project conclusion). In addition, further steps to establish synergies with similar projects have been undertaken in order to enhance the exploitation of results (COSSMIC and DAREED workshops and the Smart City Expo).

The e-balance project faced some delays in the current reporting period, but all the milestones have been achieved and all the deliverables planned for this reporting period have been submitted within this period.

## 2 Progress of technical work and achievements

In the following sections we describe the tasks that were active in the third reporting period, the work that was done as well as the results of the tasks. An overview on all tasks of the project is shown in Figure 1.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46									
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul									
<b>WP1</b>																																																							
Task 1.1	D1.1	D1.2	D1.3			D1.4			D1.5			D1.6			D1.7			D1.8			D1.9			D1.10										D1.12				D1.13				D1.14				D1.15					D1.16				
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**Figure 1: Project plan on the task level for the e-balance project**

The efforts reported in this document do not include any activity realized in the suspension period.

It is important to mention that before the first amendment the most of the numbers on effort plan were based on linear effort allocation over the task duration. Since this does not necessarily express the actual effort allocation, some deviations appear, especially due to the dependencies between different activities, but also

due to internal resource availability changes like vacation or illness. This approach provides the simplest and basic measure to estimate the effort distribution. During the first amendment we have updated the effort plan with numbers provided by the partners. However, some deviations can still be observed after the suspension period, mainly due to changes in the execution plan, unexpected additional efforts and resources availability.

## 2.1 WP2 - Use cases and socio-economic aspects (M1 – M44)

During Y1 in WP2 the use cases were defined and the technical and socio-economic analyses over the use cases, as well as the first user study (survey-based) were done. The aim of this analysis was to ensure proper definition of the overall architecture and features taking into account proper allocation of system components, the correct flow of information etc. In addition, this knowledge helped to identify where and which information is required and whether it needs to be protected against misuse or loss.

The user study involved the second wave as well as the face-to-face interviews with the participants. We used the results of these to evaluate the proposed system in general and against the changes in the users' needs.

We also further deeply elaborated the economic aspects, especially the business concepts that can be realized with the proposed technical solution.

From the user acceptance perspective, the technical and socio-economic aspects are essential for development of appropriate and holistic approach providing security and privacy means. Thus, WP2 defines the socio-economic framework for the technical solution that shall help to enable the willingness and flexibility of the system users.

WP2	Reporting Period: M37-M46											
Participant	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
PM spent in Y1	8.31	2.61	12.05	0.3	9.72	2.30	2.67	27.18	1.21	7.64	2.35	<b>76.34</b>
PM plan for Y1	9.24	2.44	12.07	0.0	9.22	2.22	3.62	28.27	1.22	9.33	2.44	<b>80.09</b>
PM spent in Y2	0.80	1.08	1.25	0.0	0.58	0.75	2.54	11.06	0.32	2.50	1.59	<b>22.47</b>
PM plan for Y2	0.80	1.08	1.25	0.0	0.28	0.70	2.33	11.06	0.32	2.50	1.59	<b>21.91</b>
PM spent in Y3	0.21	2.65	0.00	0.00	0.00	0.00	0.23	5.26	0.00	1.49	0.00	<b>9.84</b>
PM plan for Y3	0.70	0.27	0.80	0.20	0.20	0.20	1.07	4.10	0.05	3.20	0.57	<b>11.36</b>
PM spent in Y4	0.00	2.70	5.10	0.00	1.50	0.05	0.76	8.13	0.00	8.90	0.06	<b>27.20</b>
PM plan for Y4	1.20	0.16	0.80	0.00	0.00	0.00	0.05	3.11	0.00	4.70	0.38	<b>10.40</b>
<b>Total spent</b>	<b>9.32</b>	<b>9.04</b>	<b>18.40</b>	<b>0.30</b>	<b>11.80</b>	<b>3.10</b>	<b>6.20</b>	<b>51.63</b>	<b>1.53</b>	<b>20.53</b>	<b>4.00</b>	<b>135.85</b>
PM plan total	<b>12.00</b>	<b>4.00</b>	<b>15.00</b>	<b>0.0</b>	<b>10.00</b>	<b>3.00</b>	<b>5.00</b>	<b>46.00</b>	<b>2.00</b>	<b>16.20</b>	<b>4.00</b>	<b>117.20</b>

### 2.1.1 The WP2 results in Y4

- Further intensive research towards the validation of the approach in T2.4. Output provided in the deliverable D2.5.
- Fine tune of use cases and business models regarding system and communication specifications. Output provided in the deliverable D2.6.

In the following the tasks are introduced and the accounted work and the results are described briefly.

## 2.1.2 Task 2.4 Validation of the proposed Use Cases and Business Models (M6 – M40)

### Description according to Annex I

In this task the potential users of the proposed solution will be interviewed in order to obtain their early opinions on the e-balance system. These opinions will be contrasted with the users' habits and attitudes towards energy consumption and saving. The goal of this research stage is also to collect the daily experience with the e-balance system in the context of the users' daily behaviours involving energy consumption.

This process is located between the two waves of the user study and includes online questionnaire with test users of the system, face-to-face interviews at the demo sites, diaries concerning daily experience with the system as well as interviews with external experts, e.g., suggested by the consortium or the advisory board. For the demo site users we will also prepare the portal to provide their feedback, so they can get more information and also provide their feedback on the technical and socio-economic aspects of the solution as well as the user interface means (GUI) even before actually using it. Note that the scope of the study includes testing the reactions to the functionalities of the basic use cases which are going to be technically available at the user research start time.

IPI as a leader of this task carries the majority of work efforts in preparation of the studies which aim at validating the proposed use cases and business models. The potential users of the proposed solution should evaluate our early ideas of the e-balance system general concept description, use cases, business models, etc. Such early opinions are very helpful in the early stage of planning, thus IPI concentrated the efforts at preparation of the exploratory usage and attitudes online research, aiming at delivering input for system design based on potential users' requirements and concerns. It is the first stage of planned research process, which will be followed by face to face interviews, online discussion forums as well as individual interviews with experts.

### Work done

- Preparation for and conducting the first stage of user studies in Bronsbergen
- Data analysis from first stage of user studies in Bronsbergen
- Preparation for user studies in Batalha (consultation regarding Use Cases and participants)
- Presentation of the data from first stage of user studies in Bronsbergen on the Review Meeting
- Conducting the second wave of survey in three countries: Poland, Netherlands and Portugal
- Data analysis from the second wave of survey
- Usability audit of the Graphical User Interface of the e-balance system prototype installed in demo-site Bronsbergen
- Conducting the individual In-depth Interviews in Bronsbergen with participants of the e-balance demo-site and analysis of the data from interviews
- Prepared and discussed the research plan for demosites in Bronsbergen and Batalha
- Prepared scenarios for Individual In-Depth Interviews
- Description of potential barriers in e-balance adoption
- All the results are presented in the deliverable D2.5

### The main activities by the partners

<b>EDP (1.3 PMs)</b>	<ul style="list-style-type: none"> <li>• Contribution to social studies questionnaire</li> <li>• Contribution to D2.5 regarding Batalha</li> </ul>
<b>ALLI (0.28 PMs)</b>	<ul style="list-style-type: none"> <li>• Minor market model discussion</li> <li>• Business model support</li> </ul>



	<ul style="list-style-type: none"> <li>• Contribution to business model discussions</li> </ul>
<b>IPI (3.71 PMs)</b>	<ul style="list-style-type: none"> <li>• Preparation for and conducting the first stage of user studies in Bronsbergen</li> <li>• Data analysis from first stage of user studies in Bronsbergen</li> <li>• Preparation for user studies in Bathala (consultation regarding Use Cases and participants)</li> <li>• Preparation for user studies in Bronsbergen</li> <li>• Conducting the second wave of survey in three countries: Poland, Netherlands and Portugal</li> <li>• Data analysis from the second wave of survey</li> <li>• Usability audit of the Graphical User Interface of the e-balance system prototype installed in demo-site Bronsbergen</li> <li>• Conducting the 7 Individual In-depth Interviews in Bronsbergen with participants of the e-balance demo-site and analysis of the data from interviews</li> </ul>

### 2.1.3 Task 2.5 Use Case, Market and Requirements Restatement (M6-M44)

#### Description according to Annex I

During the course of the project, internal Research or Development, as well as external factors may influence the above specifications developed earlier on in the project – for example a new requirement identified, a change in regulation can happen or a business hypothesis prove not to be valid.

#### Work done

Work has been developed in order to fine tune use cases, business models and requirements regarding system and communication specifications. This has been done based on the developments in the project and the further social and economic investigation. This task covered the following activities:

- Use case restatement
- Restatement of the conceptual map according to the use cases' restatement and current system architecture
- Redefinition of the Market model, ownerships and BM overall descriptions
- BCA final analysis and description
- Simulations were performed to validate the business concepts
- Analysis of the changes in law (Polish case)
- Restatement of use cases, requirements and business models
- All the results were presented in the deliverable D2.6

#### The main activities by the partners

<b>INOV (2.7 PMs)</b>	<ul style="list-style-type: none"> <li>• Work on the restatement of the use cases demonstrated in the Batalha pilot with basis on the actual filed deployment</li> <li>• Contribution to deliverable D2.6</li> </ul>
<b>EDP (3.8 PMs)</b>	<ul style="list-style-type: none"> <li>• Use cases restatement</li> <li>• Collection and review of D2.6 contributions</li> </ul>
<b>CEMOSA (1.5 PMs)</b>	<ul style="list-style-type: none"> <li>• Contribution to the business models restatement</li> <li>• Review and restatement of energy balancing requirements according to new energy balancing approach (in WP5)</li> <li>• Restatement of users' requirements related to energy balancing algorithms and use cases thereof</li> </ul>

	<ul style="list-style-type: none"> <li>• Review of business models restatement</li> <li>• Contributions on deliverable D2.6</li> </ul>
<b>UTWE (0.05 PMs)</b>	<ul style="list-style-type: none"> <li>• Verify requirement list</li> </ul>
<b>ALLI (0.48 PMs)</b>	<ul style="list-style-type: none"> <li>• Minor social research discussions</li> <li>• Social research support</li> <li>• Contribution to Bronsbergen social study, planning, execution and review</li> </ul>
<b>IPI (4.42 PMs)</b>	<ul style="list-style-type: none"> <li>• Preparation for second wave of quantitative study in 3 countries – Portugal, Poland, Netherlands</li> <li>• Prepared the questionnaire for the quantitative study</li> <li>• Use case and requirements restatement based on the user study</li> </ul>
<b>LODZ (8.9 PMs)</b>	<ul style="list-style-type: none"> <li>• Collecting and analysis of the materials about the energy market in the Netherlands and Poland, business cases development, cooperation with Żywiecki energy cluster</li> <li>• Cooperation with preparing the questionnaire for CAWI survey mainly according business models issues</li> <li>• Expanded concepts of the flexibility market. In-depth analysis of the relationship between important stakeholders, and how they are integrated into the market, the characteristics of specific business cases/strategy for the energy markets in Poland and in the Netherlands- final state. We were gathering data from spot market to preparing mathematical model of pricing methods and how to develop it in mature models. Risk analysis introduction</li> <li>• Simulation studies of the possible profitability from participation of small prosumers in local balancing on e-balance platform, for Polish energy market conditions. Final state.</li> <li>• Simulation studies of the pricing model for flexible energy product on Dutch market.</li> <li>• Correction, analysis and final preparation of the obtained results of simulation studies for all considered business cases. Preparation of the conclusions and final remarks resulted from the study. Elaboration of the presentation form of simulations results</li> <li>• Final preparation for Business lean canvas analysis chapters and annexes (for deliverable D2.6)</li> </ul>
<b>EFA (0.06 PMs)</b>	<ul style="list-style-type: none"> <li>• Contribution for the evaluation of the use cases definition, as a result of the lessons learnt during the deployment occurred in the previous periods</li> </ul>

#### 2.1.4 Deliverables in WP2 the consortium worked on in Y4

- D2.5 “Validation of the proposed use cases and business models” within Task 2.4 (M6-M40) – submitted on 31.07.2017.

D2.5	Reporting Period: M37-M46												
	Participant	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
PM spent in Y1	0	0	0.50	0	0	0	0	0.31	13.54	0	0.56	0	14.91
PM plan for Y1	0.80	0	0.40	0	0	0	0	0.40	5.60	0	0	0	7.20
PM spent in Y2	0.20	0	0.35	0	0	0	0	0.53	6.64	0	0.16	0	7.88
PM plan for Y2	0.20	0	0.35	0	0	0	0	0.53	6.64	0	0.16	0	7.88
PM spent in Y3	0.21	0	0	0	0	0	0	0.23	3.62	0	0.98	0	5.04
PM plan for Y3	0.30	0	0.30	0.20	0.20	0.20	0.20	1.07	3.35	0	2.70	0	8.32

<b>PM spent in Y4</b>	0	0	1.30	0	0	0	0.28	3.71	0	0	0	<b>5.29</b>
<b>PM plan for Y4</b>	0.20	0	0.10	0	0	0	0.05	1.30	0	1.00	0	<b>2.65</b>
<b>Total spent</b>	<b>0.41</b>	<b>0</b>	<b>2.15</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.35</b>	<b>27.51</b>	<b>0</b>	<b>1.70</b>	<b>0</b>	<b>33.12</b>
<b>PM plan total</b>	<b>1.50</b>	<b>0</b>	<b>0.60</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.65</b>	<b>25.69</b>	<b>0</b>	<b>3.92</b>	<b>0</b>	<b>33.36</b>

This deliverable provides the summary of the obtained feedback during the validation and actions we made, e.g., for the integration of the improvements.

- D2.6 “Restatement of the selection of the representative use cases” within Task 2.5 (M6-M44) – submitted on 15.09.2017.

<b>D2.6</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y1</b>	0.30	0.48	0.15	0	0.60	0	0.01	6.33	0.15	0.32	0.35	<b>8.69</b>
<b>PM plan for Y1</b>	0.44	0.44	0.67	0	0.22	0.22	0.22	2.67	0.22	1.33	0.44	<b>6.89</b>
<b>PM spent in Y2</b>	0.60	1.08	0.90	0	0.58	0.75	2.01	4.42	0.32	2.34	1.59	<b>14.59</b>
<b>PM plan for Y2</b>	0.60	1.08	0.90	0	0.28	0.70	0.99	4.42	0.32	2.10	1.59	<b>12.98</b>
<b>PM spent in Y3</b>	0	2.65	0	0	0	0	0	1.64	0	0.51	0	<b>4.80</b>
<b>PM plan for Y3</b>	0.40	0.27	0.50	0	0	0	0	0.75	0.05	0.50	0.57	<b>3.04</b>
<b>PM spent in Y4</b>	0	2.70	2.00	0	1.50	0.05	0.48	4.42	0	8.90	0.06	<b>21.91</b>
<b>PM plan for Y4</b>	1.00	0.16	0.70	0	0	0	0	1.81	0	3.70	0.38	<b>7.75</b>
<b>Total spent</b>	<b>0.90</b>	<b>6.91</b>	<b>4.85</b>	<b>0</b>	<b>2.68</b>	<b>0.80</b>	<b>2.50</b>	<b>16.81</b>	<b>0.47</b>	<b>12.07</b>	<b>2.00</b>	<b>49.99</b>
<b>PM plan total</b>	<b>2.19</b>	<b>1.87</b>	<b>3.00</b>	<b>0</b>	<b>0.88</b>	<b>0.70</b>	<b>1.00</b>	<b>12.00</b>	<b>0.94</b>	<b>4.62</b>	<b>2.00</b>	<b>29.20</b>

This deliverable provides an evaluation of the use case definitions, as well as the requirement and business analyses done in the initial phase of the project and reasoning for the needed adaptations as lessons learnt during the integration and testing phase.

## Deviations

The overall difference of the effort planned and actually spent in Y4 for all activities in the work package WP2 is large, because in the current reporting period we focused on finalizing and extending the concepts from WP2. The total efforts spent for WP2 in the whole project lifetime are about 16% above the originally planned number.

There are only three partners that have not overspent the planned effort (IHP, LW and EFA). All the other partners have overspent their planned PM efforts. However, the overspending is rather small in most of the cases and only INOV overspent by 125% the planned effort. Other partners spent less than 30% more than planned for this WP. This overspending was due to the fact that all these partners were very active with restatements of the market models and use cases.

## 2.2 WP3 – System specification (M1 – M44)

The goal of this work package is to develop a blueprint for building energy management systems that allow for balancing energy production and consumption on very local basis. In order to achieve this goal the needed components will be identified and specified. In addition the data flow between the components and the required features are defined, based on the results of WP2. WP3 defines the technical framework (identifies modules and defines interfaces between them) for WP4, WP5 and WP6. After evaluating the

interaction of the components in early integrations in these work packages, the architecture was refined gradually to ensure quality and consistency between the concept and the implementations and to guarantee that the architecture can be re-used by other projects or in case of commercial exploitation.

In the current reporting period we focused on restatement activities.

<b>WP3</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y1</b>	5.96	5.14	3.10	5.40	0.40	3.80	1.00	3.35	5.20	0.47	3.51	<b>37.33</b>
<b>PM plan for Y1</b>	5.50	4.50	3.34	5.20	2.40	4.60	1.80	7.00	5.20	3.00	5.60	<b>48.14</b>
<b>PM spent in Y2</b>	3.00	1.89	0.60	5.38	2.60	2.10	0.55	5.09	1.57	0.23	2.49	<b>25.50</b>
<b>PM plan for Y2</b>	1.08	1.00	1.40	3.70	3.00	2.20	1.16	4.60	1.18	0.40	4.11	<b>23.83</b>
<b>PM spent in Y3</b>	0.30	3.11	0.00	0.00	0.00	0.10	0.00	2.18	0.00	1.11	0.10	<b>6.90</b>
<b>PM plan for Y3</b>	1.00	0.70	0.30	0.00	0.00	0.40	0.16	3.40	0.10	0.80	0.46	<b>7.32</b>
<b>PM spent in Y4</b>	0.36	2.35	0.00	0.00	0.00	0.20	0.00	4.53	0.00	0.00	1.34	<b>8.78</b>
<b>PM plan for Y4</b>	1.50	0.30	0.60	0.00	0.00	0.60	0.24	5.46	0.00	0.50	0.54	<b>9.74</b>
<b>Total spent</b>	<b>9.62</b>	<b>12.49</b>	<b>3.70</b>	<b>10.78</b>	<b>3.00</b>	<b>6.20</b>	<b>1.55</b>	<b>15.15</b>	<b>6.77</b>	<b>1.81</b>	<b>7.44</b>	<b>78.51</b>
<b>PM plan total</b>	<b>9.00</b>	<b>6.00</b>	<b>4.70</b>	<b>6.50</b>	<b>3.00</b>	<b>7.00</b>	<b>3.00</b>	<b>19.00</b>	<b>8.00</b>	<b>1.80</b>	<b>8.50</b>	<b>76.50</b>

### 2.2.1 The WP3 results in Y4

Focus in the current reporting period was on work towards the restatement of the system architecture specification in Task 3.3

In the following the tasks are introduced and the accounted work and the results are described briefly.

### 2.2.2 Task 3.3 Architecture and Specification Restatement (M15 – M44)

#### Description according to Annex I

During the course of the project, internal research or development, as well as external factors may influence the above architecture and specifications. Thus this task provides time for end-project activity to ensure a final iteration in which deliverables will be updated to ensure synchronicity with the factual final results for wider publishing. In addition practical aspects i.e. those that have impact on deployment will be emphasized where ever possible. To reflect that the lead is taken by an industrial partner.

#### Work done

The activities towards the restatement of the technical specification were performed. In the previous reporting period they were mainly from the social perspective, while in the current reporting period they were mainly based on the experience and observations collected while working on the technical system and demonstrators.

During this reporting period in this work package the partners were active in the restatement of the system specification due to the feedback from different areas (technical and socioeconomic). The technical aspects were covered by IHP, INOV, UTWE and EFA, while the non-technical were covered by IPI.

## The main activities of the partners

<b>IHP (0.36 PMs)</b>	<ul style="list-style-type: none"> <li>Contributions to the system architecture restatement deliverable D3.3</li> </ul>
<b>INOV (2.35 PMs)</b>	<ul style="list-style-type: none"> <li>Work on the restatement of the system architecture having in view feedback experience from the deployment done in the Batalha pilot</li> <li>Contribution to deliverable D3.3</li> </ul>
<b>UTWE (0.2 PMs)</b>	<ul style="list-style-type: none"> <li>Start restatement architecture</li> </ul>
<b>IPI (4.53 PMs)</b>	<ul style="list-style-type: none"> <li>Consultations with partners regarding restatement of the system architecture specification on the basis of the results of user studies</li> </ul>
<b>EFA (1.34 PMs)</b>	<ul style="list-style-type: none"> <li>Assessment of the restatement method to be carried out in WP3 with other WPs.</li> <li>Restatement of the deployed system architecture and features, as compared to the initial architecture and specifications</li> <li>Editing and publishing of the deliverable D3.3</li> </ul>

### 2.2.3 Deliverables in WP3 the consortium worked on in Y4

- D3.3 “Restatement of the system architecture specification” within Task 3.3 (M15-M44) – submitted on 22.07.2017.

<b>D3.3</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y2</b>	0	0	0	0	0	0	0	5.09	0.23	0	1.49	<b>6.81</b>
<b>PM plan for Y2</b>	0.60	0.20	0.20	0	0	0.40	0.20	4.60	0.40	0.40	0.80	<b>7.80</b>
<b>PM spent in Y3</b>	0.30	3.11	0	0	0	0.10	0	2.18	0	1.11	0.10	<b>6.90</b>
<b>PM plan for Y3</b>	1.00	0.70	0.30	0	0	0.40	0.16	3.40	0.10	0.80	0.46	<b>7.32</b>
<b>PM spent in Y4</b>	0.36	2.35	0	0	0	0.2	0	4.53	0	0	1.34	<b>8.78</b>
<b>PM plan for Y4</b>	1.50	0.30	0.60	0	0	0.60	0.24	5.46	0	0.50	0.54	<b>9.74</b>
<b>Total spent</b>	<b>0.66</b>	<b>5.46</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.30</b>	<b>0</b>	<b>11.80</b>	<b>0.23</b>	<b>1.11</b>	<b>2.93</b>	<b>22.49</b>
<b>PM plan total</b>	<b>3.00</b>	<b>1.00</b>	<b>1.00</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>1.00</b>	<b>10.00</b>	<b>2.00</b>	<b>0.80</b>	<b>2.00</b>	<b>22.80</b>

This deliverable restates the detailed technical specification of the entire system covering the all system levels and the interaction between the different grid levels.

### Deviations

The overall effort spent in WP3 is only 2 PM above the planned total effort for the whole project duration, while for the current reporting period it is slightly below the plan. There was a slight reshuffling of the effort between the partners. Several partners spent more effort than planned (IHP – 15%, INOV – 108% and UMA – 66%), while the other partners spent less effort than planned.

The total effort spent to complete the deliverable D3.3 was almost exactly as planned.

## 2.3 WP4 – Communication Platform (M3 – M44)

WP4 is devoted to the development of the communication platform. In this work package, the modules for the communication layer of the system architecture were chosen, adapted and integrated into a common communication platform. Its tasks cover all the levels of the energy grid, i.e., communication with individual home appliances but also communication between higher level management units.

The primary objectives and goals of this work package in the current reporting period were focusing on the restatement of the defined modules.

<b>WP4</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y1</b>	4.58	4.55	1.65	11.50	0	2.4	0	0	4.60	0	1.92	<b>31.20</b>
<b>PM plan for Y1</b>	9.45	4.56	2.09	8.89	0.59	4.76	0	0	4.69	0	3.40	<b>38.44</b>
<b>PM spent in Y2</b>	6.95	7.52	1.70	5.30	1.00	8.42	0	0	5.59	0	5.40	<b>41.88</b>
<b>PM plan for Y2</b>	12.52	5.65	2.25	6.10	1.20	8.10	0	0	4.70	0	4.38	<b>44.90</b>
<b>PM spent in Y3</b>	1.20	5.25	0.60	7.53	0	1.00	0	0	0	0	0.29	<b>15.87</b>
<b>PM plan for Y3</b>	1.76	0.70	0.90	3.50	0.20	1.20	0	0	0.15	0	0.42	<b>8.83</b>
<b>PM spent in Y4</b>	4.06	2.80	0	6.76	0	1.33	0	0	0	0	0.18	<b>15.13</b>
<b>PM plan for Y4</b>	3.00	0.30	0.35	1.50	0.50	1.80	0	0	0	0	0.49	<b>7.94</b>
<b>Total spent</b>	<b>16.79</b>	<b>20.12</b>	<b>3.95</b>	<b>31.09</b>	<b>1.00</b>	<b>13.15</b>	<b>0</b>	<b>0</b>	<b>10.19</b>	<b>0</b>	<b>7.79</b>	<b>104.08</b>
<b>PM plan total</b>	<b>21.00</b>	<b>11.00</b>	<b>4.70</b>	<b>20.00</b>	<b>2.00</b>	<b>14.00</b>	<b>0</b>	<b>0</b>	<b>11.00</b>	<b>0</b>	<b>8.00</b>	<b>91.70</b>

### 2.3.1 The WP4 results in Y4

The focus of the work package in the current reporting period was on the restatement of the communication platform. This includes redefinition and reimplementing of some modules, but also revision of some chosen concepts due to the experience gained in the course of the project.

In the following the tasks are introduced and the accounted work and the results are described briefly.

### 2.3.2 Task 4.5 Communication Platform Restatement (M12 – M44)

#### Description according to Annex I

During the course of the project, internal research or development, as well as external factors may influence the above architecture and specifications. Thus this task provides time for end-project activity to ensure a final iteration in which deliverables will be updated to ensure synchronicity with the factual final results for wider publishing.

#### Work done

After closing the other tasks in the WP4 and during the integration of the communication platform with the energy management platform (WP5) we realized that some additional adaptations were necessary in the middleware implementation and definition. Thus, in this task we had to realize these changes (restatement) to the communication platform.

#### The main activities of the partners

- |                       |  |
|-----------------------|--|
| <b>IHP (4.06 PMs)</b> | <ul style="list-style-type: none"> <li>• Activities related to the analysis of the current form of the e-balance middleware and communication platform</li> <li>• Revising the communication platform implementation,</li> <li>• Providing new versions of the management unit applications with the required features</li> <li>• Implementation of the device drivers for the smart appliances and inverters</li> <li>• Contributions and editing the deliverable D4.5</li> </ul> |
|-----------------------|--|

<b>INOV (2.80 PMs)</b>	<ul style="list-style-type: none"> <li>• Work on the restatement of the communication platform reflecting the experience gained in the wireless sensor communications from the Batalha deployment</li> <li>• Work on the restatement of the communication platform considering the experience obtained with the deployment of communications in Batalha</li> <li>• Restatement of the communication platform specification. Contribution to D4.5</li> </ul>
<b>UMA (6.76 PMs)</b>	<ul style="list-style-type: none"> <li>• Communication platform restatement – memory leak investigation</li> <li>• Middleware improvement to cope with new requirements</li> <li>• Performance testing of the middleware</li> <li>• Bug fixing</li> <li>• Implementation of new functionalities of the middleware</li> </ul>
<b>UTWE (1.33 PMs)</b>	<ul style="list-style-type: none"> <li>• Start restatement communication platform</li> <li>• Restatement communication with appliances (shift from Miele to Whirlpool)</li> </ul>
<b>EFA (0.18 PMs)</b>	<ul style="list-style-type: none"> <li>• Assessment of the communications features implementation and related architecture deployed in the Batalha demonstrator, as a result of the lessons learnt during the deployment occurred in the previous periods</li> </ul>

### 2.3.3 Deliverables in WP4 the consortium worked on in Y4

- D4.5 “Restatement of the communication platform specification” within Task 4.5 (M12-M44) – submitted on 31.07.2017

D4.5	Reporting Period: M37-M46												
	Participant	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
PM spent in Y1	0	0	0	0	0	0	0	0	0	0.01	0	0	<b>0.01</b>
PM plan for Y1	0.10	0.03	0.03	0.10	0.03	0.13	0	0	0.07	0	0.07		<b>0.60</b>
PM spent in Y2	0	0	0	0	0	0	0	0	1.71	0	0		<b>1.71</b>
PM plan for Y2	0.10	0.20	0.20	0.30	0.20	0.50	0	0	0.30	0	0.30		<b>2.10</b>
PM spent in Y3	0.94	2.65	0	2.74	0	0	0	0	0	0	0.29		<b>6.62</b>
PM plan for Y3	1.00	0.70	0.20	3.50	0.20	1.20	0	0	0.15	0	0.42		<b>9.98</b>
PM spent in Y4	4.06	2.80	0	6.76	0	1.85	0	0	0	0	0.18		<b>15.13</b>
PM plan for Y4	3.00	0.30	0.35	1.50	0.50	1.80	0	0	0	0	0.49		<b>7.94</b>
<b>Total spent</b>	<b>5.00</b>	<b>5.45</b>	<b>0</b>	<b>9.50</b>	<b>0</b>	<b>1.85</b>	<b>0</b>	<b>0</b>	<b>1.72</b>	<b>0</b>	<b>0.47</b>		<b>23.47</b>
<b>PM plan total</b>	<b>3.00</b>	<b>1.00</b>	<b>1.00</b>	<b>3.00</b>	<b>1.00</b>	<b>4.00</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>0</b>	<b>2.00</b>		<b>17.00</b>

This deliverable provides an evaluation of the technical specification of the communication platform components and reasoning for needed adaptations as lessons learnt during the integration and testing phase.

### Deviations

The total effort spent in WP4 in current reporting period exceeds the plan by about 100%, but for the whole project duration, including the current reporting period it is only about 14% higher than the initial plan. Most of the partners active in the current reporting period were involved in the reanalysis and sometimes re-implementation of their respective modules for the communication platform and contributing to the deliverable D4.5, describing these changes.

The effort related to the restatement was quite high, thus in the current reporting period most of the active partners spent more effort than was planned. However, in the total, for the whole project duration only INOV and UMA overspent their planned efforts. The finalized deliverable D4.5 had an overspending of about 40%. The effort related to the restatement was also related to the changes needed in the communication platform related to the integration activities in WP6.

The reason for the quite big overspending by UMA and INOV is explained in Section 3.4.

## 2.4 WP5 – Energy Management Platform (M3 – M44)

In this work package we have developed the different modules in the energy management platform of the e-balance architecture that was defined in WP3. Also, we have developed various models that allow us to validate the designed algorithms in an early stage of the developments.

All these parts were separately developed and tested, and finally integrated together with the communication platform, developed in WP4, into the various management units of the e-balance system.

WP5	Reporting Period: M37-M46											
Participant	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
PM spent in Y1	3.15	3.93	1.95	1.80	2.15	9.00	0.19	8.93	7.75	0	3.28	<b>42.13</b>
PM plan for Y1	6.90	4.44	3.52	8.71	6.27	11.41	0.56	6.43	7.78	0	11.94	<b>67.94</b>
PM spent in Y2	4.90	3.38	3.05	9.40	6.85	10.32	1.01	2.15	6.86	0	24.64	<b>72.56</b>
PM plan for Y2	9.09	5.57	3.65	11.42	8.25	10.30	0.87	2.01	5.55	0	18.72	<b>75.43</b>
PM spent in Y3	2.08	0.57	1.40	6.95	2.90	2.00	0	1.10	0	0	0.70	<b>17.70</b>
PM plan for Y3	1.70	0.50	0.10	1.95	2.00	2.40	0	1.60	0	0	1.20	<b>11.45</b>
PM spent in Y4	4.95	0	0	8.48	9.83	1.87	0	3.06	0	0	0.10	<b>28.29</b>
PM plan for Y4	3.00	0	0	0.40	1.50	0.60	0	2.52	0	0	0.94	<b>8.96</b>
<b>Total spent</b>	<b>15.08</b>	<b>7.88</b>	<b>6.40</b>	<b>26.63</b>	<b>21.73</b>	<b>23.19</b>	<b>1.20</b>	<b>15.24</b>	<b>14.61</b>	<b>0</b>	<b>28.72</b>	<b>160.68</b>
<b>PM plan total</b>	<b>14.00</b>	<b>9.00</b>	<b>5.60</b>	<b>16.50</b>	<b>14.00</b>	<b>22.00</b>	<b>1.00</b>	<b>16.00</b>	<b>14.00</b>	<b>0</b>	<b>26.50</b>	<b>138.60</b>

### 2.4.1 The WP5 results in Y4

In the current reporting period the focus was on the restatement of the energy management platform. So changes needed or suggested by the experience we gained in the course of the testing and integration of the demonstrators.

In the following the tasks are introduced and the accounted work and the results are described briefly.

### 2.4.2 Task 5.6 Energy Management Platform Restatement and Revision of the System Models (M12 – M44)

#### Description according to Annex I

In order to provide very accurate system models, developed in Task 5.1, for future research and the community, in this task the system models will be revisited after feedback from the integration and evaluation tasks in WP6.



## Work done

After closing the other tasks in the WP5 and during the integration of the energy management platform with the communication platform (WP4) we realized that some additional adaptations were necessary in the applied modules and definition. Thus, in this task we had to realize these changes (restatement) to the energy management platform and also to the models developed in Task T5.1.

## The main activities of the partners

<b>IHP (4.95 PMs)</b>	<ul style="list-style-type: none"> <li>• Analysis of the current form of the energy management platform</li> <li>• Analysis of the energy balancing module based on the sources received from UTWE on 5.12 (the wrong version) and on the 19.12 (the right version)</li> <li>• Revising the energy management platform implementation</li> <li>• Providing new versions of the management unit applications with the required features</li> <li>• Bug fixing</li> <li>• Implementation of the restated modules</li> <li>• Editing and contributions to the D5.6 deliverable</li> </ul>
<b>UMA (8.48 PMs)</b>	<ul style="list-style-type: none"> <li>• Setup of virtual machines for CMUs for the tests of the Management Platform</li> <li>• Development and integration of the new balancing algorithm</li> <li>• Bug fixing</li> </ul>
<b>CEMOSA (9.83 PMs)</b>	<ul style="list-style-type: none"> <li>• Research, design and implementation of energy balancing algorithms (local and demo-site algorithms that allow rescheduling smart-appliances for the best suitable time) including simplification of the steering energy profile negotiation procedure as alternative approach</li> <li>• Contributions and reviewing of deliverable D5.6</li> </ul>
<b>UTWE (1.87 PMs)</b>	<ul style="list-style-type: none"> <li>• Initial restatement of energy management platform</li> <li>• Extension of resilience models</li> </ul>
<b>IPI (3.06 PMs)</b>	<ul style="list-style-type: none"> <li>• Consultations with partners regarding restatement and revision of system models</li> <li>• Reanalysis of prediction model fit errors at the household level</li> <li>• Tests of prediction methods alternative to the single Artificial Neural Network (ANN) approach: Distributed Random Forest (DRF) and Gradient Boosting Machines (GBM)</li> </ul>
<b>EFA (0.1 PMs)</b>	<ul style="list-style-type: none"> <li>• Work on the restatement of the energy management platform. Assessment of lessons learnt during the integration phase of the LVGMU and MVGMU, focused on the grid resilience algorithms</li> </ul>

### 2.4.3 Deliverables in WP5 the consortium worked on in Y4

- D5.6 “Restatement of the energy management platform specification and revision of the system models” within Task 5.6 (M12-M44) – submitted on 31.07.2017.

<b>D5.6</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y1</b>	0	0	0	0	0	0	0	0.08	0	0	0	<b>0.08</b>
<b>PM plan for Y1</b>	0.07	0	0	0.07	0.10	0.10	0	0.28	0	0	0.14	<b>0.76</b>
<b>PM spent in Y2</b>	0	0	0	0	0	0	0	2.14	0.50	0	0.88	<b>3.52</b>
<b>PM plan for Y2</b>	0.10	0	0	0.30	0.30	0.30	0	2.00	0.30	0	0.50	<b>3.80</b>
<b>PM spent in Y3</b>	0	0	0	0	0	0	0	1.10	0	0	0.70	<b>1.8</b>
<b>PM plan for Y3</b>	0	0	0	0.20	1.00	0.60	0	1.60	0	0	1.20	<b>4.60</b>

<b>PM spent in Y4</b>	4.95	0	0	8.48	9.83	1.87	0	3.06	0	0	0.10	<b>28.29</b>
<b>PM plan for Y4</b>	3.00	0	0	0.40	1.50	0.60	0	2.52	0	0	0.94	<b>8.96</b>
<b>Total spent</b>	<b>4.95</b>	<b>0</b>	<b>0</b>	<b>8.48</b>	<b>9.83</b>	<b>1.87</b>	<b>0</b>	<b>6.38</b>	<b>0.50</b>	<b>0</b>	<b>1.68</b>	<b>33.69</b>
<b>PM plan total</b>	<b>1.86</b>	<b>0</b>	<b>0</b>	<b>2.00</b>	<b>3.00</b>	<b>3.00</b>	<b>0</b>	<b>7.14</b>	<b>1.00</b>	<b>0</b>	<b>5.00</b>	<b>23.00</b>

This deliverable provides an evaluation of the technical specification of the energy management platform components as well as of the defined system models and reasoning for needed adaptations as lessons learnt during the integration and testing phase.

## Deviations

The total effort spent in WP5 in current reporting period exceeds the plan by about 200%, but for the whole project duration, including the current reporting period it is only about 16% higher than the initial plan. Most of the partners active in the current reporting period were involved in the reanalysis and sometimes re-implementation of their respective modules for the communication platform and contributing to the deliverable D5.6, describing these changes.

The effort related to the restatement was quite high, thus in the current reporting period most of the active partners spent more effort than planned (IHP, UMA, CEMOSA, UTWE, IPI). However, in the total, for the whole project duration only UMA and CEMOSA overspent their planned efforts very much. This overspending was caused by the necessary changes and restatement in the energy management platform related to the integration activities in WP6. The finalized deliverable D5.6 had an overspending of about 46%.

The reason for the quite big overspending by UMA and INOV is explained in Section 3.4.

## 2.5 WP6 – System Integration and Evaluation (M12 – M45)

In this work package we defined and integrated the demonstrators, validated and evaluated the results. The experience gained from the early integration in the laboratory helped in the adaptation of the detailed specifications and the implementations done in WP4 and WP5 and was also provided back to WP2 and WP3 in order to ensure the compliance of the system specification with the final implementation.

The solutions researched and developed in the WP4 and WP5 were integrated into real life demonstrators using the premises of EDP and Alliander in Portugal and Bronsbergen in the Netherlands, respectively. The demonstrator in Portugal is focused on the management and control part in the distribution network – energy resilience service. The demonstrator in Bronsbergen focuses on the building automation and related energy management issues – the energy balancing service, but also on security and privacy. The means for energy production of renewable energy are available to the consortium in Bronsbergen. The evaluation was done on the basis of the use cases specified in WP2.

<b>WP6</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y1</b>	0.20	0.73	0.90	0	0	0.20	0.75	0	0.13	0	0.50	<b>3.41</b>
<b>PM plan for Y1</b>	0.80	1.00	0.87	1.07	0.27	1.27	0.53	0	0.13	0	0.93	<b>6.87</b>
<b>PM spent in Y2</b>	4.81	10.17	6.60	4.92	0.95	5.50	3.83	0	1.60	0	9.22	<b>47.60</b>
<b>PM plan for Y2</b>	5.00	9.77	6.60	8.50	1.90	10.80	3.95	0	1.50	0	11.50	<b>59.52</b>
<b>PM spent in Y3</b>	3.72	8.81	6.95	7.91	2.32	11.62	5.73	0	0	0	7.66	<b>54.72</b>
<b>PM plan for Y3</b>	4.23	4.90	3.98	7.70	1.90	8.00	3.37	0	0.27	0	6.20	<b>40.55</b>

<b>PM spent in Y4</b>	8.54	6.94	9.55	12.54	1.03	6.00	6.48	0	0	0	1.33	<b>52.41</b>
<b>PM plan for Y4</b>	3.00	1.20	2.10	3.30	1.30	6.00	1.37	0	0	0	0	<b>18.27</b>
<b>Total spent</b>	17.27	26.65	24.00	25.37	4.30	23.32	16.79	0	1.73	0	18.71	<b>158.14</b>
<b>PM plan total</b>	<b>16.00</b>	<b>18.00</b>	<b>14.00</b>	<b>16.00</b>	<b>5.00</b>	<b>17.00</b>	<b>9.00</b>	<b>0</b>	<b>2.00</b>	<b>0</b>	<b>19.00</b>	<b>116.00</b>

### 2.5.1 The WP6 results in Y4

The WP6 was the major work package of the reporting period, the integration of the units for the Batalha and Bronsbergen demonstrators was accomplished and the demonstrators were deployed. After that we performed the evaluation of the e-balance system in both demo sites.

In the following the tasks are introduced and the accounted work and the results are described briefly.

#### 2.5.2 Task 6.2 Integration and set-up of the prototypes (M12 – M26)

##### Description according to Annex I

In this task the individual prototypes were integrated and evaluated. The integrated platform incorporates all the layers used in the individual prototypes, the communication platform, management platform and the specific underlying grid hardware.

##### Work done

The task started in M12, and was about to finish in M26. In this task, the work done in WP4 (Communication Platform) and in WP5 (Energy Management Platform) was integrated for the different units that were deployed in the demonstrators. The results are presented in the deliverable D6.2.

Following the e-balance architecture defined in D3.1 and D3.2, it was concluded that the following units should be integrated for the two life-demonstrators: Medium Voltage Grid Management Unit (MVG MU), Low Voltage Grid Management Unit (LVGMU), Customer Management Unit (CMU) and Sensor units. Due to the different characteristics of each of the demonstrators the integration of these units is different for each of the demonstrators. Each unit integrates the developed communication (WP4) and energy management (WP5) platforms as appropriate in each case. The integration work was completed for each of the units during the reported period. In the following some details of the integration of each unit are given.

The MVGMU and the LVGMU for Bronsbergen are both realized in Virtual Machines located at the Alllander Server Center. The CMU for Bronsbergen is based on a Beaglebone board. In Bronsbergen, the available smart meters are used as sensor units – they measure the energy produced and consumed by each cottage. The smart appliances and controllable inverters are used to perform the energy balancing.

The LVGMU for Batalha is based on an embedded PC plus a GSmart equipment from Efacec. The MVGMU and the TLGMU are both workstations virtualized at the Efacec data centre. These management units integrate different types of application software for the distinct use cases.

For the IHP in-lab demo, the building blocks of the grid emulator were defined and developed. On top of the grid emulator we deploy the e-balance devices (management units). The focus has been put on the real life demonstrators.

The main activities of the partners

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<b>IHP (7.42 PMs)</b>	<ul style="list-style-type: none"> <li>• Analysis of the implementation provided by UTWE</li> <li>• Integration and testing of the Bronsbergen demonstrator components</li> <li>• Integration and testing of the communication platform and energy management platform for the Bronsbergen prototype</li> <li>• Contribution and editing of the deliverable D6.2</li> </ul>
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<b>INOV (1.0 PMs)</b>	<ul style="list-style-type: none"> <li>• Integration work in the Batalha demonstrator</li> <li>• Preparation of the demonstration for the project review in December 2016</li> <li>• Leadership of WP6 and T6.2</li> </ul>
<b>EDP (0.05 PMs)</b>	<ul style="list-style-type: none"> <li>• Deliverable D6.2 document review</li> </ul>
<b>UMA (2.59 PMs)</b>	<ul style="list-style-type: none"> <li>• GUI implementation and modifications for the Bronsbergen demonstrator</li> <li>• Performance testing of the middleware and the GUI</li> <li>• Bug fixing</li> <li>• Contributions to deliverable D6.2</li> </ul>
<b>CEMOSA (0.6 PMs)</b>	<ul style="list-style-type: none"> <li>• Monitoring of integration issues in Bronsbergen demo (middleware, GUI and CMU).</li> <li>• Review preparation and periodic on-line meetings</li> </ul>
<b>UTWE (5.8 PMs)</b>	<ul style="list-style-type: none"> <li>• Integration work</li> </ul>
<b>ALLI (0.27 PM)</b>	<ul style="list-style-type: none"> <li>• Integration support (CMU testing &amp; xxGMU IT department support)</li> </ul>

### 2.5.3 Task 6.3 Deployment of the demonstrators (M22 – M33)

#### Description according to Annex I

In this task the demonstrators were deployed in the real life demonstrator sites. These are the Alliander microgrid in Bronsbergen, the Netherlands, and the EDP Smart Grid in Portugal. These environments allowed us to test and evaluate chosen scenarios, but they also give us the possibility to observe and record the real world behaviour together with the complete set of real world situations that can be experienced.

#### Work done

This task started in M22 and was planned to end in M33. After the site surveys and creating the list of materials we planned the setup and deployed both the demonstrators. The results are presented in deliverable D6.3.

#### The main activities of the partners

<b>INOV (4.0 PMs)</b>	<ul style="list-style-type: none"> <li>• Deployment work in the Batalha demonstrator</li> <li>• Preparation of the demonstration for the project review in December 2016</li> <li>• Leadership of WP6</li> <li>• Field tests in the Batalha demonstrator</li> <li>• Contribution to the validation and evaluation of the Batalha demonstrator results</li> <li>• Contributions to deliverable D6.3</li> </ul>
<b>EDP (6.0 PMs)</b>	<ul style="list-style-type: none"> <li>• Deployment the solution on Batalha demonstrator</li> <li>• Contributions to the deliverable D6.3</li> </ul>
<b>UMA (4.95 PMs)</b>	<ul style="list-style-type: none"> <li>• In-lab and deployment testing</li> <li>• GUI modifications</li> <li>• GUI deployment and testing</li> <li>• Contributions to the deliverable D6.3</li> </ul>
<b>UTWE (0.2 PMs)</b>	<ul style="list-style-type: none"> <li>• Support deployment – On-site and remote support at Alliander cottage deployment</li> </ul>
<b>ALLI (5.73 PM)</b>	<ul style="list-style-type: none"> <li>• Pre-rollout of CMUs and xxGMUs testing and support, smart appliance acquisition, roll-out support and administration</li> <li>• Field testing of the CMU design, updating CMUs pre-rollout, participant contacts</li> <li>• Contribution to and review of deliverable D6.3</li> <li>• Bronsbergen demonstrator roll-out activities</li> <li>• Bronsbergen demonstrator management and participant support activities</li> </ul>

## 2.5.4 Task 6.4 Validation and evaluation of the results (M26 – M45)

### Description according to Annex I

This task evaluates the behaviour exposed by the demonstrators, according to the expected one described by the test cards, defined in Task T6.1 and to the functionalities identified in the use cases. The results were examined by the technical staff of the owners of the infrastructures in collaboration with the project participants.

An evaluation of the results from the infrastructure owners' point of view regarding the future deployment of the developed algorithms and technologies in their infrastructures was also done.

### Work done

This task started in M26 and was about to end in M45. The major activities were:

- Validation and evaluation of the Batalha deployment – completed and reported in D6.4.
- Validation and evaluation of the Bronsbergen deployment – completed and reported in D6.4.

### The main activities of the partners

<b>IHP (1.12 PMs)</b>	<ul style="list-style-type: none"> <li>• Evaluation of the results obtained from the Bronsbergen demonstrator</li> <li>• Contribution and editing of the deliverable D6.4</li> </ul>
<b>INOV (1.94 PMs)</b>	<ul style="list-style-type: none"> <li>• Field tests in the Batalha demonstrator</li> <li>• Leadership of WP6 and T6.4</li> <li>• Contribution to the validation and evaluation of the Batalha demonstrator results</li> <li>• Contributions to deliverable D6.4</li> </ul>
<b>EDP (3.5 PMs)</b>	<ul style="list-style-type: none"> <li>• Data collection and analysis from demo for evaluation</li> </ul>
<b>UMA (5.0 PMs)</b>	<ul style="list-style-type: none"> <li>• Data collection and evaluation</li> <li>• Deployment testing</li> <li>• GUI evaluation</li> <li>• Contributions to deliverable D6.4</li> </ul>
<b>CEMOSA (0.43 PMs)</b>	<ul style="list-style-type: none"> <li>• Restatement of use cases related to deliverable D6.1</li> <li>• Contributions to the deliverable D6.4 regarding validation of Bronsbergen demonstrator</li> </ul>
<b>ALLI (0.48 PMs)</b>	<ul style="list-style-type: none"> <li>• Contribution to and review of D6.4 and related activities</li> </ul>
<b>EFA (1.33 PMs)</b>	<ul style="list-style-type: none"> <li>• A cross check was performed regarding the main purpose described in WP2's use cases and on the integration tests proposed in WP5</li> <li>• Assessment of the results regarding the LVGMU and the sensors deployment at the Batalha demonstrator, comprising the existing infrastructure for smart metering.</li> <li>• Assessment of the results regarding the MVGMU deployed at the selected data centre.</li> <li>• Assessment of the results regarding the TLGMU deployed at the selected data centre</li> <li>• Contributions for the editing of deliverable D6.4, comprising contents for the Batalha demonstrator and for the overall document review</li> </ul>

## 2.5.5 Deliverables in WP6 the consortium worked on in Y4

- D6.2 “Integration of the prototypes” within Task 6.2 (M13-M26) – updated version submitted on 18.07.2017.

<b>D6.2</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
PM spent in Y1	0	0	0	0	0	0	0	0	0.13	0	0	<b>0.13</b>
PM plan for Y1	0.20	0.60	0.27	0.27	0.07	0.47	0.13	0	0.13	0	0.53	<b>2.67</b>
PM spent in Y2	1.86	6.87	2.10	2.56	0.30	1.70	1.28	0	1.60	0	7.00	<b>25.27</b>
PM plan for Y2	2.00	7.00	3.00	3.00	0.50	5.00	1.50	0	1.50	0	6.50	<b>30.00</b>
PM spent in Y3	3.59	8.81	2.45	7.91	2.32	10.22	2.74	0	0	0	1.00	<b>39.04</b>
PM plan for Y3	2.00	3.10	1.98	4.00	0.85	3.00	1.10	0	0.27	0	1.10	<b>17.40</b>
PM spent in Y4	7.42	1.00	0.05	2.59	0.60	5.80	0.27	0	0	0	0	<b>17.73</b>
PM plan for Y4	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>Total spent</b>	<b>12.87</b>	<b>16.68</b>	<b>4.60</b>	<b>13.06</b>	<b>3.22</b>	<b>17.72</b>	<b>4.29</b>	<b>0</b>	<b>1.73</b>	<b>0</b>	<b>8.00</b>	<b>82.17</b>
PM plan total	<b>3.00</b>	<b>9.00</b>	<b>4.00</b>	<b>4.00</b>	<b>1.00</b>	<b>7.00</b>	<b>2.00</b>	<b>0</b>	<b>2.00</b>	<b>0</b>	<b>8.00</b>	<b>40.00</b>

This deliverable describes the actions taken for the prototype integration and results of the integration.

- D6.3 “Deployment of the demonstrators” within Task 6.3 (M22-M33) – updated version submitted on 31.07.2017.

<b>D6.3</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
PM spent in Y2	0.09	0	1.00	0	0	0	0.26	0	0	0	0	<b>1.35</b>
PM plan for Y2	0.20	1.50	1.50	1.50	0.40	2.00	1.20	0	0	0	3.50	<b>11.80</b>
PM spent in Y3	0.13	0	4.50	0	0	1.30	2.99	0	0	0	6.66	<b>15.58</b>
PM plan for Y3	1.23	1.10	1.15	1.50	0.45	3.00	1.68	0	0	0	5.10	<b>15.21</b>
PM spent in Y4	0	4.00	6.00	4.95	0	0.20	5.73	0	0	0	0	<b>20.88</b>
PM plan for Y4	0	0	0	0	0	0	0	0	0	0	0	<b>0</b>
<b>Total spent</b>	<b>0.22</b>	<b>4.00</b>	<b>11.50</b>	<b>4.95</b>	<b>0.00</b>	<b>1.50</b>	<b>8.98</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>6.66</b>	<b>37.81</b>
PM plan total	<b>2.00</b>	<b>4.00</b>	<b>4.00</b>	<b>4.00</b>	<b>1.00</b>	<b>5.00</b>	<b>3.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>9.00</b>	<b>32.00</b>

This deliverable describes the actions taken for the deployment of the demonstrators and the results of the deployment.

- D6.4 “Validation and evaluation of the results” within Task 6.4 (M26-M45) – updated version submitted on 12.09.2017.

<b>D6.4</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
PM spent in Y3	0	0	0	0	0	0.10	0	0	0	0	0	<b>0.10</b>
PM plan for Y3	1.00	0.70	0.85	2.20	0.60	2.00	0.59	0	0	0	0	<b>7.94</b>
PM spent in Y4	1.12	1.94	3.50	5.00	0.43	0	0.48	0	0	0	1.33	<b>13.80</b>
PM plan for Y4	3.00	1.20	2.10	3.30	1.30	6.00	1.37	0	0	0	0	<b>18.27</b>
<b>Total spent</b>	<b>1.12</b>	<b>1.94</b>	<b>3.50</b>	<b>5.00</b>	<b>0.43</b>	<b>0.10</b>	<b>0.48</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>1.33</b>	<b>13.90</b>
PM plan total	<b>3.00</b>	<b>3.00</b>	<b>3.00</b>	<b>4.00</b>	<b>2.00</b>	<b>6.00</b>	<b>2.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>23.00</b>

This deliverable describes the actions taken for the deployment of the demonstrators and the results of the deployment.

## Deviations

The efforts spent in total in the WP6 including the current reporting period are exceeding the plan for this work package by about 37%. But already in the previous reporting period the reported efforts were reaching the planned effort for this work package.

The efforts for integration accomplished in task T6.2 exceeded the planned effort by slightly more than 100%, the efforts spent for deployment in task T6.3 are about 18% higher than the plan, while the evaluation in task T6.4 shows an underspending by 40%.

The complexity of the integration of the demonstrators was underestimated. In the previous reporting period the additional effort was due the communication between the management units according to the Alliander security architecture and due to specific requirements of the communication with the home appliances. In the current reporting period the additional effort was also related to these aspects, but it was also caused by the need for reshuffling tasks between partners. Due to the delays UTWE was unable to accomplish the integration of the Bronsbergen demonstrator and this task had to be reallocated to IHP, UMA and CEMOSA.

Because of that underestimated complexity of the integration most of the partners overspent in task T6.2. Only EFA and LW are slightly below or exactly at the planned figured with IPI and LODZ not being active in this work package.

The effort related to the deployment (T6.3) was only slightly above the planned one. The underspending in the evaluation (T6.4) was mainly caused by the shortened evaluation period.

The overall efforts for the whole work package for the project duration were also general higher than planned. Overspending by EDP and ALLI, was mainly because these partners were deeply involved in all the activities at the demo sites. The reason for the quite big overspending by UMA and INOV is explained in Section 3.4.

## 2.6 WP7 – Dissemination and Exploitation (M1 – M46)

Efficient dissemination and exploitation are fundamental aspects in any research project, since the success of related activities contributes decisively to the short and long term success of the project. This WP has been responsible for ensuring that all these activities have been appropriately developed and managed throughout the project duration.

Moreover, this WP is responsible to monitor the regulatory and standardisation activities directly related to the research work, in order to assure the overall viability and coherence of the project results, and formulate guidelines for developing pre-normative documents for energy management systems.

This work package started in M1 of the project and finishes in M42. The work package consists of four tasks.

The objectives of WP7 during the second period have been:

- Ensure an appropriate project dissemination activities and exploitation of the results.
- Improve and update the project website.
- Prepare material for dissemination (self-stickers).
- Cooperate with other related projects in order to reach synergies.
- Perform dissemination activities:
  - Participation at relevant conferences, workshops, seminars or related events.
  - Publication of papers, press releases, and reports in relevant journals.

WP7	Reporting Period: M37-M46											
Participant	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
PM spent in Y1	0.50	0.52	0.23	0	1.89	0.30	0	0.71	0.28	0.20	0	<b>4.63</b>
PM plan for Y1	0.57	0.57	0.86	0.29	1.14	0.86	0.57	0.57	0.29	0.57	0.29	<b>6.57</b>
PM spent in Y2	0.36	1.38	0.45	0	1.09	1.60	0	0.26	0.28	0.20	0	<b>5.63</b>
PM plan for Y2	0.54	0.55	0.79	0.29	1.07	0.79	0.54	0.54	0.29	0.54	0.29	<b>6.22</b>
PM spent in Y3	0.12	3.83	0.47	0.25	2.68	0.80	0	0	0	0.20	0	<b>8.35</b>
PM plan for Y3	0.29	0.34	0.90	0.10	1.24	0.76	0.26	0.14	0.07	0.74	0.26	<b>5.10</b>
PM spent in Y4	0.60	3.54	1.90	2.48	11.09	0.77	0.19	0.00	0.00	1.70	0.33	<b>22.60</b>
PM plan for Y4	0.78	0.49	1.37	0.90	2.16	1.21	1.12	1.03	0.00	1.90	0.31	<b>11.27</b>
<b>Total spent</b>	<b>1.58</b>	<b>9.27</b>	<b>3.05</b>	<b>2.73</b>	<b>16.75</b>	<b>3.47</b>	<b>0.19</b>	<b>0.97</b>	<b>0.56</b>	<b>2.31</b>	<b>0.33</b>	<b>41.21</b>
<b>PM plan total</b>	<b>2.00</b>	<b>2.00</b>	<b>3.00</b>	<b>1.00</b>	<b>4.00</b>	<b>3.00</b>	<b>2.00</b>	<b>2.00</b>	<b>1.00</b>	<b>3.00</b>	<b>1.00</b>	<b>24.00</b>

### 2.6.1 The WP7 results in Y4

- The **website has been totally renovated (including new domain)** according to the recommendations described by reviewers. A modern and dynamic style has been applied in order to achieve also mobile devices. Addition of more pictures and clear messages for public audiences complements the basic project information facilitating the visitor to access the information he/she looks for, mainly focus on demonstrators and latest developments and news. The Bronsbergen users can access their individual CMU, and thus the GUI, through the website and the specific number allocated for their CMU. Further explanations of project details have been collected all in the section “Project”. On the other hand, the section “Technologies” has been updated and it will be updated when the prototypes are ready to be shown. News has been also updated with the information from meetings and events attended by the consortium. Access to social networks (LinkedIn and Youtube) has been enhanced and automated as well.
- **Flyers** (100) have been updated and dispatched in the Smart City World Expo 2016 (SCWE 2016) in Barcelona (Spain) by CEMOSA and EFA. The two official e-balance posters were shown as well.
- The project partners have participated in **10 events** (workshops, conferences, expositions, publications), which they have presented 7 scientific papers (2 journals), and 8 presentations. In addition, during this period the consortium has prepared papers and dissemination material for **4 events** in 2017.
- **Identification related FP7 and Horizon2020** projects to establish a procedure for the exchange of information and mutual collaboration
  - COSSMIC Project (Workshop). Speaker: IHP. Location: Caserta (Italy). Date: October 27, 2016.
  - DAREED Project (Workshop): Speaker: CEMOSA. Location: Seville (Spain). Date: November 23, 2016.

In addition, new attempts to prepare and configure workshops with other projects (NOBELGRID, Flexmeter, Flexiciency, Empower, Energaware, Cityfied, R2Cities and SmartNet) has been explored. However, due to agenda incompatibilities or lack of interest or response have not motivated additional workshops during 2017.

- **Two new newsletters have been edited and published in 2017.** The second newsletter was focused on Batalha demonstrator and the third one on Bronsbergen, published in April and July 2017 respectively.
- **According to reviewers’ advice, a formal dissemination plan has been prepared and edited.**



- **Preparation and publication of 5 videos, including the management of the YouTube channel.** Four videos focused on Batalha demonstrator (OPF/VOS algorithm; Fault detection, isolation and restoration simulation; demonstrator deployment and View4Grid simulation) and Bronsbergen (developments and deployments).
- **Report on exploitation activities during the project and exploitation strategies after the project using business management methodologies.** Edition of the public deliverable with dissemination activities related to exploitation purposes during the project and confidential deliverable that explains the entire methodology, the exploitable results (16), common exploitable results (3) and the strategies or business models (steps, timeline, costs...) to reach the market in coming years.
- **Contribution to standardisation.** Proposal of the extension of the DLMS/COSEM data model for LV sensors by EFACEC and INOV. Under analysis by EDP.
- **Preparation and edition of the guide book.** It has been edited a deliverable version and a public and free book published in the website that can be printed in A4 format. The book summarises the e-balance developments, showing the application fields, the advantages, economic benefits and the social context, aimed specially to DSO, city authorities and large energy producers. A list of lessons learnt is also included.

In the following sections the tasks are introduced and the accounted work and the results are described briefly.

## 2.6.2 Task 7.1 Communication Plan (M1 – M46)

### Description according to Annex I

This task develops a communication plan that aims to raise the profile of the project and to stimulate a high level of market, stakeholders and policy awareness through various actions at an international level, which includes liaison with relevant funder research projects, developers of similar and attractive technologies and potential user communities. Inter-project cooperation will focus on coordination and cooperation between EU and other projects, and activities within the energy domain.

### Work done

The main activities within this task include:

- Research on similar initiatives and other communication possibilities. The main conclusion is the necessary presence in specific social networks (e.g. LinkedIn) and expositions regarding smart cities.
- Preparation and edition of a formal dissemination and communication plan in deliverable format (D7.2b).
- Contact with e-balance related European Research projects to promote cooperative workshops. Example: NOBELGRID, Flexmeter, Flexiciency, Empower, Energaware, Cityfied, R2Cities and SmartNet.
- Special collaboration between the project COSSMIC and DAREED has allowed participating in two workshops to detect potential synergies.

### The main activities of the partners

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<b>CEMOSA</b> <b>(0.36 PMs)</b>	<ul style="list-style-type: none"> <li>• Dissemination and communication plan. Deliverable 7.2b</li> <li>• Contacting related EU project for common dissemination</li> </ul>
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### 2.6.3 Task 7.2 Dissemination (M1 – M46)

#### Description according to Annex I

This task includes the proactive dissemination of project information and results to a broad public audience. In particular this task includes dissemination plan, activities & reporting, based on agreed strategy and plan to promote project among market entities, policy makers, and scientific community.

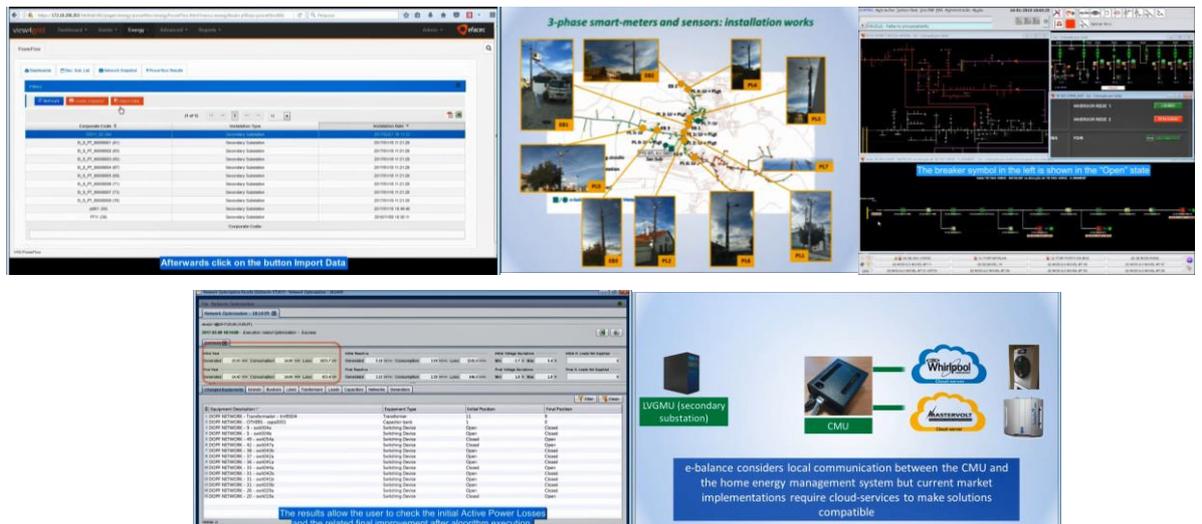
#### Work done

- Innovative Smart Grid Technologies Conference (ISGT), 2016 IEEE Power & Energy Society (USA). Speaker: UTWE. “Assessing the Potential of Residential HVAC Systems for Demand-Side Management”. Thijs van der Klauw, Gerwin Hoogsteen, Marco E.T. Gerards, Johann L. Hurink.
- IEEE ISGT Europe 2016 (Conference). Speaker: UTWE. Location: Ljubijana (Slovenia). Date: October 2016. Paper: “Using Demand-side Management to increase Transformer Lifetime”; Thijs van der Klauw, Marco E T Gerards and Johann L Hurink.
- COSSMIC Project (Workshop). Speaker: IHP. Location: Caserta (Italy). Date: October 27, 2016.
- MEDPOWER 2016 (Conference). Speaker: INOV. Location: Belgrade (Serbia). Date: November 6-9, 2016. Contributors: IHP, UTWE, EDP, UMA, ALLI and CEM. Paper: “A Hierarchical Architecture for an Energy Management System”; Krzysztof Piotrowski, Augusto Casaca, Marco E.T. Gerards, Marijn Jongerden, Francisco Melo, Daniel Garrido, Marcel Geers, Jacobo Peralta.
- Zarządzanie energią i teleinformatyka Conference (ZET 2017). Speaker: LODZ. “Local Balancing Service – Business case for e-balance platform” Bożena E. Matusiak.
- Smart-City Expo World Congress (Conference). Booth: EFA and CEMOSA. Location: Barcelona (Spain). Date: November 23, 2016. For the Smart-City Expo: new poster explaining demosites. 3-days exhibition with more than 30 visitors the first day, especially from Latin-America, Europe and Asia. Demonstration of G-Smart (EFA), poster presentation and flyers distribution. Companies, research centres and regional governments interested in the replication potential.
- DAREED Project (Workshop): Speaker: CEMOSA. Location: Seville (Spain). Date: November 23, 2016.
- 1st International Conference on the Sustainable Energy and Environment Development (SEED 2016). Speaker: LODZ. “Local Balancing System from the Business Model Canvas Perspective”, Bożena Ewa Matusiak.
- Journal OR Spectrum, Springer Link. UTWE. “Resource allocation problems in decentralized energy management” Thijs van der Klauw, Gerwin Hoogsteen, Marco E.T. Gerards, Johann L. Hurink.
- Participation on CIRED 2017. Efacec participated in the 24th International Conference & Exhibition on Electricity Distribution (CIRED 2017), which took place in Glasgow on 12 – 15 June 2017, where some of the features implemented within e-balance were shown, namely those regarding “Neighbourhood Monitoring via LV grid Power Flows”. Moreover, another major goal was the demonstration of MV grid self-healing solutions, again where important features implemented within e-balance were shown. CIRED 2017 has offered the opportunity to interact face-to-face with up to 1500 key decision leaders in the field of Electricity Distribution, being the major International Electricity Conference & Exhibition.
- Last 22nd of June INOV presented the paper titled “A Management System for Low Voltage Grids” at the IEEE International Conference Powertech 2017. This paper will appear at the IEEE Xplore digital library as Proceedings of the 12th IEEE PES PowerTech Conference. The conference had about 650 attendees and lasted from June 19th to June 22nd at the University of Manchester. For updates and further information, please, check the section Publications.
- LinkedIn updates (Publication of LinkedIn posts).

- Design and opening of the new web site (more dynamic and social networks oriented). Publication of website updates (news, publications, videos, newsletters...)



- Edition and publication of 3 videos about Batalha developments, 1 video about Batalha deployment and 1 video about Bronsbergen deployment and energy balancing algorithms



- Edition and publication of second newsletter (April 2017) and third newsletter (July 2017).



- Edition of deliverable D7.2; report on dissemination activities.
- Accepted papers (registration during project but publication after project period):
  - Bartkiewicz W, Matusiak B.E., 2017. *Pricing methods for users' reaction in energy flexibility management*. SEED 2017 International conference, Krakow November 14-17, 2017.
  - Bartkiewicz W, Matusiak B.E., 2017. *e-balance business proposal: How to find benefits from active demand response*. SEED 2017 International conference, Krakow November 14-17, 2017

### The main activities of the partners

<b>IHP (0.14 PM)</b>	<ul style="list-style-type: none"> <li>• Dissemination activities (publications, newsletter, etc.)</li> <li>• Contributions and review of common publications in the project: Papers, Website, Newsletter.</li> </ul>
<b>INOV (2.14 PM)</b>	<ul style="list-style-type: none"> <li>• Preparation for the review meeting, including slides preparation</li> <li>• Contribution for the renovation of the e-balance web site</li> <li>• Preparation of contribution for the first edition of the newsletter</li> <li>• Initial planning for the participation in the Smart City Expo. Planning for the demonstration to be shown in the stand of the Smart City Expo.</li> <li>• Preparation of an extended abstract of a paper for the IEEE Power Tech 2017 conference. Preparation of the final version of the paper submitted to the IEEE Power Tech 2017 Conference, with main emphasis on the Batalha demonstrator.</li> <li>• Preparation and presentation of e-balance paper at the PowerTech 2017 conference in Manchester, U.K. Contribution to the work on the exploitation of results. Contribution to the Guide book.</li> </ul>
<b>EDP (1.4 PM)</b>	<ul style="list-style-type: none"> <li>• Contributions and review of the papers submitted to EnergyCon2016 and MedPower</li> <li>• Revision and contributions to website</li> <li>• Contributions to Newsletter #2</li> <li>• Contributions to PowerTech Manchester 2017 paper</li> <li>• Contributions to website</li> </ul>
<b>UMA (1.0 PM)</b>	<ul style="list-style-type: none"> <li>• MedPower and EnergyCon paper preparation</li> <li>• Contributions to Newsletter</li> </ul>
<b>CEMOSA (4.24 PM)</b>	<ul style="list-style-type: none"> <li>• Planning 2017 activities (potential events) in T7.2</li> <li>• Update of posters and flyers (contents and format)</li> <li>• Contributions to the paper abstract "A Hierarchical Architecture for an Energy Management System" – MedPower</li> <li>• Coordination of requests for the Smart City Expo 2016</li> <li>• Monitoring of dissemination activities (website updates, DAREED workshop presentation, Smart City World Expo presentation and poster design, LinkedIn updates)</li> <li>• Contact with e-balance related European Research projects to promote cooperative workshops.</li> <li>• Design and publication of new web site. Contributions to the website (designs and contents)</li> <li>• Edition and publication of LinkedIn updates</li> <li>• Coordination, edition and publication of second and third newsletter on April and July 2017 respectively.</li> <li>• Coordination, edition and publication of videos (3 videos of Batalha developments, 1 video of Batalha deployment and 1 video of Bronsbergen deployment), including administration of YouTube channel.</li> <li>• Coordination and edition of Deliverable D7.2</li> </ul>

<b>LODZ (0.6 PM)</b>	<ul style="list-style-type: none"> <li>Dissemination work – participation in preparation of two papers on scientific conference Seed 2017 submitted in July 2017, and the paper for e-balance Newsletter, content’s preparation about business model and simulation results for e-balance website</li> </ul>
<b>ALLI (0 PM)</b>	<ul style="list-style-type: none"> <li>Third Newsletter</li> <li>Contributions to Bronsbergen video</li> <li>Contributions to the website</li> </ul>
<b>UTWE (0 PM)</b>	<ul style="list-style-type: none"> <li>Dissemination activities - Preparation of two manuscripts for a special issue on decentralized energy management (journal: Energies)</li> </ul>
<b>EFA (0 PM)</b>	<ul style="list-style-type: none"> <li>Stand in CIRED 2017.</li> </ul>

## 2.6.4 Task 7.3 Exploitation and contribution to standards (M1 – M46)

### Description according to Annex I

An active approach towards exploitation of results will be carried out within the project. Exploitation will be based on appropriate technology assessment as well as market condition and business opportunities analysis.

Another important component will be monitoring and contributing to standards bodies and to standards developments as may be appropriate.

### Work done

- Mapping of background and foreground of partnership to identify exploitable results using business analysis methodology proposed by CEMOSA. Exploitable result analysis: 16 exploitable results with 3 common exploitation packages (applications for enabling LV grid resilience, applications for public lighting faults, detection and location and energy management platform to run energy balancing and resilience mechanisms).
- Assessment to define a common exploitation framework for e-balance partnership.
- PEST and SWOT Analysis
- CAME (TOWS) Analysis
- Definition of individual and common strategies for exploiting results and IPR management
- Risk analysis and time to market of exploitable results
- Exhibition of e-balance outputs in the CIRED 2017 Exhibition: G-Smart (EFA), View4Grid (EFA) and SCATEX+ (EFA) were demonstrated, comprising features developed within e-balance, namely those regarding LV grids (Neighbourhood Power Flows and monitoring of secondary substations) and MV grids (Self-healing and Optimal Power Flows). Posters, leaflets and explanations supported the exhibition.
- Definition of contributions to standardisation. Contributions to standardisation: extension of data model DLMS/COSEM of the LV sensors.
- Edition of deliverable D7.3 (public and confidential versions)

### The main activities of the partners

<b>IHP (0.1 PMs)</b>	<ul style="list-style-type: none"> <li>Defining exploitation possibilities</li> </ul>
<b>INOV (1.2 PMs)</b>	<ul style="list-style-type: none"> <li>Preparation of a document containing a proposal for the extension of the data model in the Inovgrid architecture of EDP, based on new DLMS objects used in the e-balance pilot in Batalha. The document has been submitted to EDP for internal analysis</li> <li>Contribution to the work on the exploitation of results.</li> </ul>

<b>CEMOSA (3.44 PM)</b>	<ul style="list-style-type: none"> <li>• Monitoring of exploitation activities (assessment of common exploitation strategy for e-balance consortium; promotion of e-balance results among Smart City World Expo visitors)</li> <li>• Exploitation: deliverable template and ToC</li> <li>• Exploitation analysis based on business tools (PEST, SWOT, background/foreground mapping, CAME, risk analysis, IPR management...)</li> <li>• Coordination and edition of Deliverable D7.3 (public and confidential versions)</li> </ul>
<b>LODZ (0.52 PM)</b>	<ul style="list-style-type: none"> <li>• Exploitation plan – final preparation</li> <li>• Final preparation of the exploitation plan for LODZ, corrections and review for all documentation.</li> </ul>
<b>ALLI (0.04 PM)</b>	<ul style="list-style-type: none"> <li>• Exploration of exploitation options, contribution and review of D7.3</li> </ul>
<b>EFA (0 PM)</b>	<ul style="list-style-type: none"> <li>• Contributions to and review of the exploitation analysis.</li> </ul>

## 2.6.5 Task 7.4 Guide Book (M1 – M46)

### Description according to Annex I

All the results achieved in the project relevant to the application of the developed energy management platform will be collected together in the form of a guide book. The guide book will explain the provided means to estimate the achievable energy savings. It includes the detailed description of the energy platform test bed together with the methodology to prepare the input data to represent a specific target deployment.

Additionally, the guide book will explain how to estimate the costs of the solution for both, installation and run time. This will be complemented by the description of the developed business models.

### Work done

- Graphical design based on existing white papers and other EU projects guidelines.
- Compilation of key messages and results of e-balance project (lessons learnt) outlined for key audiences (DSO, city authorities, large energy producers and prosumers).
- Edition of the deliverable D7.4 and the guide book in electronic format (free download from official web site).

### The main activities of the partners

<b>IHP (0.36 PMs)</b>	<ul style="list-style-type: none"> <li>• Contributions to the Guide Book</li> </ul>
<b>INOV (0.2 PM)</b>	<ul style="list-style-type: none"> <li>• Contribution to the Guide book.</li> </ul>
<b>EDP (0.5 PMs)</b>	<ul style="list-style-type: none"> <li>• Contributions and review to Guide Book</li> </ul>
<b>UMA (1.48 PMs)</b>	<ul style="list-style-type: none"> <li>• Inputs for the guidebook.</li> </ul>
<b>CEMOSA (3.05 PMs)</b>	<ul style="list-style-type: none"> <li>• Graphical design of the e-balance guide book</li> <li>• Coordination and edition of Deliverable D7.4</li> </ul>
<b>LODZ (0.6 PM)</b>	<ul style="list-style-type: none"> <li>• Works on parts of e-balance Guide Book. Business model visualisation, achievements and lessons learned, pricing model evaluation</li> </ul>
<b>IPI (0 PM)</b>	<ul style="list-style-type: none"> <li>• Contributions to the guide book</li> </ul>
<b>ALLI (0.15 PM)</b>	<ul style="list-style-type: none"> <li>• Contribution to guide book and D7.4</li> </ul>
<b>UTWE (0.77 PMs)</b>	<ul style="list-style-type: none"> <li>• Inputs for the guidebook.</li> </ul>
<b>EFA (0.33 PMs)</b>	<ul style="list-style-type: none"> <li>• Preliminary contributions for the Guide Book: description of the Neighbourhood Power Flow user manual. Preparation of other subsequent contributions regarding other modules of the Energy Management Platform.</li> </ul>

- Contributions for the Guide Book: organization of pictures and their documentation regarding the LV grid resilience features deployment at the Batalha demonstrator, as well as regarding the MV grid resilience features deployment at the selected data centre.
- Editorial contributions for the Guide Book:
  - Briefing of the Batalha demonstrator main goals;
  - LV grid resilience features deployment at the Batalha demonstrator;
  - MV grid resilience features deployment at the selected data centre;
  - Description of the main lessons learnt during the project.

## 2.6.6 Deliverables in WP7 the consortium worked on in Y4

- D7.2 “Dissemination activities” within Task 7.1 and Task 7.2 (M1-M46) – submitted on 31.07.2017.

<b>D7.2</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
PM spent in Y1	0.19	0.52	0.13	0	1.82	0.23	0	0.71	0	0.20	0	<b>3.80</b>
PM plan for Y1	0.14	0.19	0.19	0.10	0.19	0.24	0	0.19	0	0.19	0	<b>1.43</b>
PM spent in Y2	0.27	1.15	0.37	0	0.81	1.30	0	0.22	0	0.17	0	<b>4.29</b>
PM plan for Y2	0.20	0.25	0.25	0.15	0.25	0.30	0	0.25	0	0.25	0	<b>1.90</b>
PM spent in Y3	0.09	3.19	0.39	0.21	1.77	0.67	0	0	0	0.08	0	<b>6.40</b>
PM plan for Y3	0.17	0.28	0.45	0.08	0.51	0.54	0.10	0.12	0	0.28	0	<b>2.54</b>
PM spent in Y4	0.16	2.26	1.17	0.83	5.15	0	0.02	0	0	0.71	0	<b>10.29</b>
PM plan for Y4	0.11	0.32	0.48	0.37	0.47	0.57	0.14	0.03	0	0.65	0	<b>3.14</b>
<b>Total spent</b>	<b>0.82</b>	<b>7.12</b>	<b>2.06</b>	<b>1.04</b>	<b>9.55</b>	<b>2.23</b>	<b>0.03</b>	<b>0.93</b>	<b>0</b>	<b>1.16</b>	<b>0</b>	<b>24.95</b>
PM plan total	<b>0.50</b>	<b>0.67</b>	<b>0.67</b>	<b>0.33</b>	<b>0.67</b>	<b>0.83</b>	<b>0</b>	<b>0.67</b>	<b>0</b>	<b>0.67</b>	<b>0</b>	<b>8.89</b>

This document summarizes our dissemination activities.

- D7.3 “Exploitation activities” within Task 7.1 and Task 7.3 (M1-M46) – submitted on 31.07.2017.

<b>D7.3</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
PM spent in Y1	0.15	0	0.10	0	0.07	0.07	0	0	0	0	0	<b>0.39</b>
PM plan for Y1	0.24	0.33	0.48	0	0.29	0.38	0.29	0	0	0	0	<b>2.00</b>
PM spent in Y2	0.09	0.23	0.08	0	0.28	0.27	0	0.04	0	0.04	0	<b>1.02</b>
PM plan for Y2	0.20	0.30	0.40	0	0.25	0.35	0.25	0	0	0	0	<b>1.75</b>
PM spent in Y3	0.03	0.64	0.08	0.04	0.71	0.13	0	0	0	0.12	0	<b>1.75</b>
PM plan for Y3	0.11	0.06	0.25	0.02	0.23	0.12	0.16	0.02	0	0.06	0	<b>1.02</b>
PM spent in Y4	0.08	1.08	0.23	0.17	2.89	0	0.02	0	0	0.41	0	<b>4.88</b>
PM plan for Y4	0.07	0.17	0.29	0.08	0.19	0.14	0.22	0	0	0.65	0	<b>1.81</b>
<b>Total spent</b>	<b>0.35</b>	<b>1.95</b>	<b>0.49</b>	<b>0.21</b>	<b>3.95</b>	<b>0.47</b>	<b>0.02</b>	<b>0.04</b>	<b>0</b>	<b>0.57</b>	<b>0</b>	<b>8.04</b>
PM plan total	<b>0.83</b>	<b>1.17</b>	<b>1.67</b>	<b>0</b>	<b>1.00</b>	<b>1.33</b>	<b>1.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5.00</b>

This document describes the public part of the exploitation activities. The confidential part of the exploitation plan was delivered separately to the EC and is identified as such.

- D7.4 “Guide book” within Task 7.4 (M1-M46) – submitted on 31.07.2017.

<b>D7.4</b>	<b>Reporting Period: M37-M46</b>											
<b>Participant</b>	<b>IHP</b>	<b>INOV</b>	<b>EDP</b>	<b>UMA</b>	<b>CEMOSA</b>	<b>UTWE</b>	<b>ALLI</b>	<b>IPI</b>	<b>LW</b>	<b>LODZ</b>	<b>EFA</b>	<b>TOTAL</b>
<b>PM spent in Y1</b>	0.05	0	0	0	0	0	0	0	0.28	0	0	<b>0.33</b>
<b>PM plan for Y1</b>	0.14	0	0.14	0.14	0.57	0.14	0.29	0.29	0.29	0.29	0.29	<b>2.57</b>
<b>PM spent in Y2</b>	0	0	0	0	0	0	0	0	0.28	0	0	<b>0.28</b>
<b>PM plan for Y2</b>	0.14	0	0.14	0.14	0.57	0.14	0.29	0.29	0.29	0.29	0.29	<b>2.57</b>
<b>PM spent in Y3</b>	0	0	0	0	0.20	0	0	0	0	0	0	<b>0.20</b>
<b>PM plan for Y3</b>	0.01	0	0.20	0	0.50	0.10	0	0	0.07	0.40	0.26	<b>1.54</b>
<b>PM spent in Y4</b>	0.36	0.20	0.50	1.48	3.05	0.77	0.15	0	0	0.58	0.33	<b>7.42</b>
<b>PM plan for Y4</b>	0.60	0	0.60	0.45	1.50	0.50	0.76	1.00	0	0.60	0.31	<b>6.32</b>
<b>Total spent</b>	<b>0.41</b>	<b>0.20</b>	<b>0.50</b>	<b>1.48</b>	<b>3.25</b>	<b>0.77</b>	<b>0.15</b>	<b>0</b>	<b>0.56</b>	<b>0.58</b>	<b>0.33</b>	<b>8.23</b>
<b>PM plan total</b>	<b>0.50</b>	<b>0</b>	<b>0.50</b>	<b>0.50</b>	<b>2.00</b>	<b>0.50</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>1.00</b>	<b>9.00</b>

This deliverable describes in short the Guide Book - a manual for third parties that contains the extract of the project results, covering the applicability suggestions for the proposed energy management platform including the researched aspects of energy efficiency, like social triggers for increasing the willingness to be energy efficient, the economic aspects - the proposed new business models, as well as technical aspects of the proposed solution with means to estimate the initial and running costs and improvement in the energy efficiency. Please note that the manual text is not part of the deliverable document; it is a separated document to be disseminated among potential users (DSOs, city authorities, large energy producers with distribution capacities) to further increase the exploitation potential.

## Deviations

In the current reporting period we further intensified our activities on dissemination and exploitation of the project results. Thus in activities related to deliverable D7.2 and D7.3 we see a trend towards overspending.

The major deviation from the effort plan can be seen at INOV (very active at dissemination) and CEMOSA (leading the WP7 and very active in the work packet).

The total effort for the guide book (T7.4) is slightly below the planned effort. This task was mainly realized in the current reporting period.



### 3 Project management and administrative issues

WP1	Reporting Period: M1-M12											
Participant	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
PM spent in Y1	1.91	0	0	0	3.00	0	0	0	0	0	0	4.91
PM plan for Y1	3.00	0	0	0	3.00	0	0	0	0	0	0	6.00
PM spent in Y2	1.81	0	0	0	0	0	0	0	0	0	0	1.81
PM plan for Y2	2.00	0	0	0	0	0	0	0	0	0	0	2.00
PM spent in Y3	1.27	0	0	0	0	0	0	0	0	0	0	1.27
PM plan for Y3	1.41	0	0	0	0	0	0	0	0	0	0	1.41
PM spent in Y4	2.13	0	0	0	0	0	0	0	0	0	0	2.13
PM plan for Y4	2.10	0	0	0	0	0	0	0	0	0	0	2.10
<b>Total spent</b>	<b>7.12</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10.12</b>
<b>PM plan total</b>	<b>8.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>11.00</b>

The progress was monitored at the quarterly meetings. During the meetings the status of each partner was reported and also the plans for the next months were elaborated. The dates of the meetings were originally set before deadlines of the deliverables in order to discuss their structures and to distribute the editorial work among the partners. Additionally, next to the usual communication by emails, several teleconferences were arranged, what helped to monitor the progress.

In the current reporting period there were two reports to report the progress to the EC. The QR12 document covered the last three months of 2016, while the QR13 covered first three months of 2017. These reports containing the status of each partner and efforts spent were prepared and submitted to the PO.

In the current reporting period we have realized a further (third) amendment to the Grant Agreement. It covered mainly the rescheduling of the project resources between partners due to the changes within the project.



### 3.1 Status of Deliverables and Milestones

Table 1 shows the status of deliverables which were due in the third reporting period of the project according to the Annex I “Description of work”.

Regarding the Milestones, Table 2 shows all Milestones planned for the current reporting period.

**Table 1: Project deliverables in the reporting period**

Del. no.	Deliverable name	Version	WP no.	Lead beneficiary	Nature	Dissemination level	Expected Delivery Date	Actual Delivery Date	Comments
1	D2.5 “Validation of the proposed use cases and business models”	1.0	WP2	IPI	R	PU	M40	31.07.2017	
2	D2.6 “Restatement of the selection of the representative use cases”	1.0	WP2	EDP	R	PU	M44	15.09.2017	
3	D3.3 “Restatement of the system architecture specification”	1.0	WP3	EFA	R	PU	M44	22.07.2017	
4	D4.5 “Restatement of the communication platform specification”	1.0	WP4	IHP	R	PU	M44	31.07.2017	
5	D5.6 “Restatement of the energy management platform specification and revision of the system models”	1.0	WP5	IHP	R	PU	M44	31.07.2017	
6	D6.2 “Integration of the prototypes”	3.3	WP6	INOV	P	PU	M26	18.07.2017	Updated version submitted

7	D6.3 “Deployment of demonstrators”	1.0	WP6	EDP	R	PU	M33	31.07.2017	Updated version submitted
8	D6.4 “Validation and evaluation of the results”	1.0	WP6	INOV	R	PU	M45	12.09.2017	
9	D7.2 “Dissemination activities”	1.0	WP7	CEMOSA	R	PU	M46	31.07.2017	
10	D7.3 “Exploitation activities”	1.0	WP7	CEMOSA	R	PU/CO	M46	31.07.2017	
11	D7.4 “Guide book”	1.0	WP7	CEMOSA	R	PU	M46	31.07.2017	

**Table 2: Project milestones in the reporting period**

<b>Milestone no.</b>	<b>Milestone name</b>	<b>WP No.</b>	<b>Lead beneficiary</b>	<b>Expected Delivery Date</b>	<b>Achieved Yes/No</b>	<b>Actual Delivery Date</b>	<b>Comments</b>
MS6	Second user study performed and evaluated	WP2	IPI	M43	Yes	31.07.2017	
MS7	Results collected from demonstrators’ runs	WP6	INOV	M44	Yes	12.09.2017	

### 3.2 Resources and Spending

A quick overview of the planned vs. reported efforts of the project beneficiaries in the reporting period is shown in Table 3 and Table 4. For most of the partners, the plan figures were determined as linear distribution of the efforts planned for the respective task over the duration. The figures show an overspending of slightly below 20% for the complete project duration. In this reporting period we focused on WP6 – finalisation of the integration, as well as deployment and evaluation of the individual demonstrators. Further focus was on WP2 and WP7 activities.

**Table 3: Overview of the spent vs. planned efforts of the project beneficiaries in the 4<sup>th</sup> period**

Participant		IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
WP1	spent Y4	2.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.13
	plan Y4	2.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.10
	spent total	7.12	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	10.12
	plan total	8.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00
WP2	spent Y4	0.00	2.70	5.10	0.00	1.50	0.05	0.76	8.13	0.00	8.90	0.06	27.20
	plan Y4	1.20	0.16	0.80	0.00	0.00	0.00	0.05	3.11	0.00	4.70	0.38	10.40
	spent total	9.32	9.04	18.40	0.30	11.80	3.10	6.20	51.63	1.53	20.53	4.00	135.85
	plan total	12.00	4.00	15.00	0.00	10.00	3.00	5.00	46.00	2.00	16.20	4.00	117.20
WP3	spent Y4	0.36	2.35	0.00	0.00	0.00	0.20	0.00	4.53	0.00	0.00	1.34	8.78
	plan Y4	1.50	0.30	0.60	0.00	0.00	0.60	0.24	5.46	0.00	0.50	0.54	9.74
	spent total	9.62	12.49	3.70	10.78	3.00	6.20	1.55	15.15	6.77	1.81	7.44	78.51
	plan total	9.00	6.00	4.70	6.50	3.00	7.00	3.00	19.00	8.00	1.80	8.50	76.50
WP4	spent Y4	4.06	2.80	0.00	6.76	0.00	1.33	0.00	0.00	0.00	0.00	0.18	15.13
	plan Y4	3.00	0.30	0.35	1.50	0.50	1.80	0.00	0.00	0.00	0.00	0.49	7.94
	spent total	16.79	20.12	3.95	31.09	1.00	13.15	0.00	0.00	10.19	0.00	7.79	104.08
	plan total	21.00	11.00	4.70	20.00	2.00	14.00	0.00	0.00	11.00	0.00	8.00	91.70
WP5	spent Y4	4.95	0.00	0.00	8.48	9.83	1.87	0.00	3.06	0.00	0.00	0.10	28.29
	plan Y4	3.00	0.00	0.00	0.40	1.50	0.60	0.00	2.52	0.00	0.00	0.94	8.96
	spent total	15.08	7.88	6.40	26.63	21.73	23.19	1.20	15.24	14.61	0.00	28.72	160.68
	plan total	14.00	9.00	5.60	16.50	14.00	22.00	1.00	16.00	14.00	0.00	26.50	138.60
WP6	spent Y4	8.54	6.94	9.55	12.54	1.03	6.00	6.48	0.00	0.00	0.00	1.33	52.41
	plan Y4	3.00	1.20	2.10	3.30	1.30	6.00	1.37	0.00	0.00	0.00	0.00	18.27
	spent total	17.27	26.65	24.00	25.37	4.30	23.32	16.79	0.00	1.73	0.00	18.71	158.14
	plan total	16.00	18.00	14.00	16.00	5.00	17.00	9.00	0.00	2.00	0.00	19.00	116.00
WP7	spent Y4	0.60	3.54	1.90	2.48	11.09	0.77	0.19	0.00	0.00	1.70	0.33	22.60
	plan Y4	0.78	0.49	1.37	0.90	2.16	1.21	1.12	1.03	0.00	0.90	0.31	10.27
	spent total	1.58	9.27	3.05	2.73	16.75	3.47	0.19	0.97	0.56	2.31	0.33	41.21
	plan total	2.00	2.00	3.00	1.00	4.00	3.00	2.00	2.00	1.00	3.00	1.00	24.00

**Table 4: Overview of the total spent vs. planned efforts of the project beneficiaries in the 4<sup>th</sup> period**

Participant		IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
<b>TOTAL</b>	spent Y4	20.64	18.33	16.55	30.26	23.45	10.22	7.43	15.72	0.00	10.60	3.34	<b>156.54</b>
	plan Y4	14.58	2.45	5.22	6.10	5.46	10.21	2.78	12.12	0.00	3.90	2.66	<b>65.48</b>
	spent total	<b>76.78</b>	<b>85.45</b>	<b>59.50</b>	<b>96.90</b>	<b>61.58</b>	<b>72.43</b>	<b>25.93</b>	<b>82.99</b>	<b>35.39</b>	<b>24.65</b>	<b>66.99</b>	<b>688.59</b>
	plan total	<b>82.00</b>	<b>50.00</b>	<b>47.00</b>	<b>60.00</b>	<b>41.00</b>	<b>66.00</b>	<b>20.00</b>	<b>83.00</b>	<b>38.00</b>	<b>21.00</b>	<b>67.00</b>	<b>575.00</b>

The following table provides the overview on the differences between the planned effort and the actually consumed efforts, per task and per partner.

**Table 5: Summary of efforts planning and spending on task level per partner**

Task/Partner	IHP	INOV	EDP	UMA	CEMOSA	UTWE	ALLI	IPI	LW	LODZ	EFA	TOTAL
<b>WP1 Total</b>	<b>0.88</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.88</b>
T1.1	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
T1.2	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
<b>WP2 Total</b>	<b>2.68</b>	<b>-5.04</b>	<b>-3.40</b>	<b>-0.30</b>	<b>-1.80</b>	<b>-0.10</b>	<b>-1.20</b>	<b>-5.63</b>	<b>0.47</b>	<b>-4.33</b>	<b>0.00</b>	<b>-18.65</b>
T2.1	0.30	0.00	0.00	-0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T2.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.90	0.00	1.90
T2.3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T2.4	1.09	0.00	-1.55	0.00	0.00	0.00	0.30	-1.82	0.00	2.22	0.00	0.24
T2.5	1.29	-5.04	-1.85	0.00	-1.80	-0.10	-1.50	-4.81	0.47	-7.45	0.00	-20.79
<b>WP3 Total</b>	<b>-0.62</b>	<b>-6.49</b>	<b>1.00</b>	<b>-4.28</b>	<b>0.00</b>	<b>0.80</b>	<b>1.45</b>	<b>3.85</b>	<b>1.23</b>	<b>-0.01</b>	<b>1.06</b>	<b>-2.01</b>
T3.1	-0.44	-0.94	-0.60	-2.60	-0.40	-0.60	0.04	5.65	0.02	0.53	-0.32	0.34
T3.2	-2.52	-1.09	0.60	-1.68	0.40	-0.30	0.41	0.00	-0.56	-0.23	2.31	-2.66
T3.3	2.34	-4.46	1.00	0.00	0.00	1.70	1.00	-1.80	1.77	-0.31	-0.93	0.31
<b>WP4 Total</b>	<b>4.21</b>	<b>-9.12</b>	<b>0.75</b>	<b>-11.09</b>	<b>1.00</b>	<b>0.85</b>	<b>0.00</b>	<b>0.00</b>	<b>0.81</b>	<b>0.00</b>	<b>0.21</b>	<b>-12.38</b>
T4.1	0.71	-1.90	-0.35	0.00	0.00	0.10	0.00	0.00	0.67	0.00	-1.63	-2.40
T4.2	0.95	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.25	0.00	-0.69	0.71
T4.3	1.78	0.00	0.00	-2.74	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.04
T4.4	2.77	-2.77	0.00	-1.95	0.00	-1.92	0.00	0.00	-0.40	0.00	0.00	-4.27
T4.5	-2.00	-4.45	1.00	-6.50	1.00	2.67	0.00	0.00	0.28	0.00	1.53	-6.47
<b>WP5 Total</b>	<b>-1.08</b>	<b>1.12</b>	<b>-0.80</b>	<b>-10.13</b>	<b>-7.73</b>	<b>-1.19</b>	<b>-0.20</b>	<b>0.76</b>	<b>-0.61</b>	<b>0.00</b>	<b>-2.22</b>	<b>-22.08</b>
T5.1	0.50	0.00	0.00	-0.14	0.00	-0.40	0.00	0.00	0.00	0.00	0.00	-0.04
T5.2	0.15	-0.50	-0.15	-0.14	0.50	-1.10	-0.14	0.00	-0.18	0.00	-0.30	-1.86
T5.3	1.74	0.64	-1.45	1.58	0.90	0.68	-0.06	0.00	0.00	0.00	-7.58	-3.55
T5.4	0.80	0.00	0.80	0.00	0.00	0.00	0.00	0.00	-0.93	0.00	2.00	2.67
T5.5	-1.18	0.98	0.00	-4.95	-2.30	-1.50	0.00	0.00	0.00	0.00	0.34	-8.61
T5.6	-3.09	0.00	0.00	-6.48	-6.83	1.13	0.00	0.76	0.50	0.00	3.32	-10.69
<b>WP6 Total</b>	<b>-1.27</b>	<b>-8.65</b>	<b>-10.00</b>	<b>-9.37</b>	<b>0.70</b>	<b>-6.32</b>	<b>-7.79</b>	<b>0.00</b>	<b>0.27</b>	<b>0.00</b>	<b>0.29</b>	<b>-42.14</b>
T6.1	-0.06	-2.03	-1.40	1.64	0.35	0.00	-1.04	0.00	0.00	0.00	-0.72	-3.26
T6.2	-4.87	-7.68	-0.60	-9.06	-2.22	-15.72	-2.29	0.00	0.27	0.00	0.00	-42.17
T6.3	1.78	0.00	-7.50	-0.95	1.00	3.50	-5.98	0.00	0.00	0.00	2.34	-5.81
T6.4	1.88	1.06	-0.50	-1.00	1.57	5.90	1.52	0.00	0.00	0.00	-1.33	9.10
<b>WP7 Total</b>	<b>0.42</b>	<b>-7.27</b>	<b>-0.05</b>	<b>-1.73</b>	<b>-12.75</b>	<b>-0.47</b>	<b>1.81</b>	<b>1.03</b>	<b>0.44</b>	<b>0.69</b>	<b>0.67</b>	<b>-17.21</b>
T7.1	0.05	1.00	0.85	0.00	-1.00	0.40	0.00	0.00	0.00	0.00	0.00	1.30
T7.2	-0.12	-7.37	-1.90	-0.75	-7.36	-1.60	0.00	0.03	0.00	-0.01	0.00	-19.08
T7.3	0.40	-0.70	1.00	0.00	-3.14	1.00	0.96	0.00	0.00	0.28	0.00	-0.20
T7.4	0.09	-0.20	0.00	-0.98	-1.25	-0.27	0.85	1.00	0.44	0.42	0.67	0.77
<b>TOTAL</b>	<b>5.22</b>	<b>-35.45</b>	<b>-12.50</b>	<b>-36.90</b>	<b>-20.58</b>	<b>-6.43</b>	<b>-5.93</b>	<b>0.01</b>	<b>2.61</b>	<b>-3.65</b>	<b>0.01</b>	<b>-113.59</b>

### 3.3 Project Meetings and other Key Events

During the reporting period M37-M46 project meetings were organized and executed. In all project meetings representatives of most of the consortium partners were present. The regular project meetings have ensured a close cooperation between all tasks and partners. The list of meetings executed in the reporting period is shown in Table 6.

**Table 6: Project meetings and other key events**

Event	Date/Venue	Purpose	Participants
Project review meeting	December 6 <sup>th</sup> , 2016 Batalha, Portugal	Evaluation of the project results in the third reporting period	All partners PO, Reviewers
Project quarterly meeting	February 15 <sup>th</sup> to 17 <sup>th</sup> , 2017 Frankfurt (Oder), Germany	Discussion on project progress and achievements in WP2, WP3, WP4, WP5, WP6 and WP7. PMC meeting	All partners
Project quarterly meeting	May 9 <sup>th</sup> to 10 <sup>th</sup> , 2017 Frankfurt (Oder), Germany	Discussion on project progress and achievements in WP2, WP4, WP5, WP6 and WP7. PMC meeting	All partners
Project quarterly meeting	July 5 <sup>th</sup> to 6 <sup>th</sup> , 2017 Amsterdam, the Netherlands	Discussion on the project progress and achievements in WP2, WP4, WP5, WP6 and WP7. PMC meeting	All partners AB members invited

### 3.4 Deviations and Delay

#### Deviations

With the third amendment to the Grant Agreement we have reshaped the original project plan to capture changes that were caused during the project execution. This includes the effort shift and budget between IHP and UTWE, as well as budget shift between LW and IHP, UMA and ALLI.

As in the previous reporting periods the deviations in the execution of the plan were influenced by the initial error in estimating the distribution of the effort for each partner in the respective tasks. In the current reporting period, similar to the previous one, we have additionally experienced underestimations of the effort related to the integration and partially deployment of the demonstrators. Thus, we see an overspending in the recent deliverables related to the integration and deployment of the system prototypes (WP6). Some of the workload was also generated back in WP4 and WP5, where restatements were necessary, causing a slight overspending in the deliverables related to that activity. The coordinator was continuously monitoring the overall state of the reported efforts and there are three cases (INOV, UMA, CEMOSA), where a partner spent significantly more effort than was originally planned for the whole project. In all the cases the situation is caused by the following problem with the resources. The originally planned and initially available personal was not available at some point in time due to different reasons and instead, less experienced and also less expensive personal was involved. This resulted in more effort in PMs, but without increasing the budget spent.

Most of the partners overspent their budgets, but they are all aware of the fact that the expenses beyond the planned budget cannot be reimbursed and they did fulfil their tasks. Only LODZ (26.968 €) and IPI (4.425 €) did not spend all of their budgets.

A slightly different situation was with the partner UTWE. This partner did already overspend the budget in previous reporting period. The solution proposed by the coordinator (IHP) that IHP and UMA take over the remaining activities of UTWE and close the gaps in the integration of the system prototypes, worked well, but was also causing additional workload at these two partners.

Like in the previous reporting period, LW did not report any efforts in the current period. This is due to the fact that partner LW has no available resources to be involved in the project anymore. Main part of the company was sold to a different one and the experts were not available anymore. Some remaining activities were taken over by the partners IHP and UMA and due to that the budget that was left by partner LW was split between these two partners (and ALLI).

## **Delays**

We worked on the limiting the delays stemming even from the first reporting period. Some of the partners increased their man power intending to speed up their work. We frequently had teleconference meetings focussed on the integration issues. These meeting helped to speed-up the progress of the integration significantly.

In the current reporting period we also had a delay with respect to the integration and deployment of the Bronsbergen demonstrator. In the previous period we won Whirlpool to provide us with their smart appliances and with an API to control these devices. And IHP bought the service of adaptation of the API for our purposes from own resources. But due to the suspension the contract with Whirlpool could not be finalized before July and finally, the progress of the development of the API took more time than originally planned causing integration delay. The personal working on the integration at UTWE was not available and IHP decided to take over this task. Due to the lack of original implementers at the UTWE and due to the observed communication overhead it was not possible to integrate the original energy balancing approach in the demonstrator. IHP, CEMOSA and UMA were working together and implemented, integrated and tested a lightweight energy balancing algorithm that took additional time, but the results have proven that the additionally implemented energy balancing approach was valid.

The main reason for delays in submission of the quarterly reports was the problem with getting reliable data on resource consumption. The partners needed about 4 weeks to gather the information about efforts spent in the reporting period and after that some time was needed to integrate all the inputs into one document.



## Annex A

This section presents the dissemination results in Y4.

Event name	Type	Role	Date and Venue	Partner/s
IEEE ISGT Europe 2016	Conference	Speaker (paper)	October 2016 (Slovenia)	UTWE
COSSMIC Project Workshop	Workshop	Speaker (slides)	October 2016 (Italy)	IHP
1 <sup>st</sup> International Conference on the Sustainable Energy and Environment Development (SEED 2016)	Conference	Speaker (paper)	October 2016 (Poland)	LODZ
Med Power 2016 (10th Mediterranean Conference on Power Generation, Transmission, Distribution and Energy Conversion)	Conference	Speaker (paper)	November 2016 (Serbia)	INOV, IHP, UTWE, EDP, UMA, ALLI, CEM
Smart City World Expo 2016	Exhibition	Booth	November 2016 (Spain)	EFA, CEM
DAREED project workshop	Workshop	Speaker (slides)	November 2016	CEM
Zarządzanie energią i teleinformatyka Conference (ZET 2017)	Conference & Rynek Energii Journal	Speaker (paper)	January 2017	LODZ
Journal OR Spectrum (Springer Link)	Journal	Writer (paper)	February 2017	UTWE
PowerTech 2017 IEEE Manchester	Conference	Speaker (paper)	June 2017	INOV
CIRED 2017	Exhibition	Booth	June 2017	EFA
2 <sup>nd</sup> International Conference on the Sustainable Energy and Environment Development (SEED 2017) (*)	Conference	Speaker (paper)	November 2017	LODZ
2 <sup>nd</sup> International Conference on the Sustainable Energy and Environment Development (SEED 2017) (*)	Conference	Speaker (paper)	November 2017	LODZ

(\*) This dissemination activity will take place after the project, but some preparation effort has done during the third period.