



FP7 Collaborative Project
no 608806

Project duration:
October 2013 – September 2016

Coordinator:
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SINTEF
Norway

Strategic objective:
6.4 Optimizing Energy Systems for
Smart Cities

Website:
www.cossmic.eu

D7.6 Final report on Dissemination and Use

VERSION/STATUS	DUE DATE	DELIVERY DATE
1.1/ Final - revised	2016-12-31	2017-03-24

DELIVERABLE NATURE	DISSEMINATION LEVEL	NUMBER OF PAGES:
R=Report	P=Public	22

EDITOR

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ABSTRACT

This document describes the status of dissemination and replication of the CoSSMic project. It describes the objectives, progress, status per task/deliverable, deviations from planning and future plans. In addition, appendixes with additional information on the project complete the status overview.

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CITE AS

CoSSMic deliverable D7.6, Final report on Dissemination and Use

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Document history

VERSION	DATE	VERSION DESCRIPTION
0.1		Ready for internal review
1.0	2017-02-24	External proposed
1.1	2017-03-24	Revised after final review

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1. Introduction

1.1. Role of the deliverable

D7.6 describes the status of the dissemination and replication in the CoSSMic project, and is a continuation of the interim deliverable D7.5 Interim report on Dissemination and use.

1.2. Relationship to other CoSSMic deliverables

Technically, this deliverable bears little relation to other CoSSMic deliverables in WPs 2-6. This is due to the fact that the content of WP7 is focused on communicating and spreading the project results and not on technical development. That being said, WP7 is dependent on input from all project partners. As such the whole consortium has been involved in the dissemination process and various activities related to it. We would like to mention here especially the local partners at the test region of Konstanz, with whom we have closely collaborated in organizing 2 major project workshops with local stakeholders.

1.3. Relationship to other versions of this deliverable

This is the continuation of D7.5 Interim report on Dissemination and use, which showed the status up until the end of October 2015.

1.4. Structure of this document

The structure of this document is fairly simple: it consists of a single chapter that describes the objectives, progress, the status of tasks and deliverables, followed by deviations from the original planning and use of resources/contribution of partners.

2. Work progress and achievements during the project

2.1. Objectives

Workpackage 7 (WP7) has as main responsibility to disseminate the knowledge that is being produced within the CoSSMic project. This entails not only the listing of articles, but also the management of the project website, contact with potential users and the European community and additional educational activities such as summer schools or workshops. Further goals are to share knowledge within the consortium, reinforce the connection between the scientific research and development of the project and the relevant economic, cultural and societal life of the European Community and enabling replication of the ICT solutions, by paving the way through involvement of target groups at an early stage.

2.2. Progress

Below are the descriptions of the tasks and deliverables (some tasks are continuous, so their current status reported here).

2.3. Knowledge Management (task 7.1)

Overall, the aim of this project is transparency and sharing of project results and research data, in accordance with EU guidelines. The software developed in this project will be open source and will be freely available.

With regards to Knowledge Management, measures to protect and distribute IP rights to contributing partners have been included in the Project Handbook that is available in the eRoom (operated by SINTEF) of the project. Procedures for IP distribution, voting, the raising of objections and guidelines for publication have been decided in an early stage of the project and were utilized on a regular basis by the whole consortium. An overview of exploitable foreground and IPR has been maintained in the IP directory, implemented as a database in the project eRoom. Boukje.com will use this information as input in the discussions with local partners. The up-to-date version as of 2017-02-24 is included in deliverable D7.1.

2.4. Public website (task 7.7)

In the revised DoW (date: 15 September 2015), a clause has been added under Task 1.4. It states that: “A public website will be set up by the coordinator for the dissemination of the project results and the outreach to the society. This public website will provide general information on the project and the partners, possibilities for exploitation, contact information, etc. This task covers the creation of the website. The consortium will update this website on a regular basis with publications and general descriptions of the work content carried out in the CoSSMic project, but this will be the responsibility of WP7.”

The CoSSMic website (www.cossmic.eu) has been extensively renewed and adapted towards contemporary requirements, and is continuously being updated. The site contains the following topics:

- **Main page:** from the main page, the following elements are accessible:
 - **Storyboard:** a fully visual explanation to communicate the CoSSMic concepts, as well as the sustainability issues it addresses to a lay audience. Since we experienced that written text does not communicate the core message we wish to impart as vividly as we would like, we opted for visual means to support our communication efforts.
 - **Video:** the storyboard has been turned into an animation / video for the general public that gives an impression why development on smart grids and integrating renewable energy into the grid are important topics.

- **Youtube channel:** a youtube channel has been created to disseminate the storyboard video, the presentations from the local workshops that took place in Konstanz and interviews with stakeholders in Konstanz.
- **News:** The menu is split into two elements:
 - Articles: a selection of news items that reflect the actual state of the project. This includes short texts on the plenary meetings, participation in Summer schools etc.
 - Photo Galleries: Pictures from meetings and workshops.
- **Results:** The menu is split into two elements:
 - Publications: An overview of all scientific papers that the consortium has agreed to publish and supporting presentations in PDF format that are available for download. Also available are general project overviews in PDF format that can be downloaded.
 - Conferences: A list of conferences where CoSSMic consortium members have presented material related to the project is available under this heading.
- **Resources:** The menu is split into two elements:
 - Links: A list of conferences and websites of interest that are related to the content that CoSSMic is developing. In addition, we maintain an agenda of upcoming events that are related to the themes that the CoSSMic project addresses, such as PV, smart grids, agent systems etc.
 - Downloads: A list of downloadable resources such as the project summary, workshops downloads, press coverage, scientific publications, etc.
- **Project structure:** An elaborate project description that gives an overview of the content, scope and overall relationships within the project, as well as an outlook on the impact that we expect. Summary tailored to technical and layman audiences are currently being prepared and will also be uploaded in order to address a broader public. All project structure descriptions are available as PDF.
- **Partners and people:** An overview of all consortium partners and the personnel involved. For each partner, there is a short description on the organization, its experience and the expertise and role of its members that are contributing to CoSSMic.
- **Contact:** Contact details of the Coordinator and Technical Manager.

2.5. Scientific Dissemination (Task/Deliverable 7.2)

The overall communication plan of the consortium has been described in a communication plan that is stored in the project eRoom under the WP7 directory. All consortium members have had the chance to give input, and as if now, this document serves a basis for the publication goals. The scientific dissemination is well underway and the results are being listed on the project website. The consortium expected to have at least 15 scientific publications at the end of the project, which has been reached. Below is the list of publications as of to date, expecting some more publications in the year after project end of articles under review and end-results to be published. The publication overview with scientific references is provided in D7.2.

	Authors	Contributing partner(s)	Title	Type	Year	Status
1	Leendert Wienhofen, Carmel Lindkvist, Mattias Noebels	01 SINTEF, 02 ISC, 06 NTNU	User-centered design for smart solar-powered micro-grid communities	Paper - conference	2014	Externally released
2	Svein Hallsteinsen, Shanshan Jiang	01 SINTEF	CoSSMic – Collaborating Smart Solar-powered Microgrids	Presentation	2014	Externally released
3	Alba Amato, Beniamino Di Martino, Marco Scialdone and Salvatore Venticinque	04 SUN	MULTI-AGENT NEGOTIATION OF DECENTRALIZED ENERGY PRODUCTION IN SMART MICRO-GRID	Paper - conference	2014	Externally released
4	Alba Amato, Beniamino Di Martino, Marco Scialdone, Salvatore Venticinque	04 SUN	Towards a SLA for Collaborating Smart Solar-powered Micro-grids	Paper - conference	2014	Externally released
5	Alba Amato, Beniamino Di Martino, Marco Scialdone and Salvatore Venticinque	04 SUN	An Agent-based Approach for Smart Energy Grids	Paper - conference	2014	Externally released
6	Alba Amato, Rocco Aversa, Beniamino Di Martino, Marco Scialdone, Salvatore Venticinque, Svein Hallsteinsen, Geir Horn	01 SINTEF, 04 SUN, 09 UiO	Software Agents for Collaborating Smart Solar-powered Micro-grids	Paper - conference	2013	Externally released
7	Luca Tasquier, Marco Scialdone, Rocco Aversa, and Salvatore Venticinque	04 SUN	Agent based negotiation of decentralized energy production	Paper - conference	2014	Externally released
8	WP7 Dissemination		draft text NorRen	Informal text	2014	Externally released
9	Alba Amato, Beniamino Di Martino, Salvatore Venticinque, Svein Hallsteinsen , Shanshan Jiang	01 SINTEF, 04 SUN	A distributed system for smart energy negotiation	Paper - conference	2014	Externally released
10	Svein Hallsteinsen		CoSSMic	Informal text		Externally released
11	Alba Amato, Marco Scialdone, Salvatore Venticinque	04 SUN	Reactive Optimization of Self Consumption	Paper - journal	2014	Under external review

12	Joachim Glatz-Reichenbach, Thomas Vilarinho, Giuseppina Cretella, Carmel Lindkvist, Adrian Minde, Leendert W. M. Wienhofen	01 SINTEF, 02 ISC, 04 SUN, 06 NTNU	End User Centred Interactive Software Architecture and Design: The Creation of Communities for a Smart Energy Use	Paper - conference	2015	Externally released
13	Matthias Noebels, Joachim Glatz-Reichenbach, Ahmed Mahran, Adrian Minde, Kristian Peter	02 ISC	Developing and investigating a smart solar powered energy system for increased PV self-consumption	Paper - conference	2015	Accepted externally
14	Geir Horn	09 UiO	Scheduling Time Variant Jobs on a Time Variant Resource	Paper - conference	2015	Accepted externally
15	Geir Horn, Salvatore Venticinque, Alba Amato	04 SUN, 09 UiO	Inferring Appliance Load Profiles From Measurements	Paper - conference	2015	Externally released
16	Shanshan Jiang, Salvatore Venticinque, Geir Horn, Svein Hallsteinsen, Matthias Noebels	01 SINTEF, 02 ISC, 04 SUN, 09 UiO	A DISTRIBUTED AGENT-BASED SYSTEM FOR COORDINATING SMART SOLAR-POWERED MICORGRIDS	Paper - conference	2016	Externally released
17	Simon Stastny, Babak A. Farshchian, Thomas Vilarinho	01 SINTEF	Designing an Application Store for the Internet of Things: Requirements and Challenges	Paper - conference	2015	Externally released
18	Gabriele Lobaccaro, Salvatore Carlucci, Erica Löfström	06 NTNU	A review of systems and tecnologies for smart homes and smart grids	Paper - journal	2016	Accepted externally
19	A. Mahran, A. Minde, M. Noebels, K. Peter, J. Glatz-Reichenbach	02 ISC	OPTIMIZING THE SELF-CONSUMPTION OF SOLAR POWERED MICRO GRIDS	Paper - conference	2016	Externally released
20	Thomas Vilarinho, Babak Farshchian, Leendert W. M. Wienhofen	01 SINTEF	Combining Persuasive Computing and User Centered Design into an Energy Awareness System for Smart Houses	Paper - conference	2016	Externally released
21	Alba Amato, Rocco Aversa, Massimo Ficco, and Salvatore Venticinque	04 SUN	CoSSMic smart grid migration in federated clouds	Paper - conference	2016	Externally released

22	Luca Tasquier and Rocco Aversa	04 SUN	An agent-based collaborative platform for the optimized trading of renewable energy within a community	Paper - journal	2014	Externally released
23	Beniamino Di Martino, Giuseppina Cretella, Antonio Esposito	04 SUN	Towards a IoT Framework for the Matchmaking of Sensors' Interfaces	Paper - conference	2016	Externally released
24	Rocco Aversa, Beniamino Di Martino, Salvatore Venticinquè, Shanshan Jiang, Svein Hallsteinsen, Geir Horn	01 SINTEF, 04 SUN, 09 UiO	A Multi-Agent System for Collaborative Smart Solar powered Micro-grids	Presentation	2015	
25	Authors of Document Amato, A., Di Martino, B., Scialdone, M., Venticinquè, S.	04 SUN	A Virtual Market for Energy Negotiation and Brokering	Paper - conference	2015	Externally released
26	Authors of Document Amato, A., Aversa, R., Di Martino, B., Venticinquè, S.	04 SUN	A Cyber Physical System of Smart Micro-Grids	Paper - conference	2016	Externally released
27	Authors of Document Amato, A., Di Martino, B., Scialdone, M., Venticinquè, S.	04 SUN	Distributed architecture for agents-based energy negotiation in solar powered micro-grids	Paper - journal	2016	Externally released
28	Authors of Document Amato, A., Di Martino, B., Scialdone, M., Venticinquè, S.	04 SUN	Design and evaluation of P2P overlays for energy negotiation in smart micro-grid	Paper - journal	2016	Externally released
29	Authors of Document Amato, A., Di Martino, B., Scialdone, M., Venticinquè, S.	04 SUN	A Negotiation Solution for Smart Grid Using a Fully Decentralized, P2P Approach	Paper - conference	2015	Externally released
30	Authors of Document Amato, A., Scialdone, M., Venticinquè, S.	04 SUN	An application of learning agents to smart energy domains	Paper - conference	2015	Externally released

CoSSMic partners organizations and personnel have participated in the following (scientific) events:

Event	Organizer	Venue	Dates	Participant	Motivation
RERC Conference 2014	UiO Energy	University of Oslo, Oslo (Norway)	16-18 June 2014	Svein Hallsteinsen, Shanshan Jiang	Project Presentation
2013 IEEE 10th International Conference on Ubiquitous Intelligence & Computing	SUN	Vietri sul Mare (Italy)	18-20 December 2013	Rocco Aversa	Paper Presentation
Future Internet Assembly	European Commission	Athens (Greece)	17-18 March 2014	Beniamino Di Martino	Project Dissemination
Conference IDEM	NREN GARR	Palermo (Italy)	2-3 April 2014	Beniamino Di Martino	Project Dissemination
Meeting	Agenzia per l'Italia Digitale	Rome (Italy)	17-Apr-14	Beniamino Di Martino	Project Presentation
Meeting	IBM	Rome (Italy)	23 June 2014	Beniamino Di Martino	Project Presentation
Conference CISIS'14	University of Birmingham	Birmingham (UK)	2-4 July 2014	Beniamino Di Martino, Salvatore Venticinque	Paper Presentation
Conference INCOS'14	University of Salerno	Salerno (Italy)	10-12 September 2014	Beniamino Di Martino, Salvatore Venticinque Luca Tasquier and Alba Amato	Paper Presentation
Conference IDCS'14	University of Calabria	Amantea (Italy)	22-24 September 2014	Beniamino Di Martino, Antonio Esposito	Paper Presentation
Conference ICART'14	ESEO Institute of Science and Technology	Angers (France)	6-8 March 2014	Salvatore Venticinque	Paper Presentation
Conference IDC 2014	DC'2014 - AIDA - Universidad Autónoma de Madrid	Madrid (Spain)	3-5 September 2014	Salvatore Venticinque, Massimo Ficco	Paper Presentations
Conference INCOS'14 – CCPI 2014	University of Salerno	Salerno (Italy)	10-12 September 2014	Salvatore Venticinque	Paper Presentations
2013 IEEE 10th International Conference on Ubiquitous Intelligence & Computing	SUN	Vietri sul Mare (Italy)	18-20 December 2013	Salvatore Venticinque	Project Presentation
NorRen Summerschool 2014	NorRen/NTNU	Holmen Fjordhotell, Asker, (Norway)	11-15 August 2014	Gabriella Tranell, Kristian Peter, Joachim Glatz-Reichenbach	Workshops and Presentations
Workshop 'Klimaschutz rentiert sich'	Consortium of local partners from Konstanz. Involved CoSSMic partners: SK, ISC, SST	Sunny Solar Technik, Konstanz (Germany)	4 November 2014	Andreas Baur, Nadja Metzler, Kristian Peter, Joachim Glatz-Reichenbach, Michael Simon, Boukje Ehlen, Otto Paans	Workshop and Presentations

The 8th International Conference on Internet and Distributed Computing Systems (IDCS 15)	N/A	Windsor (UK)	2-4 September 2015	Geir Horn, Salvatore Venticinquè, Alba Amato	Paper Presentation
Multidisciplinary International Scheduling Conference (MISTA 2015)	N/A	Prague (Czech Republic)	25-28 August 2015	Geir Horn	Paper Presentation
EU PVSEC 2015	N/A	Hamburg (Germany)	14-18 September 2015	Matthias Noebels, Joachim Glatz-Reichenbach, Ahmed Mahran, Adrian Minde, Kristian Peter	Paper Presentation
i4cs conference 2015	N/A	Nürnberg (Germany)	8-10 July 2015	Joachim Glatz-Reichenbach, Thomas Vilarinho, Giuseppina Cretella, Carmel Lindkvist, Adrian Minde, Leendert W. M. Wienhofen	Paper Presentation
EU PVSEC 2016	N/A	München (Germany)	20-24 June 2016	Ahmed Mahran, Adrian Minde, Kristian Peter, Joachim Glatz-Reichenbach	Paper Presentation
SAI Computing Conference 2016,	SAI conferences	London (UK)	13-15 July 2016	Shanshan Jiang	Paper Presentation
IEEE 30th International Conference on Advanced Information Networking and Applications Workshops, WAINA 2016	N/A	Crans-Montana (Switzerland)	March 23,25 2016	Beniamino Di Martino, Rocco Aversa, Massimo Ficco	Cossmic Dissemination (Booth) and Paper Presentations
Meeting	Italian Ministry of Defence	Roma (Italy)	December 16 th 2016	Beniamino Di Martino	Project presentation and discussion on possible take-up
Conference i-Cities 2015	CINI and University of Palermo	Palermo (Italy)	28-30/10/2015	Rocco Aversa	Paper presentation and project dissemination (flyers)
Conference IoT360 2015	EAI – European Alliance for Innovation	Roma (Italy)	26-28 th october 2015	Beniamino Di Martino	Paper presentation and project dissemination (flyers)
Meeting	Municipality of Castellammare di Stabia (Italy)	Castellammare di Stabia (Italy)	12 th october 2016	Beniamino Di Martino	Project presentation and discussion on possible take-up

Conference ESOCC 2016	IEEE, University of Vienna	Vienna (Austria)	5-8 September 2016	Beniamino Di Martino	Keynote talk and project dissemination (flyers)
Conference NBiS 2016	IEEE	Ostrava	5-9 september 2016	Salvatore Venticinque	Paper presentation and project dissemination (flyers)
Conference iCities 2016	CINI and University of Sannio	Benevento (Italy)	29/9/2016	Salvatore Venticinque	Speech and project dissemination
Conference CloudForward 2016	Hola EU Project	Madrid (Spain)	18-22th October 2016	Beniamino Di Martino	Talk and project dissemination (flyers)
SmartWorld 2016	IEEE and University of Toulouse	Toulouse (France)	18-21th July 2016	Antonio Esposito	Talk and project dissemination (flyers)
Meeting	Italian Ministry of Defence	Roma (Italy)	February 13 th 2017	Beniamino Di Martino	Plan of activities for investigating possible take-up

2.6. Local workshops (Task 7.3/Deliverable 7.3)

The DoW states: “Adjacent to the kick-off meeting, ISC and SINTEF will jointly organize a training workshop, where the potential of solar electricity and its implementation supported by microgrids will be explained in more detail to the consortium. A similar but extended workshop will be organized twice, and will involve local government officials from different areas, and keeping them up to date with the progress in the trial areas.

- At M18 by the Province of Caserta, supported by SUN
- At M33 by Konstanz, supported by ISC.”

In total, 5 workshops have been organized. ISC, Konstanz and SST have organised two workshops for their local stakeholders, once July 2015 and once November 2016. Province of Caserta and SUN have organized 3 Workshops for their local stakeholders: one on October 9th 2013, one on 4th February 2015, and one on October 27th 2016. For details, we refer to D7.3.

2.7. Summer school (Task 7.4/Deliverable 7.4)

In 2014, personnel from ISC Konstanz have been invited by NTNU to participate in the NorRen (Norwegian Research School of Renewable Energy) 2014 which had as theme: ‘**Implementing And Integrating Renewables In The Energy System – Focusing On Consumer Behavior And Energy Storage**’. This summer school took place from 11-15 august 2014 in the Holmen/Fjord hotel in Asker, Norway. A summary of the contents can be found at www.norren.no. Additional information on the summer school is provided in D7.4.

2.8. Replication and exploitation planning (Task 7.5)

The project developed an ICT-based energy management system that allows electricity users to control and schedule their electricity consumption. It also built an electricity exchange platform where

members of a community using the energy management system can exchange electricity in order to maximize the use of locally produced renewable energy.

Within the project the energy management system and the platform are developed to the advanced prototype stage. They can be brought to commercialization with moderate additional effort.

At the workshops in Konstanz (Smart Energy Workshop in July 2015 and the '*Klimaschutz rentiert sich*' in November 2014) promising contacts have been established with local industry partners and users, in order to disseminate the goals and preliminary results for CoSSMic technology, and to pave the way for future replication at this trial site. Contacts with the local mayor, multiple companies working in solar energy and academic institutions (University of Konstanz, DHBW, HWTG) have been established. See for a more comprehensive list the workshop programme enclosed in Appendix 5 of deliverable D7.5.

BCC has brought a Business Developer to a consortium meeting in Konstanz, to discuss the exploitation potential of CoSSMic. Consortium members presented their knowledge and results so far, based on which the Business Developer has offered the consortium an exploitation agreement, that would organise his involvement in the commercialisation of CoSSMic results. Negotiations are ongoing.

SUN has initiated contact with the Ministry of Defence in Italy, which has - among many premises - a headquarter in Rome called "Città Militare Cecchignola" (Cecchignola Military Town). It is a neighbourhood composed of a number of buildings, many of them equipped with PV panels. A birds-eye view photo is provided in the annex, together with a letter of interest. The Ministry has expressed its potential interest in utilizing the CoSSmic technology for two purposes: monitoring energy consumption and production in the households, and energy production optimization, by allowing exchange of energy on the place. It has to be considered that, although in Italy there is a restrictive regulation on exchange of energy on the place, these restrictions should not hold for exchanges within "Città militare", since it is a single entity. Consultation is ongoing (two meetings in December 2016 and January 2017) in order to define a Memorandum of Understanding for an experimentation of CoSSmic technology on a set of buildings of the "città militare".

A core of the CoSSMic partners have participated in a bid (DOMINOES) for the call topic EE-12-2017, *Integration of Demand Response in Energy Management Systems while ensuring interoperability through Public Private Partnership (EeB PPP)*. The intention is to use parts of the CoSSMic results and infrastructure for implementation and demonstration, in a context of DSO and utility providers. Beside the application for this call (focused on the Stadtwerke Konstanz to use the CoSSMic-results to build up and optimize the “tenant-current-model”, Konstanz has won a German competition. The City will focus on new digital and effective living standards at a new quarter which will be built up in the near future. The local CoSSMic partners will use their gained knowledge in conjunction with the local university of applied science to train students with the technologies. Furthermore, the city is interested to implement the technology in the new neighbourhood, as long as the novel technology works operationally in a secure way.

Moreover, all partners were urged to describe their potential for commercial exploitation or use of the CoSSMic results, based on the IP summarised in D7.1 IP-directory, resulting in the paragraphs below.

2.8.1. SINTEF's potential for exploitation of results

Through the participation in the CoSSMic project SINTEF has built considerable knowledge about energy smart neighbourhoods and their potential role in a more sustainable and distributed energy supply system for the future. More concretely SINTEF has contributed to the following project results:

- The overall concept and architecture of the CoSSMic solution
- The hybrid (predictive and reactive) optimization and control mechanism (WP3, WP4)
- The technology baseline of the CoSSMic system (WP3)
- The design and implementation of the CoSSMic graphic user interface of the prototype (WP2).
- The CoSSMunity gamification concept and prototype implementation (WP2)
- The investigation of business models for local PV (WP2)
- Design of the simulation software framework (WP6)
- The evaluation design and the evaluation (WP6)

Being a research institute, for SINTEF the primary venue for exploitation of project results, both the acquired knowledge and the developed software, will be further research and innovation projects. At the time of writing SINTEF is involved in the following activities where the use of CoSSMic results are planned:

- The DOMINOES H2020 project proposal together with the other CoSSMic partners described above.
- The Zero Emission Neighbourhoods (ZEN) centre, which is a collaborative research centre funded by the national research council as part of a national initiative to promote renewable energy. It is hosted by CoSSMic partner NTNU and includes a number of industry and public partners. The budget is 400 MNOK over a period of 8 years. The plan is to use the CoSSMic prototype and the simulator for investigating the possible contribution of smart management of electric power consumption and local production to achieve zero emission neighbourhoods.
- The GreenCharge H2020 proposal focusing on smart sustainable charging infrastructure for EVs. It is a two stage proposal coordinated by SINTEF. The first stage proposal was submitted in January. The key idea is to integrate the charging infrastructure with energy smart neighbourhoods with local PV based energy production. Recent studies indicate that with a high penetration of EVs and local PV, this is a good match that could almost eliminate the need for additional storage

in the houses as well as additional central production and transfer capacity in the public grid¹ to accommodate the shift. It is planned to use the CoSSMic prototype in field trials to collect data on the effect of smart neighbourhood wide energy management in this context, and in the evaluation phase to investigate the effect of factors not so easily varied in trials.

- SINTEF participates in a proposal for the "Smart Cities and Communities lighthouse projects" call together with the cities Oslo, Toulouse and Sevilla, where CoSSMic technology is planned as an element in a smart EV charging experiment.

Commercial exploitation of R&D results

SINTEF normally leaves commercial exploitation of project results to commercial partners, but occasionally also engages in the establishment of spin-off companies to take care of it. In this case there are no plans for spin-offs. One reason is that because of our far north location and a power supply systems almost entirely based on hydroelectric power, the market for solar is not so hot in Norway. Also we do not have suitable commercial partners on board. However in both the H2020 proposals mentioned above we have picked European commercial partners that have suitable profiles to take such a role.

SINTEF's knowledge has been developed as a joint effort between: WP2, WP3, WP4, with the following partners: SINTEF, ISC and SUN. The product has proven to be of interest to end users as well as energy suppliers and distribution system operators. It can be sold either directly to users or electricity companies to be further distributed by them.

2.8.2. ISC's potential for exploitation of results

ISC has contributed to and gained the following knowledge from the project:

- Roadmap how to work out a smart household and integrate it into a smart neighbourhood by inter- and intra-household communication and power/energy transfer. In particular by the integration of PV yield prediction and consumption task scheduling based on improved weather and demand side management forecast.

This knowledge was developed as a result of participation in a number of WP's; in WP2 the preferences, expectations, restrictions and limitations of users could be explored and proofed. WP3 gave a clear roadmap of the concept and planning of the software development which has been realized in WP4 under the interactive support of preliminary results of WP5 and WP6 installed and maintained within WP5 and finally the results evaluated in WP6..

The hardware selection and deployment in Konstanz has been supported by SST, SINTEF, and Konstanz, the user-selection and evaluation by Konstanz and SST, the software development and deployment in cooperation with SUN, UiO and SINTEF.

ISC has already used the knowledge for further research and development projects:

- | | |
|--|------------------------------|
| • CALLIA – Smart Grid ERA Net + | July 2016 – March 2019 |
| • C/cells German Ministry of Economy(BMWi) | January 2017 – December 2020 |
| • Ehoch4-Quartier 4.0 (Umweltministerium BW) | May 2016 – May 2018 |

Commercial exploitation of R&D results

The knowledge we built up in the frame of "Energy Storage - ICT Solutions - PV Systems" will be a basis for future public workshops as already been held within the project CoSSMic. Additional to that

¹ FORREST, Kate et al. Charging a renewable future: The impact of electric vehicle charging intelligence on energy storage requirements to meet renewable portfolio standards. Journal of Power Sources 336 (2016) 63-74, Elsevier

ISC will offer smart grid knowledge to educate students and small and medium size enterprises to support them to go on for smart energy utilization.

2.8.3. Stadt Konstanz' potential for exploitation of results

As this was the first time the city of Konstanz participated in an EU-project, much knowledge was gained from collaboration in such a scheme and from the different partners, such as:

- The City of Konstanz did learn how to deal with a special topic: a EU- funded scientific-project
- The City of Konstanz did learn how to deal with an epistemic community
- The City of Konstanz have learned about the different levels of market readiness.
This is a key point for getting partners/ coordinators on board
- Within the administration of the local government it is hard to get attention on projects which have a roll out in mid-term focus or even with a longer focus (Housing-Development, Energy-management)
- The specific circumstances of different institution one should spend more attention: the market orientated Stadtwerke as an important partner are reacting at technology readiness level 8/9
- The community of institutions and companies dedicated to renewable energies are getting a lot of input from the project, especially when there are conferences at local level to get them introduced about the idea of the project
- The local business development department of the city of Konstanz will participate or coordinate more projects focusing on smart and sustainable energy
- Users within a scientific project are to be selected with care and preset requirements
- It is a different story if scientist are communicating to users with the specific focus of technology or a person who is caring about people and the whole process like an information manager; e.g. when there is a danger for the food during the trial

2.8.4. Boukje.com Consulting's potential for exploitation of results

The logo, images used to visualise the CoSSMic results, and the theme-song at the beginning of the CoSSMiC video's are within the copyright of Boukje.com Consulting (BCC). However, BCC wavers all copyrights to the partners, as long as they will accredit the CoSSMiC project whenever using them outside the scope of the project.

2.8.5. Sunny Solartechnik's potential for exploitation of results

With the knowledge gained from the implementation of the trials in Konstanz, SST has elaborated its experience and expertise in the field of smart integration and installation of PV. Moreover, it has benefited from the insights into consumer behaviour, to expand its advice on storage and smart use of electricity for consumers, giving it a cutting edge advantage from its competitors.

SST actively drove the agenda of the workshops in Konstanz, to spread the information gained within the project and to create economic benefit for the company and the economic region. Therefore, the company was getting a very broad and useful network, especially within leading pioneers and market leaders in the field of energy storage systems. Focussing on the consumer's side, the company got significant more requests to inform end-users and to sell energy production and storage systems.

2.8.6. University of Oslo

The University of Oslo's core activities are to advance science through excellent research, and to pass the insight gained in the research on to students in relevant courses. Being publicly funded, the main mission is to provide the results of projects back to the society through disseminating the knowledge in

research papers, through educating candidates with up to date expertise in their fields, and to release source code and research data openly for others potentially to exploit in their economic activities.

UiO's main result in CoSSMic is the distributed task scheduler that assigns consumers' load requests to producers based on the prediction of the producers' electricity production and the consumption profile of the load. This has expanded the field of stochastic combinatorial optimization, and reinforcement learning is used for matching loads with producers in a distributed collaborative game where all users and producers are payers. The resulting implementation has been released as open source under the LGPLv3² license. UiO will maintain and expand this implementation over the coming years, promoting the solution to other fields needing stochastic matching.

UiO will try to promote this approach as a starting point for other research projects. This has already been accepted by the EasyCharge proposal (GV-8-2015), which unfortunately was not retained, and the GreenCharge proposal (MG-4.2-2017) now under first-stage evaluation.

The CoSSMic solution itself is the technical enabler for the DOMINOES (EE-12-2017) proposal. Coordinated by UiO, a consortium has been assembled to allow city citizens living in apartment buildings to participate to the enlargement of the PV market by sharing, like a CoSSMic "neighborhood", the electricity produced by PV systems on the roofs of the apartment buildings. A professional software house is participating to DOMINOES with the objective of ensuring professional quality of the demonstrated extended CoSSMic platform, and the platform will be interoperable with both household devices and back-end DSO business systems in a large scale technology demonstration real, inhabited apartment buildings and neighborhoods. The resulting DOMINOES platform will be offered with commercial support from the software house to DSOs wanting to replicate and deploy the DOMINOES solution for their clients; and thereby offer commercial CoSSMic exploitation.

UiO has also established a cross-faculty initiative, UiO:Energy³, aiming to coordinate and promote UiO's portfolio of research, teaching, and results in the domain of renewable energy systems. As such, UiO participated to a proposal for funding for 8 years from the Research Council of Norway (RCN⁴) for a Centres for Environment-friendly Energy (FME⁵). This proposal was unfortunately not retained for RCN funding, but the industrial partners found it so interesting that they will fund the center directly. Currently, UiO:Energy and the municipality of Oslo are looking at Smart City initiatives where the CoSSMic distributed scheduler can be enhanced and extended.

2.8.7. SUN's potential for exploitation of results

SUN has contributed to and gained the following knowledge from the project:

- The architecture of the CoSSMic system, the technology baseline of the CoSSMic system, from WP3
- The concept of prediction-based control mechanism, from WP3/WP4
- The user interface software (i.e. GUI based on emoncms), from WP2
- business model, from WP2
- Simulation software framework, from WP6
- Evaluation framework, from WP6

² <https://www.gnu.org/licenses/lgpl-3.0.en.html>

³ <http://www.uio.no/english/research/strategic-research-areas/uio-energy/index.html>

⁴ http://www.forskingsradet.no/en/Home_page/1177315753906

⁵ http://www.forskingsradet.no/servlet/Satellite?c=Page&cid=1222932140849&p=1222932140849&pagename=energisenter%2FHovedside_mal

In particular, SUN has developed the extended emoncms module of the CoSSMic software - together with SINTEF and ISC - has developed drivers and interfaces for commercial meters and embedded devices, integrating prototype platform to be used in industrial and academic contexts. It has applied machine learning techniques and developed new methodologies - in collaboration with UIO - for the modelling and representation of energy profiles of consuming appliances.

SUN plans to exploit these new developments in smart energy and in other application contexts, such as monitoring of water networks or Cloud delivery of CoSSMic technologies in terms of sensor as service in distributed SCADA solutions. SUN will exploit CoSSMic foreground in terms of original techniques and new technologies in related researches and application context such as IoT and Big Data. SUN will also set up collaborations with IT companies, which are interested in CoSSMic technology transfer to innovate their business, by research agreements, but also by hosting and hiring graduating students. SUN is already introducing in its academic courses and master thesis the knowledge and expertise gained through Cossmic, both in terms of theoretical results and new technologies.

Thanks to its role of main developer for Cossmic's Distributed Multi Agent and Simulator systems, SUN has established contacts and collaborations with a number of important national (Italian) based IT industries active in Software Engineering and Smart Energy area, such as IBM Italia (Rome), Oracle Italia (Rome), Ericsson Italia (Pagani), Microsoft Italia (Rome), IREN (Turin), Enel Green Power (Rome). Promotion of the Cossmic activities and results for possible take up have been performed through provided seminars at their premises, and several internal meetings.

Contacts have been established with a number of public institutions, for possible take up of CoSSMic results. Most important ones include: Italian Agency for Digital Italy (AGID) of the Italian Ministry of Economic Development, Ministry of Defence, and a number of municipalities (e.g. Castellammare di Stabia). At the moment it is under investigation the possibility to utilize the Cossmic results from Ministry of Defence, for their headquarter "Città Militare della Cecchignola" in Rome. Letters of interest are in the appendix. Also with the municipality of Castellammare di Stabia discussion is going on for possible take-up of Cossmic results in their SmartCities agenda.

Thanks to its role in Cossmic SUN's team has increased visibility at national and international level. SUN is among a few Italian public universities currently participating to European EC-FP7 funded Projects on Smart Energy. SUN's participation in Cossmic is having an impact on the SUN's score of Italian Ministry of University evaluation scheme for Public Universities' funding.

Scientific publications' production of the SUN scientific personnel has benefitted from the participation in Cossmic. A relevant number of conference publications, and a satisfactory number of book chapters and journal papers has been up to now a successful scientific outcome.

SUN will exploit the knowledge and results gained from CoSSMic in future research projects.

Currently CoSSMic results have been considered in several on-going proposals, for both EU projects and national projects, in partnership with main national industries and research institutions, featuring as baseline the scientific expertise and technology achievements maturing within the Cossmic project. 3 PostDocs, one PhD student, and 2 young research assistants have been hired on the project, thus providing an high level opportunity for professional experience at international level to young persons. A relevant number of Master theses have been conducted on Cossmic related topics.

Commercial exploitation of R&D results

Knowledge has been developed as a joint effort between: WP2, WP3, WP4, WP6 with the following partners: SINTEF, ISC and UiO.

2.9. Deviations from plan

The only deviation from the initial plans is that Boukje.com (BCC) has taken over the hosting and maintenance of the project website. This allows for a more efficient route from initial result to dissemination, since now only one project partner coordinates the website content. In the revised workplan, Boukje.com has been allocated some more time to spend on the website maintenance.

The Legal Assessment will be starting later than originally planned. Since the CoSSMic technology has taken quite some time to develop and since trials are still on-going, it was unclear what the precise legislative implication would be.

2.10. Use of resources/contribution of partners

There have been some deviations on the use of resources which has not affected the initial plans.

The city of Konstanz (and Sunny Solartechnik) needed more personmonths, to prepare, execute and follow up the 2 large and a smaller workshop that were organised, instead of just one workshop as proposed in the DoW. Hence, needing more resources.

Boukje.com has spent more resources on maintaining the website (a task not originally planned in the DoW), announcing the workshops, and filming the presentations from the workshop in Konstanz and putting them online in a visual attractive way.

In CoSSMic, most partners contributed to the overall goals of scientific dissemination. In practice, this means that partners freely cooperate in the preparation and publication of papers and presentations. NTNU has played a pivotal role in organizing the NorRen Summer school 2014. Stadt Konstanz, Stadtwerke, Sunny Solar Technik and ISC Konstanz fulfil an important role in maintaining contact with local stakeholders and interested audiences within the test region of Konstanz. SUN and the Province of Caserta fulfil a similar role in Italy. SINTEF keeps an IP database in preparation for the final report. Furthermore, SINTEF, NTNU and the University of Oslo disseminate CoSSMic results in Norway, while closely cooperating with SUN and ISC for the software development.

Annex Letter of Interest Ministry of Defence in Italy



MINISTERO DELLA DIFESA
DIREZIONE GENERALE PER IL PERSONALE MILITARE
Servizio Informatica
3^ Sezione – Processi di dematerializzazione e Banche Dati

Roma, 13 febbraio 2017

Oggetto: Conferma incontro del 13 febbraio 2017 c/o Palazzo “G.MESSE”-Viale dell’Esercito,186- Roma. Riunione su possibile take-up risultati progetto COSSMIC.

Con la presente confermo che in data odierna 13 febbraio 2017 ho incontrato il Prof. Di Martino per valutare la possibilità di impiegare gli esiti del progetto COSSMIC in ambito Città militare Cecchignola (Roma). Gli esiti della riunione sono di seguito specificati:

1. si conferma il potenziale interesse ad avviare una sperimentazione atta a valutare i benefici derivanti dall'adozione del sistema Cossmic per l'efficientamento energetico e l'ottimizzazione della produzione fotovoltaica all'interno della Città militare Cecchignola;
2. si procederà alla individuazione degli stakeholder di riferimento all'interno del Ministero della Difesa, per individuare i siti della Città militare Cecchignola che saranno coinvolti nella sperimentazione;
3. si procederà nella redazione di un MOU (memorandum of understanding) tra l'Università della Campania “Luigi Vanvitelli” - Dipartimento di Ingegneria Industriale e dell'Informazione (in rappresentanza del Consorzio Cossmic) ed il Ministero della Difesa, al fine di dettagliare le attività della sperimentazione.

Il Capo della 3^ Sezione
(Dott. Fabio CAPRABIANCA)

