Collaborating Smart Solar-powered Microgrids

FP7 Collaborative Project no 608806

Project duration:
October 2013 – September 2016

Coodinator:
Svein Hallsteinsen
SINTEF
Norway

Strategic objective:
6.4 Optimizing Energy Systems for Smart Cities

Website:
www.cossmic.eu

D6.3 Report on the influence of the system on the habits of users

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EDITOR

Joachim Glatz-Reichenbach / ISC

CONTRIBUTING PARTNERS

SINTEF, SUN, Caserta, Konstanz, SST, UiO, ISC

ABSTRACT

Report on results from questionnaires and interviews, how the installed systems influence the habits of users. The report is a documentation of the opinions and attitudes and their changes in user behaviour during the trial based on ethnographic observation in at least one case complemented by interviews with trial participants.

INTERNAL REVIEWER(S)	APPROVED BY
Shanshan Jiang/SINTEF	Svein Hallsteinsen

CITE AS

CoSSMic deliverable D6.3, Report on the influence of the system on the habits of users, 2016

CoSSMic consortium

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Document history

VERSION	DATE	VERSION DESCRIPTION
0.1	2016-11-30	PCOS proposed (Planned COntent and Structure)
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0.3	2016-11-30	Intermediate proposed (editor considers about 50% complete)
1.1	2017-02-21	Intermediate approved
1.2	2017-02-23	External proposed (proposed for external release)
		External approved
2.0	2017-02-24	Released
3.0	2017-03-31	New release

Table of contents

1 About this Document

1.1 Role of the deliverable

The purpose of this deliverable is to report on the stability and reliability of the installed hardware, the user-friendliness of the installed software, the influence of the entire system on lifestyle / active involvement, and other related issues as experienced by the users. The assessement is based on regular surveys and visits with the users in the trial groups, and on feedback from the training workshops organised in WP7. This user feedback will be valuable input to the further development of the of the COSSMic concept and technology.

Feedback has been collected from six different workshops, one in Norway, two in Germany (Konstanz) and three in Italy (Caserta and Vietri sul Mare). On these occasions questionnaires have been created and distributed to be filled out by the workshop participants for each country.The answers to the different questions on the flyers have been evaluated by the use of an excel-datasheet and a graphical evaluation of the input of the participants has been worked out.

1.2 Relationship to other CoSSMic deliverables

Feedbacks from the interviews and workshops have been used as input to further design of the CoSSMic software. Therefore, this deliverable provides input to deliverables in WP2, WP3 and WP4, in particular, D2.4, D3.2, D3.3, D3.4, D4.2 and D4.3.

1.3 Structure of this document

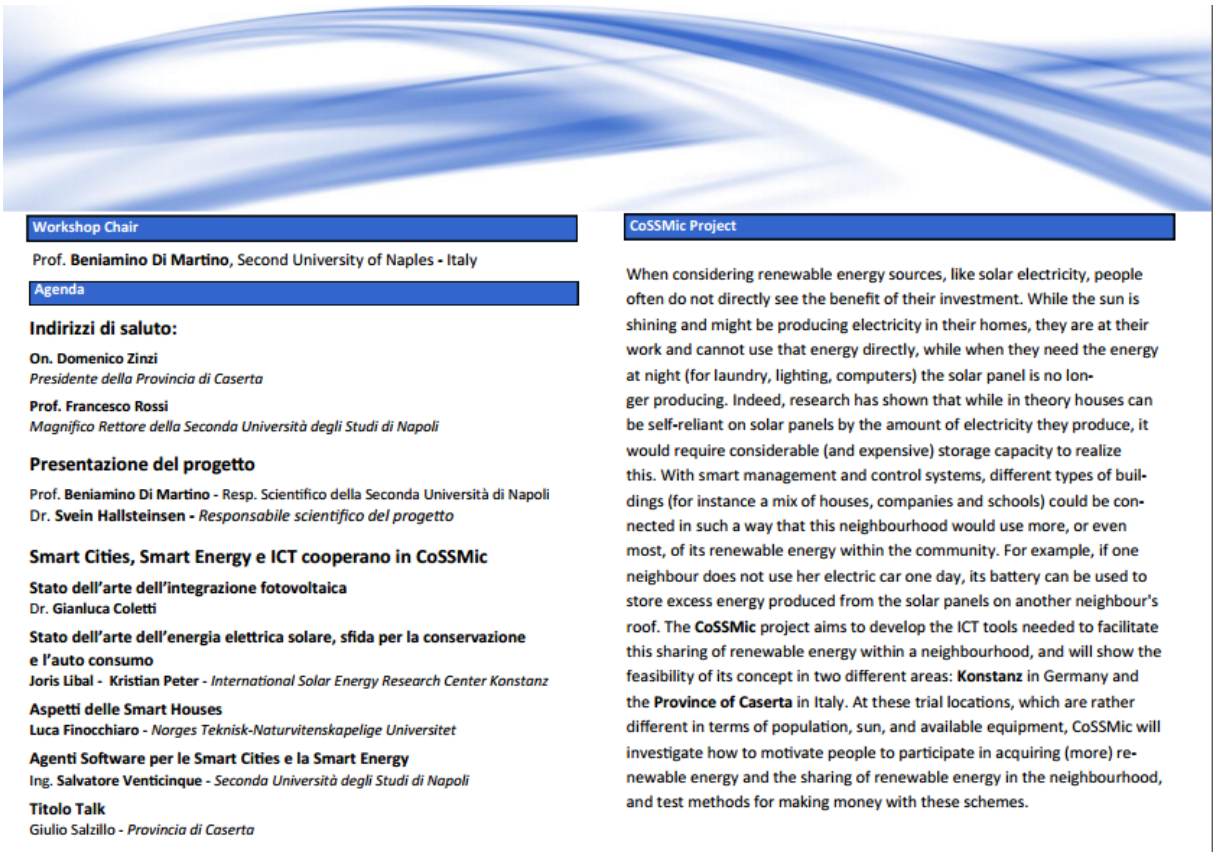
Chapter 2 gives an overview of the held workshops based on the collected flyers released o announce the workshops, Chapter 3 refers shortly on the CoSSMic GUI, Chapter 4 describes the analysis and the final evaluation of the filled out and returned distributed questionnaires, Chapter 5 gives an example of a case study with interview with participating trial users and followed by the concluding Chapter 6. Finally in the appendix one finds the distributed questionnaires in the original countries language.

2 The held workshops

2.1 In Italy

2.1.1 The one at Kick-off in Oct. 2013

The project kick-off meeting and a first start up workshop of politics, public interested and expert participation was held in Caserta, Italy. The two pages flyer to announce the workshop follows.



Workshop Chair

Prof. **Beniamino Di Martino**, Second University of Naples - Italy

Agenda

Indirizzi di saluto:

On. Domenico Zinzi
Presidente della Provincia di Caserta

Prof. Francesco Rossi
Magnifico Rettore della Seconda Università degli Studi di Napoli

Presentazione del progetto

Prof. **Beniamino Di Martino** - Resp. Scientifico della Seconda Università di Napoli
Dr. **Svein Hallsteinsen** - *Responsabile scientifico del progetto*

Smart Cities, Smart Energy e ICT cooperano in CoSSMic

Stato dell'arte dell'integrazione fotovoltaica
Dr. **Gianluca Coletti**

Stato dell'arte dell'energia elettrica solare, sfida per la conservazione e l'auto consumo
Joris Libal - Kristian Peter - *International Solar Energy Research Center Konstanz*

Aspetti delle Smart Houses
Luca Finocchiaro - *Norges Teknisk-Naturvitenskapelige Universitet*

Agenti Software per le Smart Cities e la Smart Energy
Ing. **Salvatore Venticinque** - *Seconda Università degli Studi di Napoli*

Titolo Talk
Giulio Salzillo - *Provincia di Caserta*

CoSSMic Project

When considering renewable energy sources, like solar electricity, people often do not directly see the benefit of their investment. While the sun is shining and might be producing electricity in their homes, they are at their work and cannot use that energy directly, while when they need the energy at night (for laundry, lighting, computers) the solar panel is no longer producing. Indeed, research has shown that while in theory houses can be self-reliant on solar panels by the amount of electricity they produce, it would require considerable (and expensive) storage capacity to realize this. With smart management and control systems, different types of buildings (for instance a mix of houses, companies and schools) could be connected in such a way that this neighbourhood would use more, or even most, of its renewable energy within the community. For example, if one neighbour does not use her electric car one day, its battery can be used to store excess energy produced from the solar panels on another neighbour's roof. The **CoSSMic** project aims to develop the ICT tools needed to facilitate this sharing of renewable energy within a neighbourhood, and will show the feasibility of its concept in two different areas: **Konstanz** in Germany and the **Province of Caserta** in Italy. At these trial locations, which are rather different in terms of population, sun, and available equipment, CoSSMic will investigate how to motivate people to participate in acquiring (more) renewable energy and the sharing of renewable energy in the neighbourhood, and test methods for making money with these schemes.

2.1.2 The first one in Feb. 2015

This workshop was given together in the course of the quarterly project meeting and with public participants in Vietri sul Mare, Italy. The flyer to announce the workshop follows.


SECONDA UNIVERSITÀ DEGLI STUDI DI NAPOLI
CoSSMic
PROJECT MEETING
Workshop dei risultati intermedi, del Progetto Europeo
CoSSMIC - Collaborating Smart Solar-Powered Microgrids
SMART ENERGY - OTTIMIZZAZIONE DEL CONSUMO E SCAMBIO DI ENERGIA ELETTRICA PRODOTTA DA FOTOVOLTAICO IN FABBRICATI E QUARTIERI
Mercoledì 4 Febbraio h. 10
Lloyds' Baia Hotel, Vietri sul mare, Salerno
Indirizzi di saluto
Welcome address
Giuseppe Paolisso | Rettore della Seconda Università di Napoli
Domenico Zinzi | Presidente della Provincia di Caserta
Massimiliano Mattei | Pro Rettore alla Ricerca, Valutazione ed Informatizzazione - SUN
Beniamino Di Martino | Responsabile Scientifico della Seconda Università di Napoli
Furio Cascetta | Direttore del Dipartimento di Ingegneria Industriale e dell'Informazione - SUN
Svein Hallsteinsen | Responsabile Scientifico del Progetto - SINTEF (Norvegia)
Ore 10:30-11:00 Coffee break
Ore 11:00 - 13:00 Presentazione dei risultati intermedi del progetto
Shanshan Jiang | Technical Project Leader - SINTEF
Joachim Glatz Reichenbach | WP5 - ISC
Salvatore Venticinque | WP4 Leader - SUN
Geir Horn | Wp4 University of Oslo
SINTEF
NTNU
SECONDA UNIVERSITÀ DEGLI STUDI DI NAPOLI

2.1.3 The second one in Oct. 2016

This workshop was given together in the course of the quarterly project meeting and with public participants in Caserta, Italy. The four pages flyer to announce the workshop follows.

PROJECT OBJECTIVES

The Computer Engineering group of Second University of Naples – DIII, coordinated by Prof. Beniamino Di Martino, participates, together with Provincia di Caserta and other seven European partners, at the European Project CoSSMic. The project aims at developing an innovative, autonomic ICT based system to coordinate energy usage and storage in buildings on neighbourhood level. It accomplishes this by facilitating loadshifting and two-way exchange of energy with public power grids. The system will be governed by building's inhabitants setting constraints, using devices such as smartphones or touchpads. Weather forecasts and pricing signals provided by electric power retailers and public grid operators will also be taken into account.

The SUN-DIII unit will develop a Software Agent based Platform for distributed monitoring of energy consumption at the appliances level, users behavior on energy usage, energy production of PV systems, other ambient factors (such as local weather prediction) and a distributed optimization, algorithm aimed at optimizing local neighborouds energy usage, local exchange of energy and sharing of storage capacity.
The CoSSMic technology will yield significant benefits in terms of reduced power bills and reduced peak loads on the public grid, thereby reducing the need for fossil fuel based backup production capacity. This approach will be demonstrated and assessed in trials in two testing regions, Konstanz (Germany)

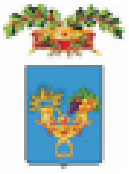
Project Info:
Project ID: 608806
Duration: 1 ottobre 2013 – 31 dicembre 2016
Total cost: 4.267 061€
Funded by European commission – Directorate General Connect call FP7—Smart Cities –2013
Funding scheme: Collaborative Project STREP

Project Partners:

SECONDA UNIVERSITÀ DEGLI STUDI DI NAPOLI
www.unina2.it
www.cossmic.eu

CSC_Centro Servizi per la Comunicazione d'Ateneo

SECONDA UNIVERSITÀ DEGLI STUDI DI NAPOLI



SMART ENERGY WORKSHOP

Dissemination Workshop of the European Project CoSSMic
Collaborating Smart Solar-Powered Microgrids

SMART ENERGY - OTTIMIZZAZIONE DEL CONSUMO E SCAMBIO DI ENERGIA ELETTRICA PRODOTTA DA FOTOVOLTAICO IN FABBRICATI E QUARTIERI

Giovedì 27 Ottobre h. 9.30
Amministrazione Provinciale di Caserta - sede centrale
Sala Consiliare - Corso Trieste, 133 Caserta

IL PROGETTO

La Seconda Università degli Studi di Napoli partecipa, insieme alla Provincia di Caserta al Progetto CoSSMic finanziato dalla Commissione Europea nell'ambito della Call SMART-C|T|ES del Settimo Programma Quadro per l'Information and Communication Technology.
Il coordinatore del progetto per la Seconda Università degli Studi di Napoli è il Prof. Beniamino Di Martino.

Il progetto coinvolge altri 8 partner da 4 paesi Europei: SINTEF (Norvegia) coordinatore del progetto, l'International Solar Energy Research Center Konstanz (Germania), la città di Konstanz (Germania), la provincia di Caserta (Italia), la Norges Teknisk-Naturvitenskapelige Universitet (Norvegia), la Sunny Solartechnik GmbH (Germania), la Boukje.com Consulting BV (Olanda) e l'Universitetet i Oslo (Norvegia). Il totale del finanziamento per il progetto è di 4,26 milioni di euro e le attività si svolgeranno dall'Ottobre 2013 al settembre 2016.

OBIETTIVI DEL PROGETTO

Il progetto CoSSMic ha l'obiettivo di sviluppare tecnologie innovative ICT allo scopo di facilitare la produzione ed immagazzinamento collaborativi e condivisione dell' energia rinnovabile e mostrerà la fattibilità di questo concetto in due aree differenti: la città di Costanza in Germania e nella Provincia di Caserta in Italia.

In queste zone di prova, che sono piuttosto differenti in termini di popolazione, quantità di luce solare e attrezzatura disponibile, CoSSMic sta coinvolgendo individui ed Enti Pubblici (tra cui diverse Scuole Superiori della Provincia di Caserta e la stessa SUN ed Ente Provincia) a partecipare alla produzione collaborativa – attraverso pannelli solari installati sulle proprie abitazioni ed edifici - e condivisione di energia rinnovabile, e proverà dei metodi per ottenere un guadagno economico attraverso scambi "intelligenti" legati ai profili di consumo e produzione.

La Seconda Università degli Studi di Napoli – Dip. di Ingegneria Industriale e dell' Informazione - sta sviluppando una piattaforma basata su tecnologie informatiche intelligenti che sfruttano agenti software. In particolare, lo scopo di questi agenti sarà quello di agire per conto degli utenti allo scopo di ottimizzare l'uso dell'energia, evitando quindi sprechi ed aumentando l'autoconsumo.

L'Università di Oslo sta definendo dei modelli di comportamento delle micro-reti intelligenti, governate da agenti software, che cercheranno di ottimizzare la soddisfazione dei propri utenti, partecipando a un mercato secondo meccanismi che consentiranno di migliorare le prestazioni globali della rete elettrica.

PROGRAMMA DELLA GIORNATA

Ore 9.30 - Welcome Address
Silvio Lavornia – Acting President of Provincia di Caserta
Massimiliano Mattei – Vice Rector for Research of Seconda Università di Napoli
Svein Hallsteinsen – Scientific Responsible of CoSSMIC
Beniamino Di Martino – Scientific Responsible for Seconda Università di Napoli

Ore 10.00 – COSSMIC PROJECT PRESENTATION
Svein Hallsteinsen – SINTEF
Beniamino Di Martino – Seconda Università di Napoli
Geir Horn – University of Oslo
Salvatore Venticinque – Seconda Università di Napoli
Rocco Aversa – Seconda Università di Napoli

Ore 11.30 – Coffee break

Ore 12.00 – EXPERIENCE WITH COSSMIC USERS AND TRIAL SITES
Joachim Glatz-Reichenbach – ISC Konstanz
Andreas Baur – City of Konstanz
Giulio Salzillo – Provincia di Caserta
Giovanni Russo – Energy Manager – Provincia di Caserta

Ore 13.00 – Lunch

Ore 14.00 – EC PROJECTS ON SMART ENERGY
Matteo Bonifacio – Representative of CIVIC – Univ. Of Trento
Krzysztof Piotrowski – Representative of e-Balance
Federico Boni Castagnetti – Representetive of FlexMeter – IREN
Gianpaolo Fiorentino – Representative of NOBELGRID and SUCCESS – Engineering

Ore 15.00 – THE INDUSTRY VIEW ON SMART ENERGY
Federico Boni Castagnetti – IREN
Marco Balzarotti – IBM
Giovanni Frattini – **Gianpaolo Fiorentino** – Engineering
Giuliano Calabrese – ATOS
Gaetano Arena – Beta 80 Group
Giorgio Graditi – ENEA – Agenzia Nazionale per le Nuove Tecnologie, Energia e Sviluppo Sostenibile

Ore 16.00 – Coffee break

Ore 16.30 – THE RESEARCH AND PUBLIC SECTOR VIEW ON SMART ENERGY
Giorgio Graditi – ENEA – Agenzia Nazionale per le Nuove Tecnologie, Energia e Sviluppo Sostenibile
Mauro Draoli – AgID – Agenzia per l'Italia Digitale
Alfredo Testa – ENSIEL – Consorzio interuniversitario nazionale per energia e sistemi elettrici
Antonino Mazzeo – CerICT – Centro Regionale Information Communication Technology
Carmine Landi – MeSE – Consorzio Interuniversitario Metriche e tecnologie di misura sui Sistemi Elettrici and Distretto Energia, Chimica verde ed Ambiente
Massimo Vitelli – Ordine degli Ingegneri – Provincia di Caserta
Antonio Pannullo – Sindaco – Città di Castellammare di Stabia

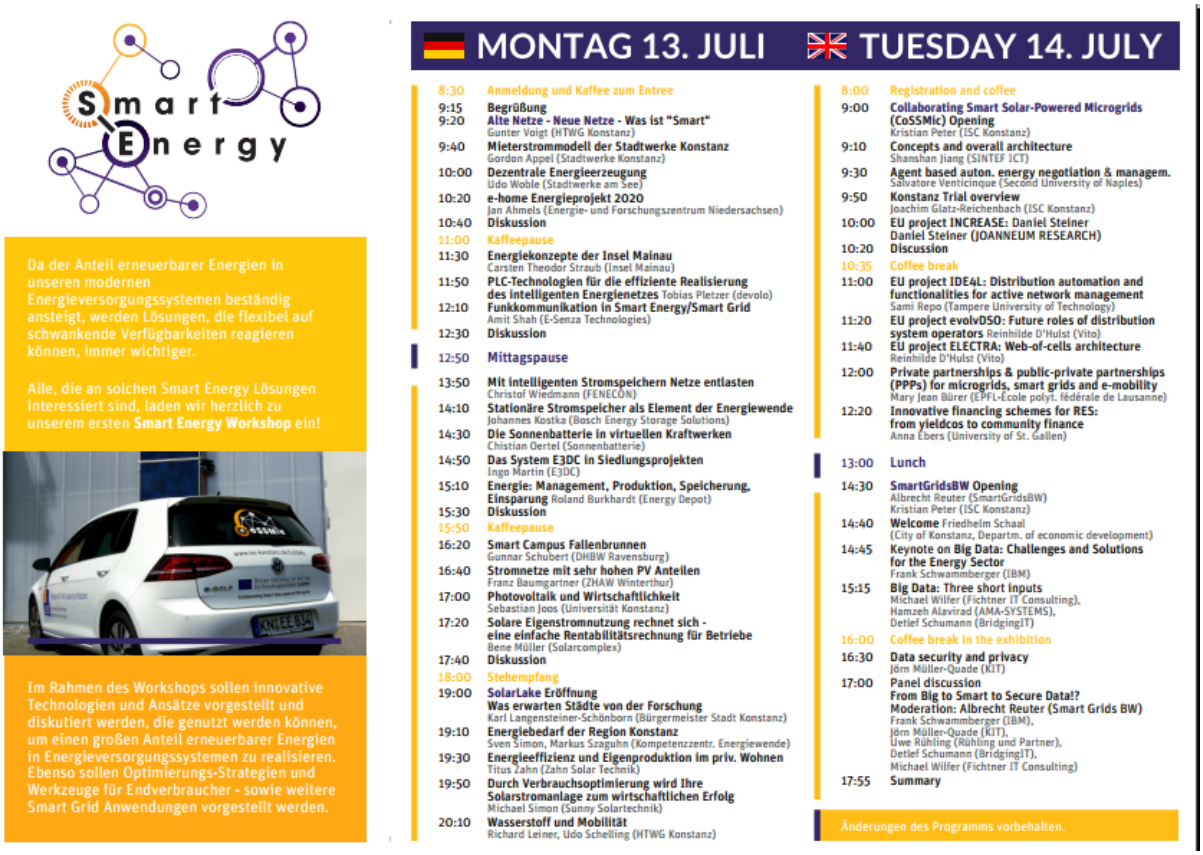
Ore 17.30 – Panel discussion

Ore 18.00 – Conclusions

2.2 In Germany

2.2.1 The first one in Jul. 2015

There was a first Smart Energy workshop of two days in Konstanz with more than 100 participants. The two pages flyer to announce the workshop follows.



2.2.2 The second one in Nov. 2016

The second Smart Energy workshop in Konstanz was one day long and had about 100 participants. The two pages flyer to announce the workshop follows.

Veranstalter

Das EU-Projekt **CoSSMic**, mit

Stadt Konstanz

Sunny Solartechnik GmbH

International Solar Energy Research Center

Veranstaltungsort

Konzil Konstanz
Hafenstraße 2
78462 Konstanz
www.konzil-konstanz.de

Organisation

ISC Konstanz e.V.
Rudolf Diesel Straße 15
78467 Konstanz
www.isc-konstanz.de

Anmeldung online

www.cossmic.eu

Die Teilnahme am Workshop ist kostenlos, setzt aber eine vorherige Anmeldung voraus.

Anmeldeschluss am **26. Nov. 2016**

Kontakt
schubert@ms-eventorganisation.de

Windpark Schneebergerhof mit Dünnschichtsolarzellen im Vordergrund by Armin Kübelbeck. Picture via CC BY-SA 3.0 Wikimedia Commons

Veranstaltet von

CoSSMic
solarLAGO smart energy network
SUNNY solartechnik
ISC International Solar Energy Research Center Konstanz

WORKSHOP II

Konzil, **Konstanz**
29. Nov. 2016

www.cossmic.eu

Smart Energy

Da der Anteil erneuerbarer Energien in unseren modernen Energieversorgungssystemen beständig ansteigt, werden Lösungen, die flexibel auf schwankende Verfügbarkeiten reagieren können, immer wichtiger. Dabei besetzen moderne Batteriespeichersysteme eine Schlüsselstellung und sollen einen Hauptaspekt der Veranstaltung bilden.

Alle, die an solchen Smart Energy Lösungen interessiert sind, laden wir herzlich zu unserem zweiten **Smart Energy Workshop** ein!

Im Rahmen des Workshops werden innovative Technologien und Pilotprojekte vorgestellt und diskutiert, die genutzt werden können, um einen großen Anteil erneuerbarer Energien in privathäuslichen und industriellen Energieversorgungssystemen zu realisieren. Ebenso werden Optimierungs-Strategien und Werkzeuge für Endverbraucher und weitere zukunfts-orientierte Smart Grid Anwendungen vorgestellt.

DIENSTAG 29. NOVEMBER 2016

Begrüßung

9:30 **Übersicht zum Workshop II**
Kristian Peter (ISC Konstanz)

Smart Energy Technology Applications
Diese Session wird auf Englisch gegeben

9:40 **CoSSMic-Overview**
Svein Hallsteinsen (SINTEF)

10:00 **CoSSMic-Trials**
Joachim Glatz-Reichenbach (ISC Konstanz)

10:20 Coffee break

10:50 **Predictions Demand/Supply**
Geir Horn (University of Oslo)

11:10 **Status and Perspectives of Battery Technology for PV Home Storage Systems**
Olaf Wollersheim (Solarwatt Innovation GmbH)

11:40 **C/sells The Energy System of the Future in the Southern German Solar Arc**
Thomas Brenner (Dr. Langniß ENERGIE & ANALYSE)

12:10 **Discussion**

12:30 Lunch

Anwendungen zur Speichertechnologie

13:30 **Speichersysteme neu durchdacht**
Thomas Hauser (RCT Power GmbH)

13:50 **StorEdge - die Speicherlösung von SolarEdge**
Marcel Seifritz (SolarEdge)

14:10 **Stromspeicher – Serienprodukte in allen Größen**
Christof Wiedmann (Fenecon)

14:30 **Energieversorgung in der Zukunft: Hybrid. Intelligent. Selbstbestimmt**
Andreas Perschke (E3DC)

14:50 **Mit Sonnen in die smarte Zukunft**
Marcel Meub (sonnen GmbH)

15:10 **Diskussion**

15:30 Kaffeepause

Stand vom **15. November 2016**
Änderungen des vorläufigen Programms vorbehalten.
Das aktuelle Programm finden Sie unter **www.cossmic.eu**

Regularien Förderung Eigennutzung

16:00 **Energieautarkie zu Hause**
Michael Simon (Sunny Solartechnik GmbH)

16:20 **TH-E Box für Quartiere**
Franz Reichenbach (ISC Konstanz)

16:40 **PV/Grosssspeicher für Gewerbe**
Roland Burkhardt (Energy Depot)

17:00 **Erfahrungsbericht über ein Quartierskonzept KfW-432**
Edgar Schmieder (Energie Concepte)

17:20 **Intelligente Kombination von PV und Wärmepumpe**
Claus Langner (ezee Energy GmbH)

17:40 **Zusammenfassende Podiumsdiskussion**

18:00 Pause Snacks Networking

Energie intelligent genutzt
Lösungsansätze und anschließender Meinungsaustausch

19:00 **Tageszusammenfassung und Einleitung zur Abendveranstaltung**

19:10 **Energieversorgung der Zukunft**
Friedhelm Schaal und Martin Wichmann (Stadt Konstanz)

19:30 **Die Zukunft der Photovoltaik liegt in der Systemintegration**
Franz Baumgartner (ZHAW)

19:45 **Solaroffensive Bodensee - Solarstrom und Solarwärme als Rückgrat der Energieversorgung in der Region**
Jörg Dürr-Pucher (Bodenseestiftung)

20:00 **Solares Bauen**
Thomas Stark (HTWG Konstanz)

20:15 **Erste Praxiserfahrungen mit dem Konstanzer Mieterstrommodell**
Gordon Appel (Stadtwerke Konstanz)

20:30 **Smart Grids Forschung für Stadtwerke – Antworten für die Herausforderungen der Energiewende**
Christoph Kondzialka (Smart Grids Forschungsgruppe Ulm)

20:45 **Wärmenetze als zentrale Bausteine der Energiewende**
Bene Müller (Solarcomplex AG)

2.3 In Norway

2.3.1 The only one in Sep. / Oct. 2016

The annual research fair in Trondheim ("Forkningstorget" in Norwegian) was organized as part of the annual Norwegian festival "The Science Days" (**http://www.forskningsdagene.no/**), where research institutions were invited to present their research results to the public. In 2016 SINTEF and NTNU teamed up and presented CoSSMic project in a stand during the research fair in Trondheim on Friday 30th of September and Saturday 1st of October. While elementary and middle school children were invited on Friday, the event was open for all on Saturday. Over 10000 people visited the event.

The stands were equipped with CoSSMic storyboard poster and video, and presented the user interface of the CoSSMic system deployed at Konstanz trial site. It was also conducted a survey and collected feedbacks about sharing of energy and their opinion of using a smart ICT system like CoSSMic.

The booth has attracted attentions from the public with different backgrounds. Some of them showed interests to be trial users of such a system and even contacted us about local collaborations in the future.

The following image gives an impression of CoSSMic at the annual research fair in Trondheim.

3 Discussion about the usability of CoSSMic user interface

A detailed evaluation on the used CoSSMic software was planned and referred to "CoSSMic GUI Likert Scale" discussion of the display of evaluated measured data. The following table gives an overview about the asked questions to the trial users. Due to the rather low answer feedback the evaluation couldn´t be performed in an adequate way which was largely due because the task scheduler did not perform satisfactorily until the end of the trial phase.

	>>CoSSMic GUI Likert Scale<<	**Strongly Disagree**			**Strongly Agree**	
	Question	**1**	**2**	**3**	**4**	**5**
1	The GUI elements provide enough information to help me being more energy efficient					
2	I believe that using the GUI, I will become more energy efficient					
3	I find that the GUI will be useful on my everyday life					
4	I believe that the consultation and usage of the GUI will become part of my routine					
5	It was easy to learn how to use the GUI					
6	I would find it easy to get the system to do what I want it to do.					
7	My interaction with the system would be clear and understandable					
8	I find the system to be flexible to interact with.					
9	It would be easy for me to become skilful at using the system.					
10	The GUI provides enough information for me to make conscious decisions about my energy usage					
11	The comparison with neighbours will drive me to increase my energy efficiency					
12	The GUI is attractive and pleasant					
13	I find the scores useful for keep track of my energy behaviour					
14	I like the tree and forest metaphores					

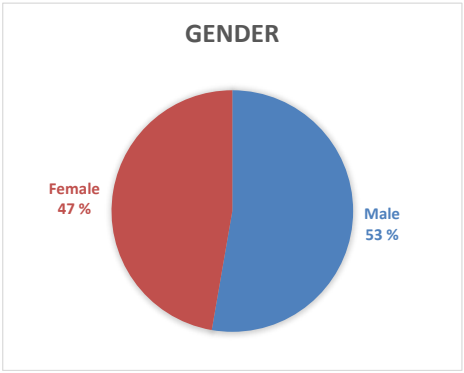
15	Getting a low score will motivate me to review my energy habits					
16	Getting a low score will trigger me to consult the system for tips on improving my energy habits					

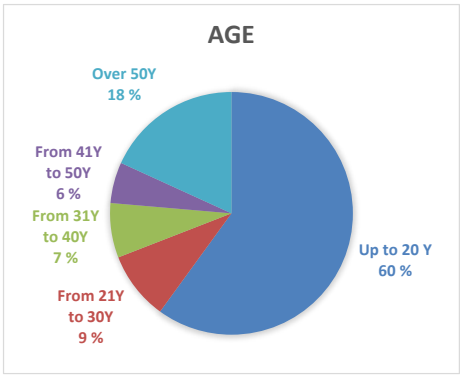
4 Data evaluation of the questionnaires

4.1 Results of the survey in Norway, Trondheim 10/2016

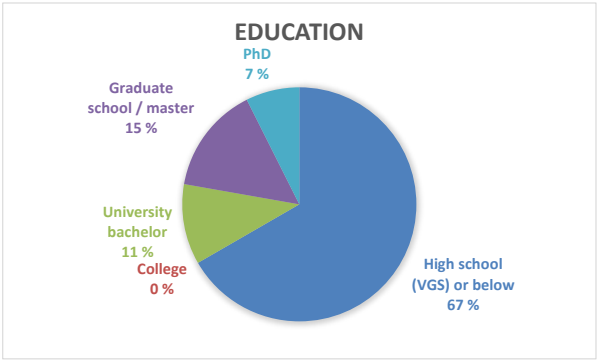
SINTEF performed a survey in connection with the dissemination event in the Research Fair September 30th and October 1st 2016 in Trondheim, Norway. While elementary and middle school children were invited on the first day, the event was open for all on the second day. We gathered 55 responses to the questionnaires handed out during the event. The following presents the results from the survey.

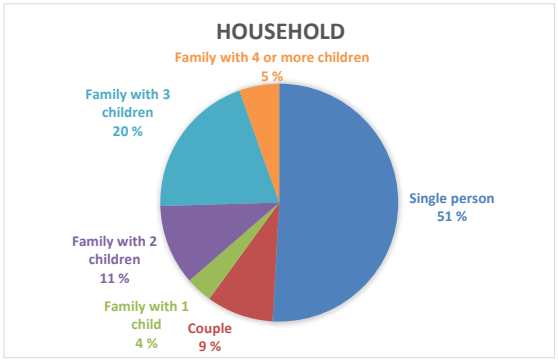
4.1.1 Demographics





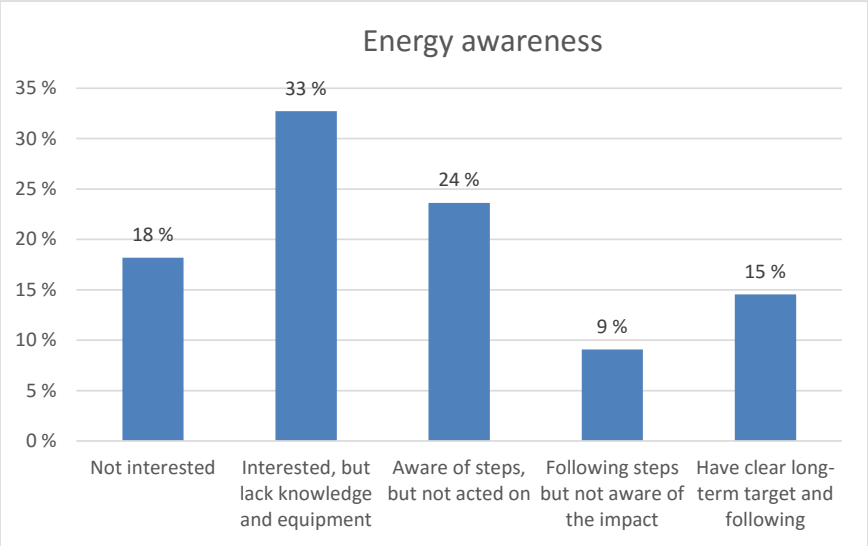
- **Repartition woman/man:** Slightly more men (53%) than women participated in the survey, but both males and females are well-represented.
- **Repartition according to age group:** Participants from different age groups were represented with a majority of participants were up to 20 years (60%) as the research fair has been targeted to young people the first day. The next largest group of participants were over 50 years (18%). The other participants were equally distributed between the groups “from 21 to 30 years”, “from 31 to 40 years” and “from 41 to 50 years”.





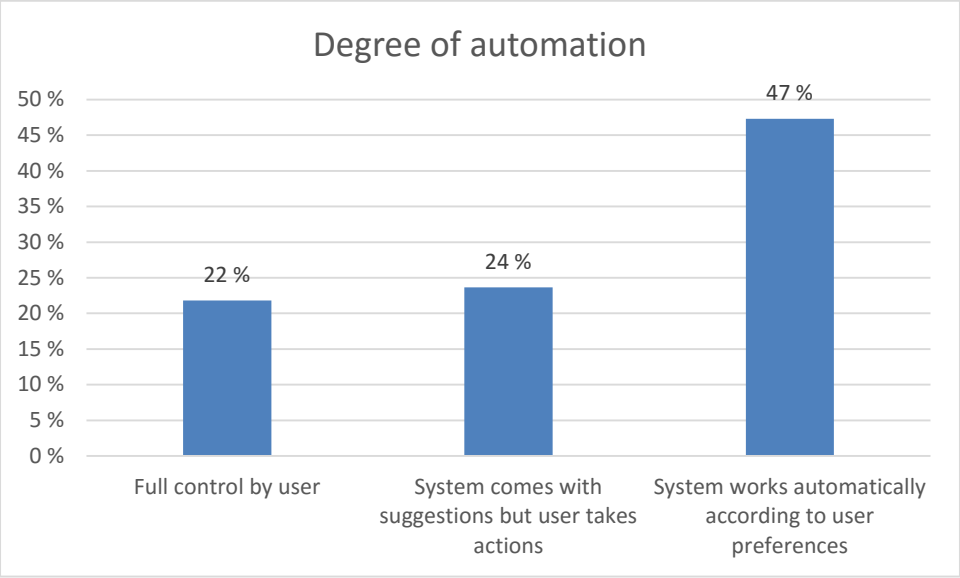
- **Repartition according to educational background:** A majority of participants has high school or below educational background (67%) as young people were the target of the event.
- **Repartition according to household:** About half of the participants were "single person". This could be because the young people considered themselves as "single" instead of considering that they were part of a family with one or more children. Otherwise, families with 2 or 3 children were the next largest groups.

4.1.2 Energy awareness



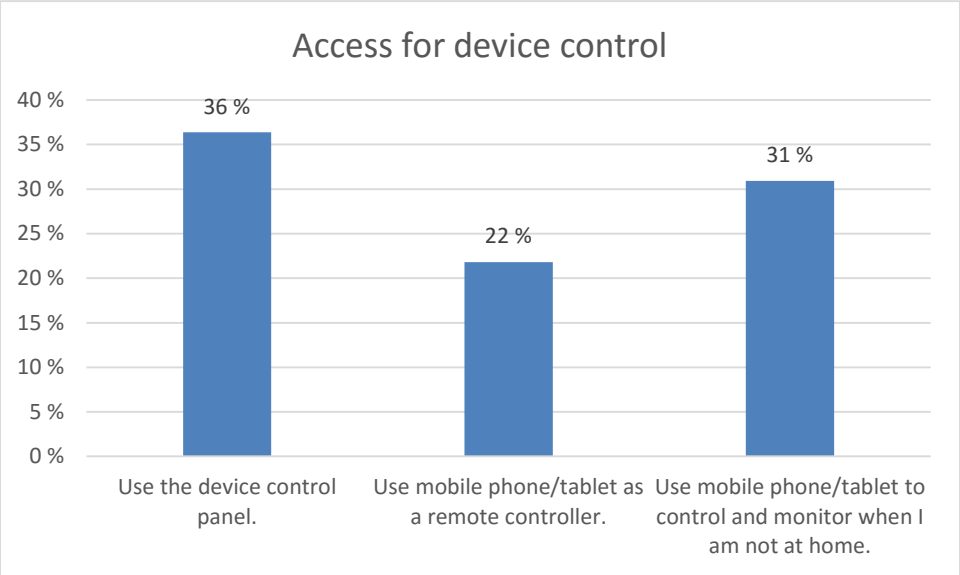
- The participants have different degree of energy awareness. One third of the participants were interested in energy efficiency, but lack knowledge and equipment to improve their energy efficiency. 24% of the participants were aware of the steps to become more energy efficient but had not acted on these steps. There were also some participants quite deeply involved in energy awareness. However, the majority of the participants (82%) did not use software, technical systems or smart phone applications to monitor their energy consumption and/or increase energy efficiency/awareness. This showed a great potential for utilization of a system like CoSSMic.

4.1.3 Degree of automation



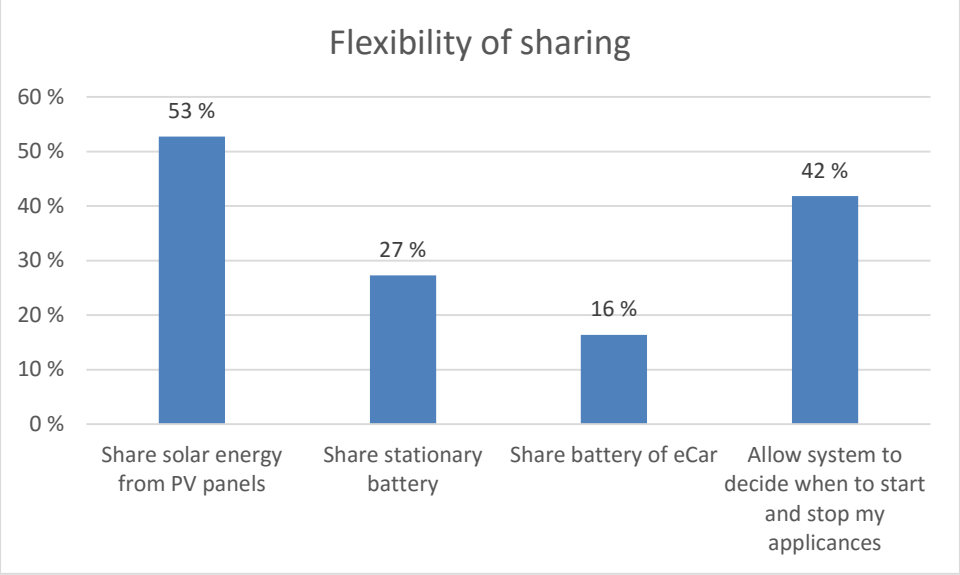
- About half of the participants would like the system to work automatically according to the user preferences.

4.1.4 Access for device control



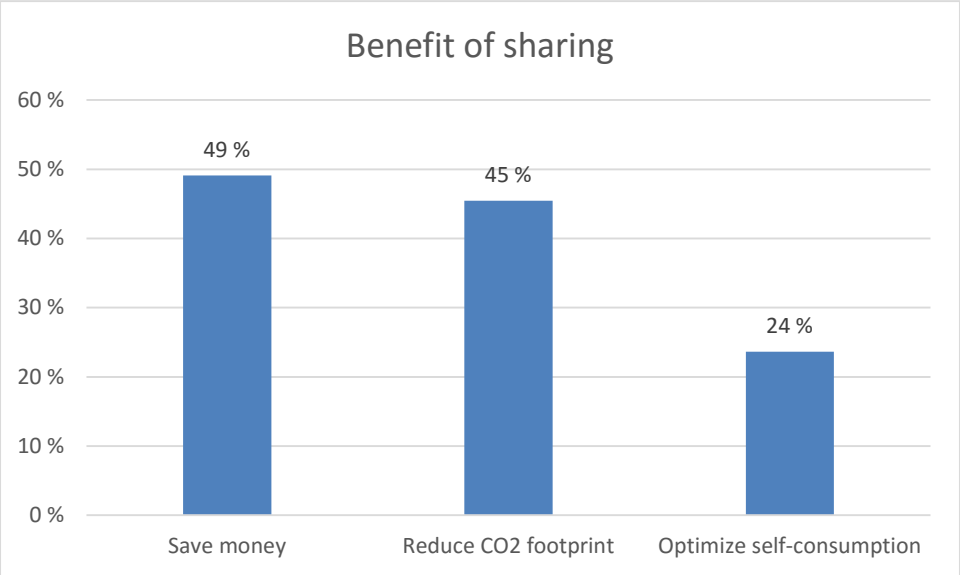
- Above one third of the participants would like to use the device control panel, and almost one third of the participants would use mobile devices to control and monitor when away from home.

4.1.5 Flexibility of sharing



- About half of the participants would share solar energy produced from PV panels, and 42% of the participants would allow the system to decide when to start and stop the appliances according to the needs and situation of the neighbourhood.

4.1.6 Benefit of sharing

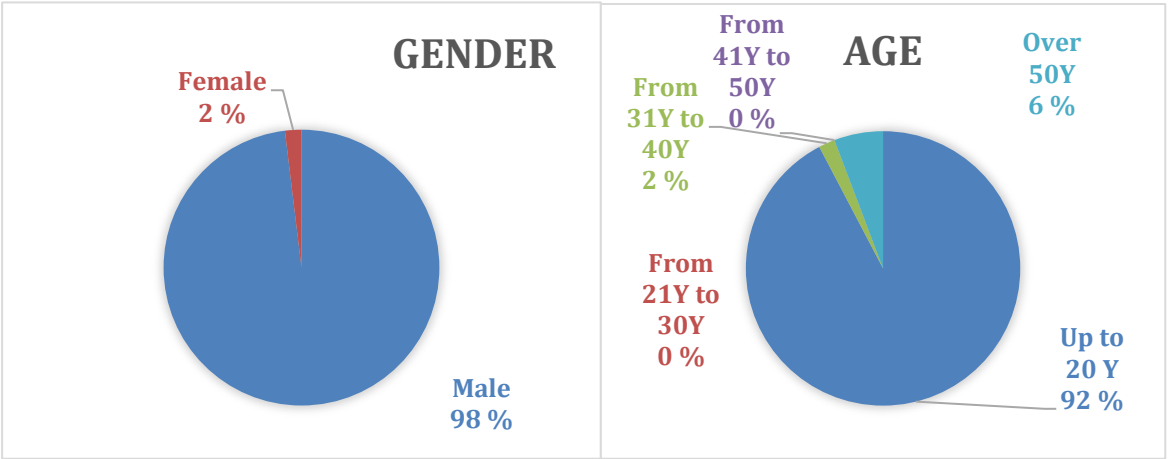


- It is interesting to see that most people were concerned with saving money (49%) and reducing CO_2 footprint (45%). The concern of CO_2 footprint could be related to the emphasis of environment friendly in the Norwegian school education.

4.2 Results of survey Smart Energy WS II, Italy Caserta 10/2016

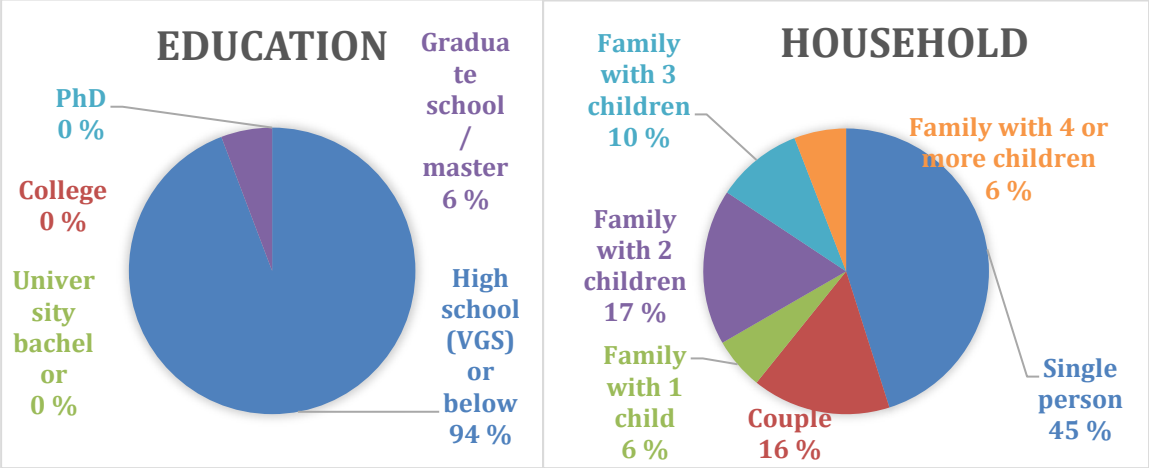
Province of Caserta together with SUN performed a survey in connection with the Smart Energy WS II on the October 27st 2016 in Caserta, Italy. While experts and engineers were invited, the event was open for all interested people, especially two school classes of representatives from middle and high school students were invited on the workshop. We gathered 52 responses to the questionnaires handed out during the event. The following presents the results from the survey.

4.2.1 Demographics



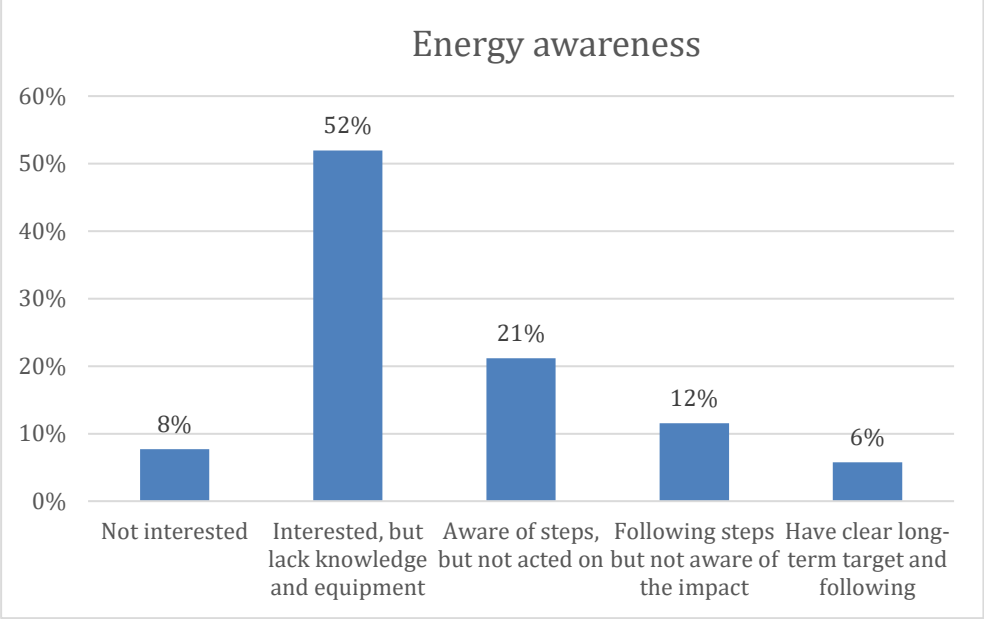
- **Repartition woman/man:** Almost only men except of the presence of one female participated in the survey.

- **Repartition according to age group:** The majority of the participants were up to 20 years old (92%) as most of the questionnaires returned from the participating students. The next largest group of participants were over 50 years (6%) and only 25 (one person) between 31 and 40 years.



- **Repartition according to educational background:** A majority of participants have already or want to become high school examination (94%) as most of the participants were young people.
- **Repartition according to household:** Because most of the participants were below 20 years in age, the given answers refer more to the status of their origin family background then of their own family status.

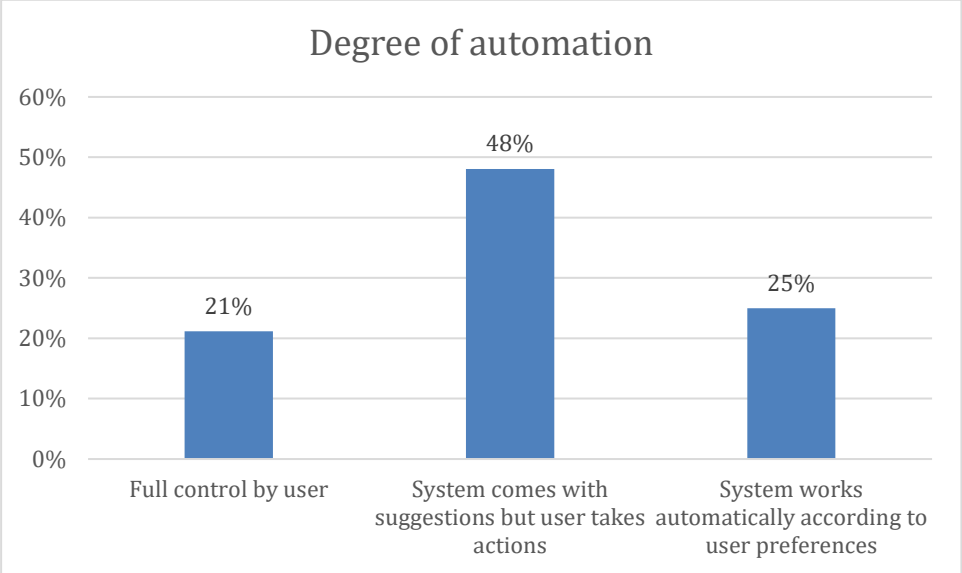
4.2.2 Energy awareness



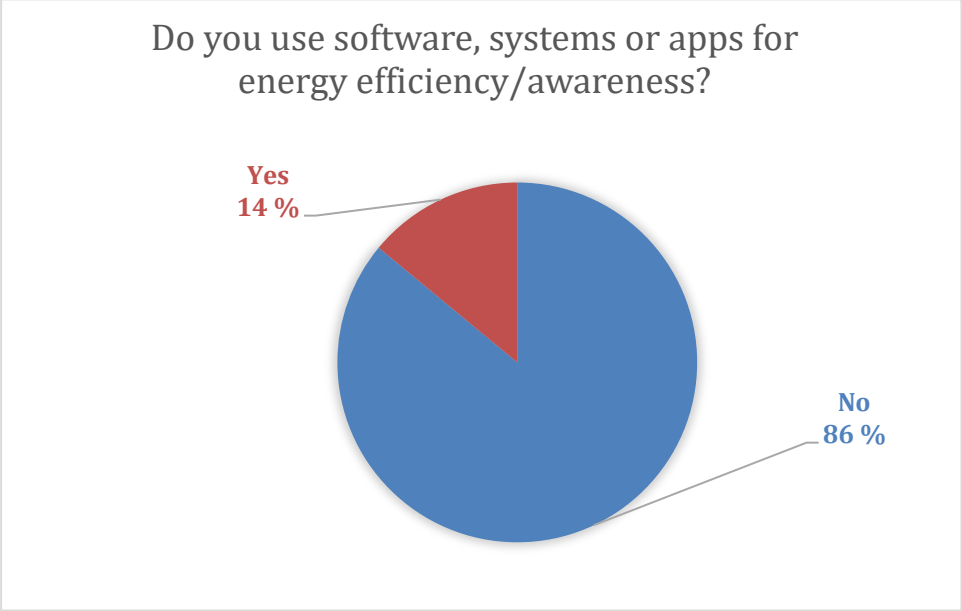
- The participants have different degree of energy awareness. About half of the participants were interested in energy efficiency, but lack knowledge and equipment to improve their energy efficiency. 21% of the participants were aware

of the steps to become more energy efficient but had not acted on these steps. There were also some participants (6%) quite deeply involved in energy awareness. However, the majority of the participants did not use software, technical systems or smart phone applications to monitor their energy consumption and/or increase energy efficiency/awareness. This showed a great potential for utilization of a system like CoSSMic.

4.2.3 Degree of automation

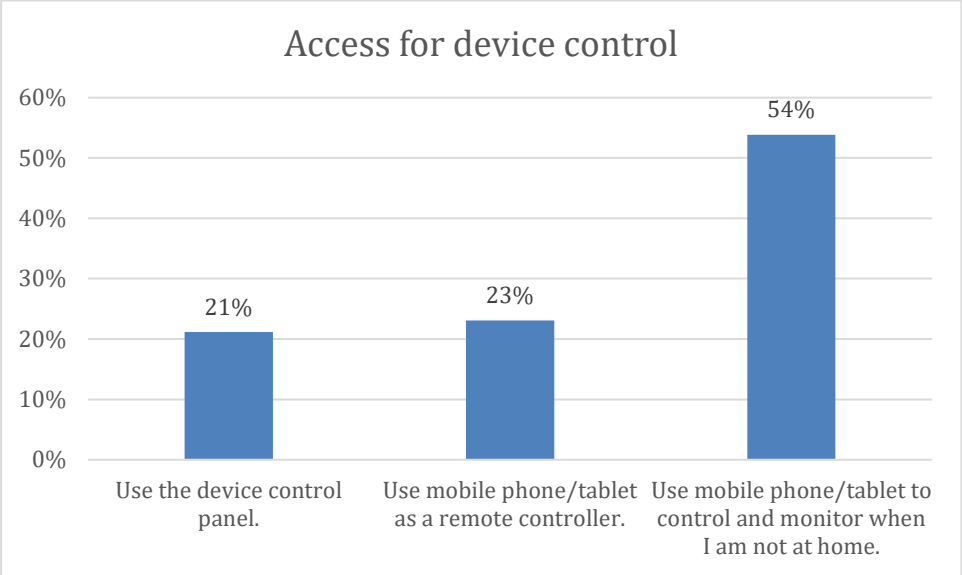


- About one quarter of the participants would like the system to work automatically according to the users preferences, however, half of all participants would like to get only suggestions from the system and would like to decide by themselves and one fifth wouldn´t get off control over the system at all.



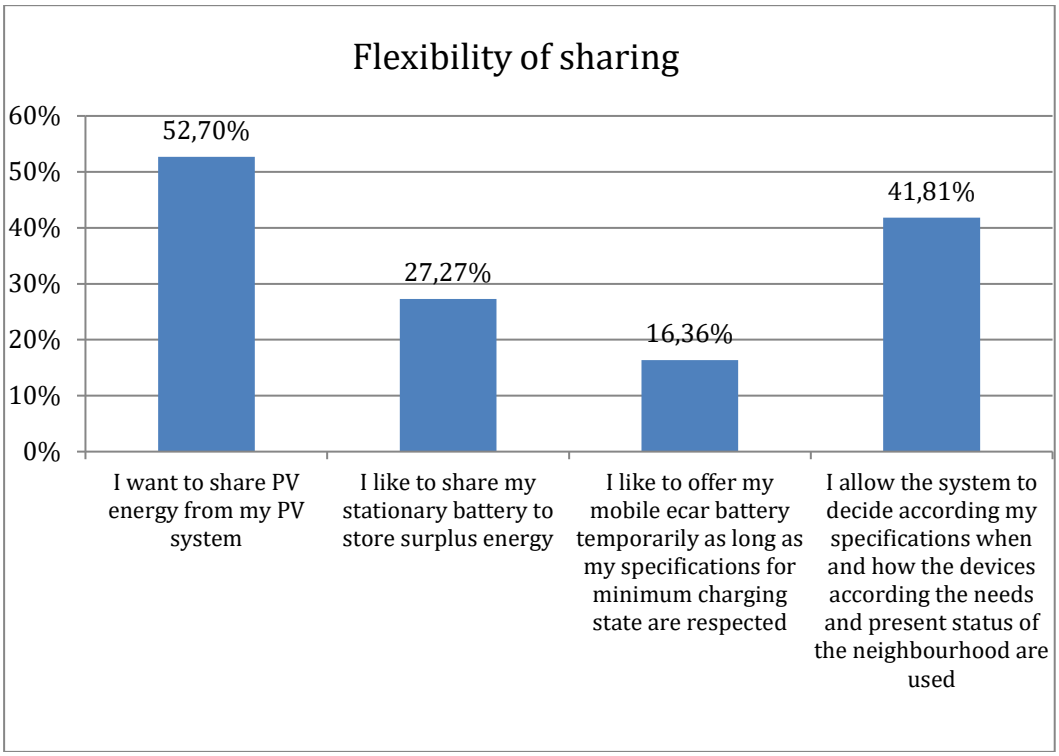
- However, the majority of the participants (86%) did not use software, technical systems or smart phone applications to monitor their energy consumption and/or increase energy efficiency/awareness. This shows a great potential for utilization of a system like CoSSMic.

4.2.4 Access for device control



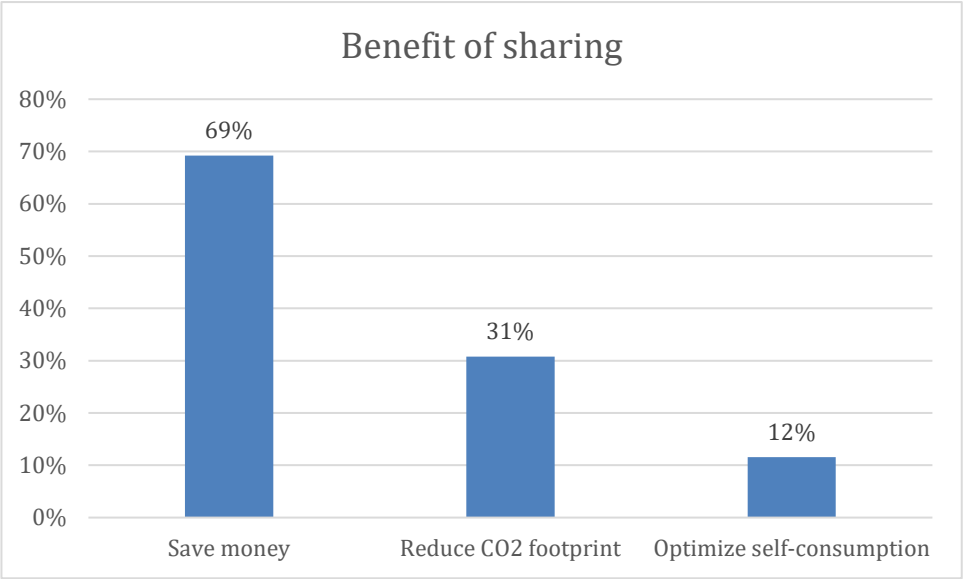
- About 21% of the participants would like to use the device control panel only, and even about one quarter when extended to mobile access whereas more than half of the participants would use mobile devices to control and monitor when away from home.
- Worth to mention that more than one answer / participant was possible, therefore the relative sum of answers exceeds 100%.

4.2.5 Flexibility of sharing



- About half of the participants would share solar energy produced from PV panels, and 42% of the participants would allow the system to decide when to start and to stop the appliances according to the needs and situation of the neighbourhood.
- Worth to mention that more than one answer / participant was possible, therefore the relative sum of answers exceeds 100%.

4.2.6 Benefit of sharing



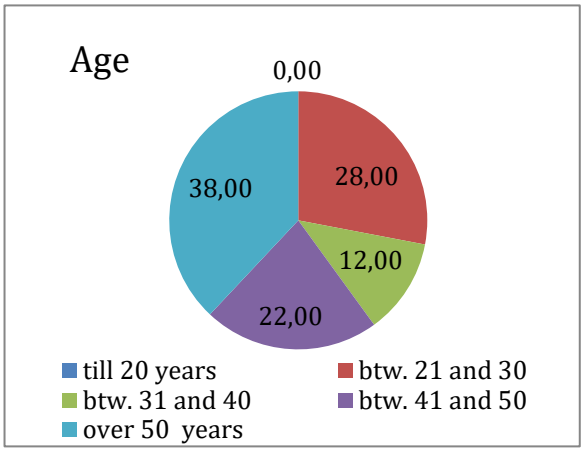
- Worth to mention that more than one answer / participant was possible, therefore the relative sum of answers exceeds 100%.

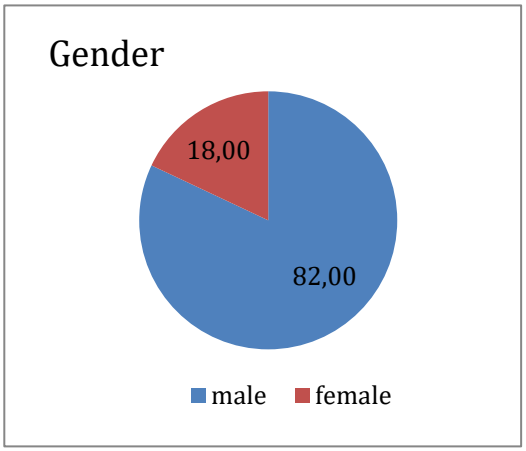
- It is interesting to see that most people were concerned with saving money (69%) and only 31% in reducing CO2 footprint. The optimization of self-consumption plays yet a minor role for the asked students.

4.3 Results of survey Smart Energy WS II, Germany, Konstanz, 11/2016

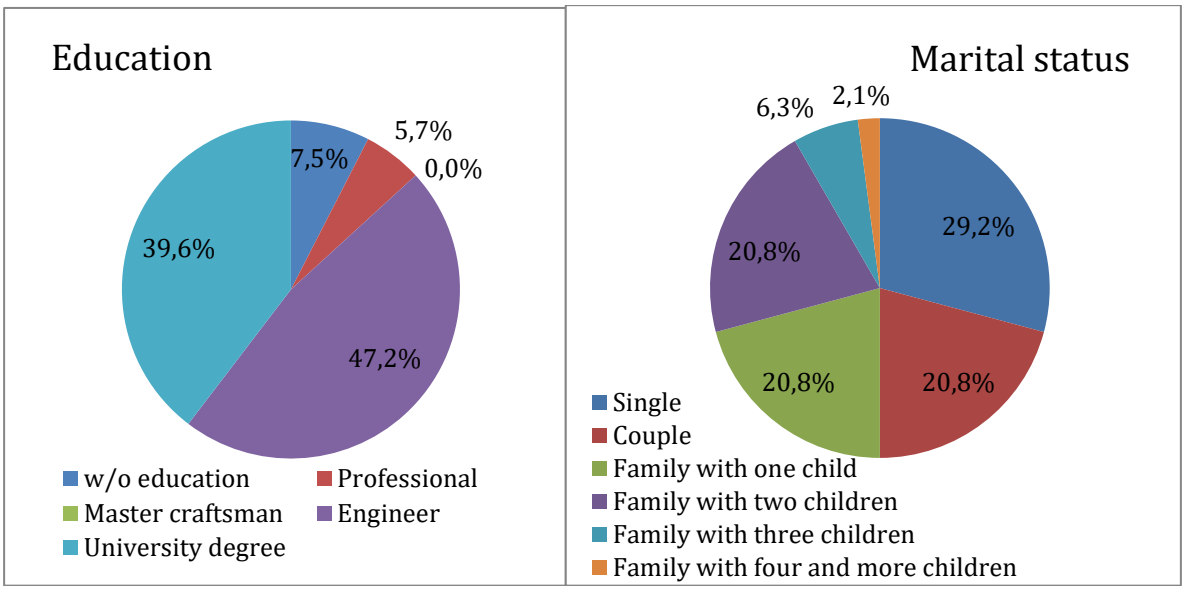
ISC performed a survey in connection with the dissemination event Smart Energy Workshop II on the 29th November 2016 in Konstanz, Germany. While experts and engineers were invited, the event was open for all interested people, especially citizens from Konstanz and surrounding communities. We gathered 52 responses of the about 130 questionnaires handed out during the event. The following presents the results from the survey.

4.3.1 Demographics



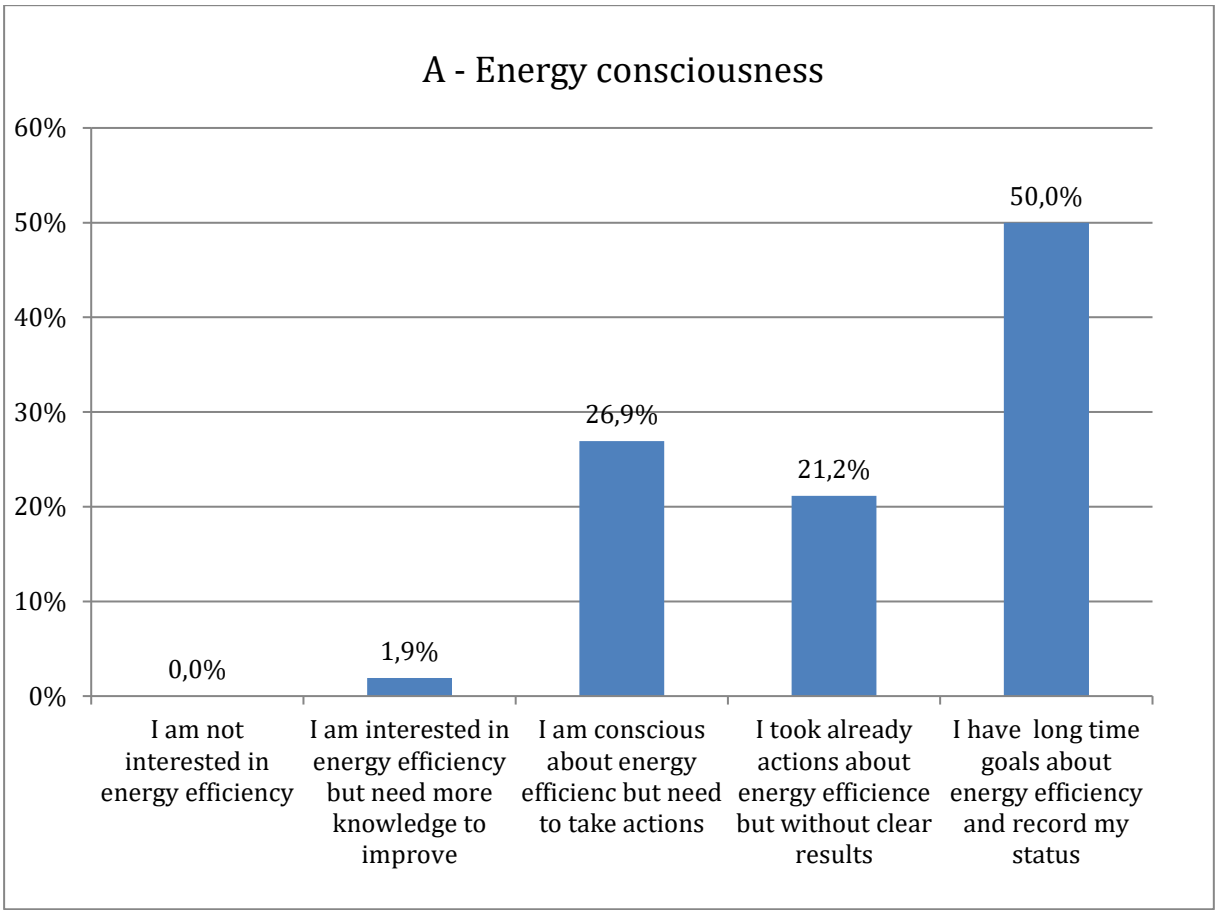


- **Repartition woman/man:** Much more men (82%) than women responded (and were also participated) in the survey.
- **Repartition according to age group:** Participants from different age groups were represented starting with up to 20 years as the Smart Energy Workshop addressed more to technical educated people. The two largest groups of participants were students (21-30 years, 28%) and people over 50 years (38%). The other participants "from 31 to 40 years" and "from 41 to 50 years" respresented together about 33%.

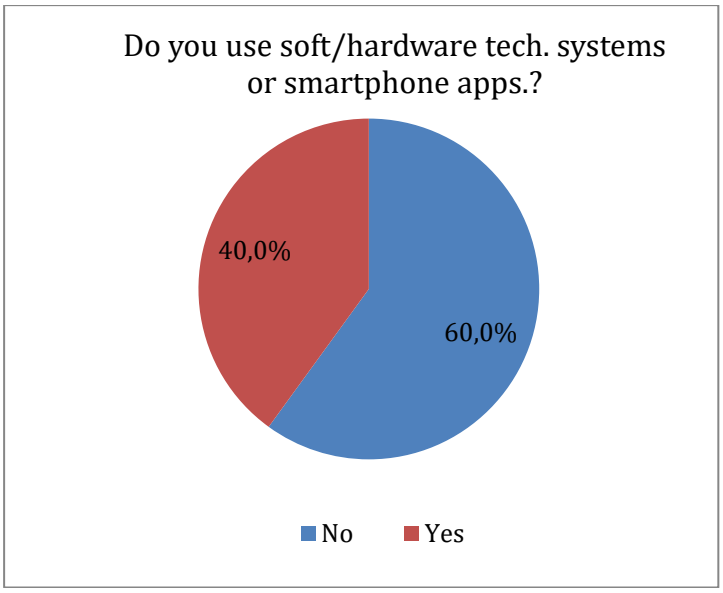


- **Repartition according to educational background:** A majority of participants has high mostly technical related educational background (92%) as such people were the target of the event. In the group of engineers also the students on their way to become soon an engineer were included. Important to mention that there was no master craftsman or –women presented in the evaluation.
- **Repartition according to household:** About 29% of the participants were "single person" which fits well with the percentage of students. Families with no to two children were equally represented and families with three and more children hold a about 8% share.

4.3.2 Energy awareness

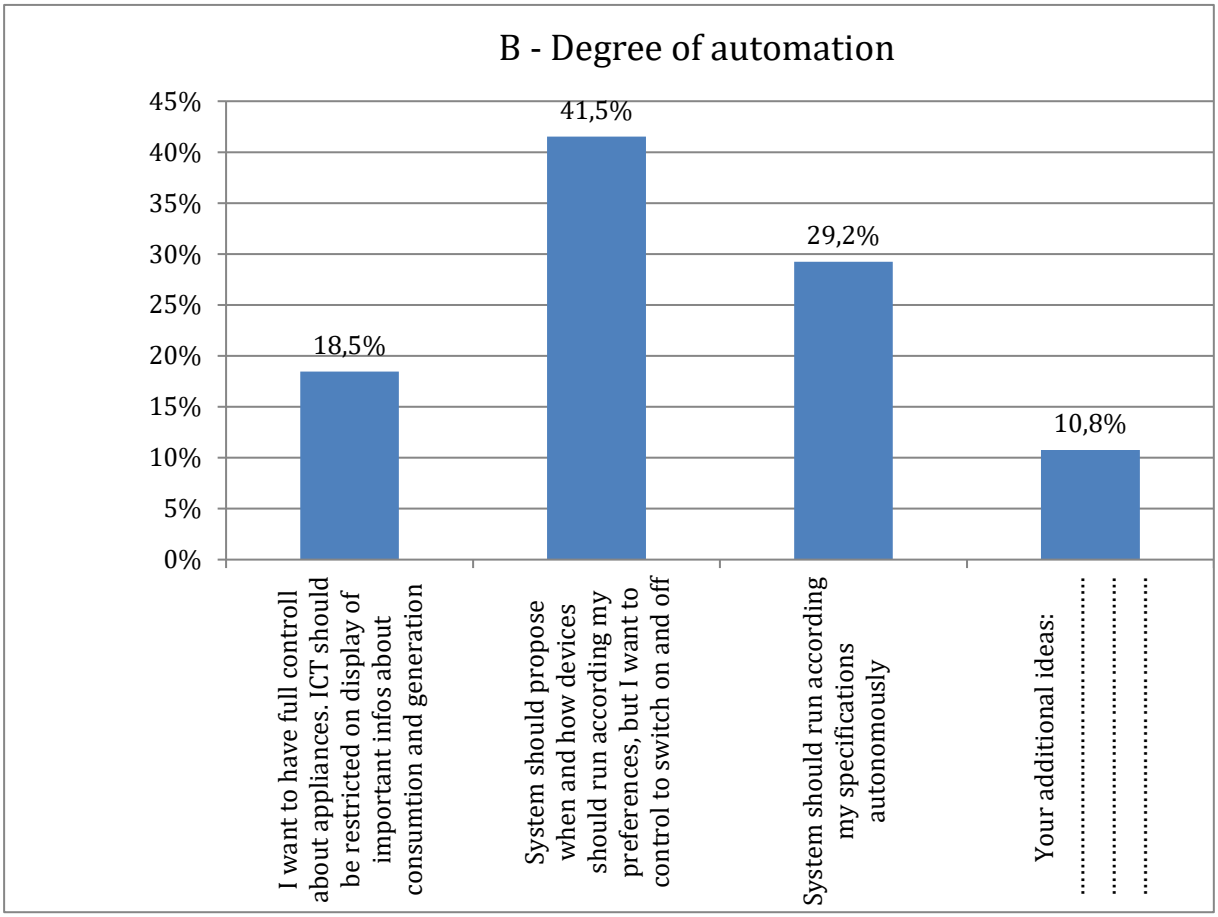


- All of the participants without an exception had energy awareness, but of course to different degrees. Only one participant was interested in energy efficiency, but lack knowledge and equipment to improve the energy efficiency. 27% of the participants were aware of the steps to become more energy efficient but had not acted on these steps. Most of the participants (71%) were already quite deeply involved in energy awareness. However, the majority of the participants did not use software, technical systems or smart phone applications to monitor their energy consumption and/or increase energy efficiency/awareness. This showed a great potential for utilization of a system like CoSSMic.



- About 40% of the participants answered with yes to the question: do you use soft/hardware tech. systems or smart phone apps. The answers are listed in part 4.3.7 Supplementary comments of the participants

4.3.3 Degree of automation

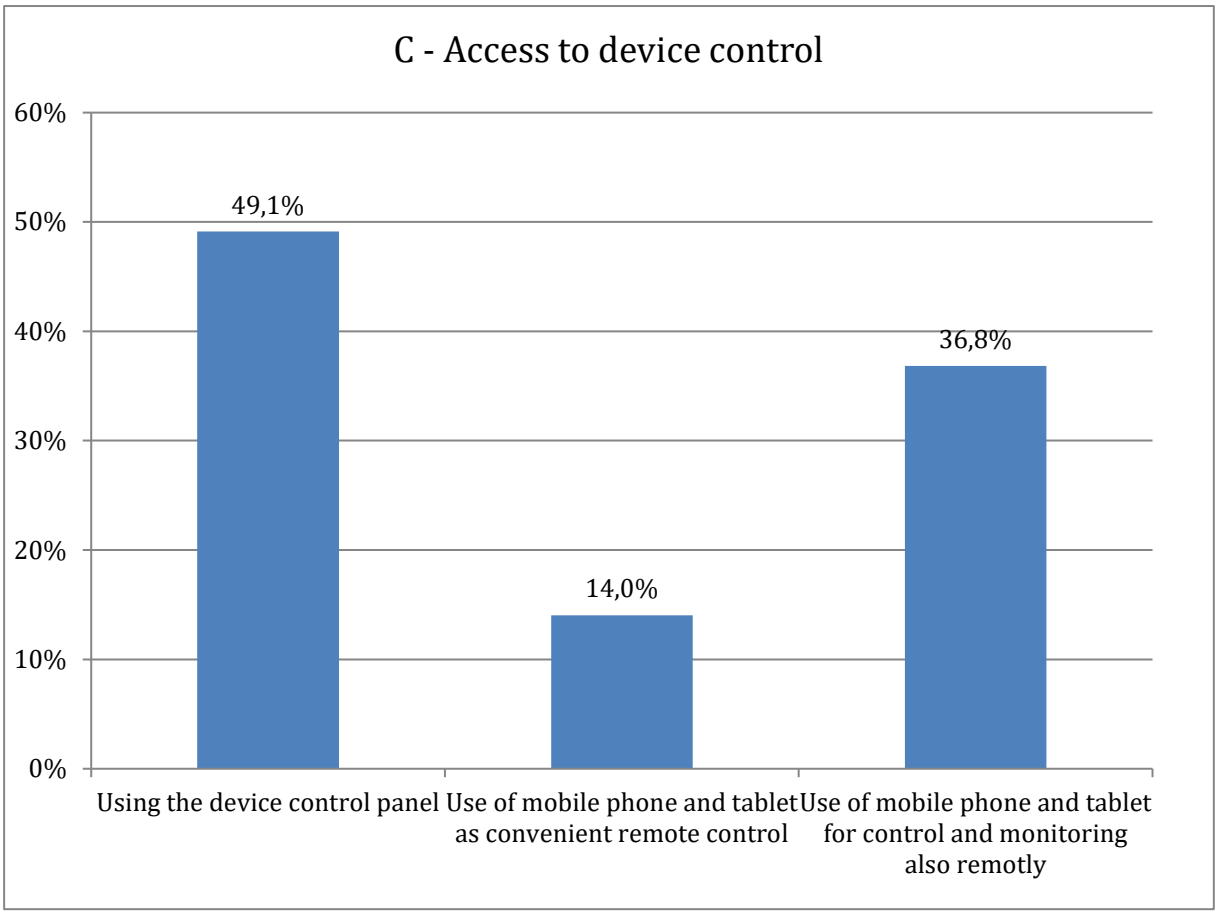


- About one third of the participants would like the system to work automatically according to the user preferences. Almost half of the participants would like to

have own control of devices while the system suggests when and how devices should run. About 20% of the participants were not willing to give away the appliance household control.

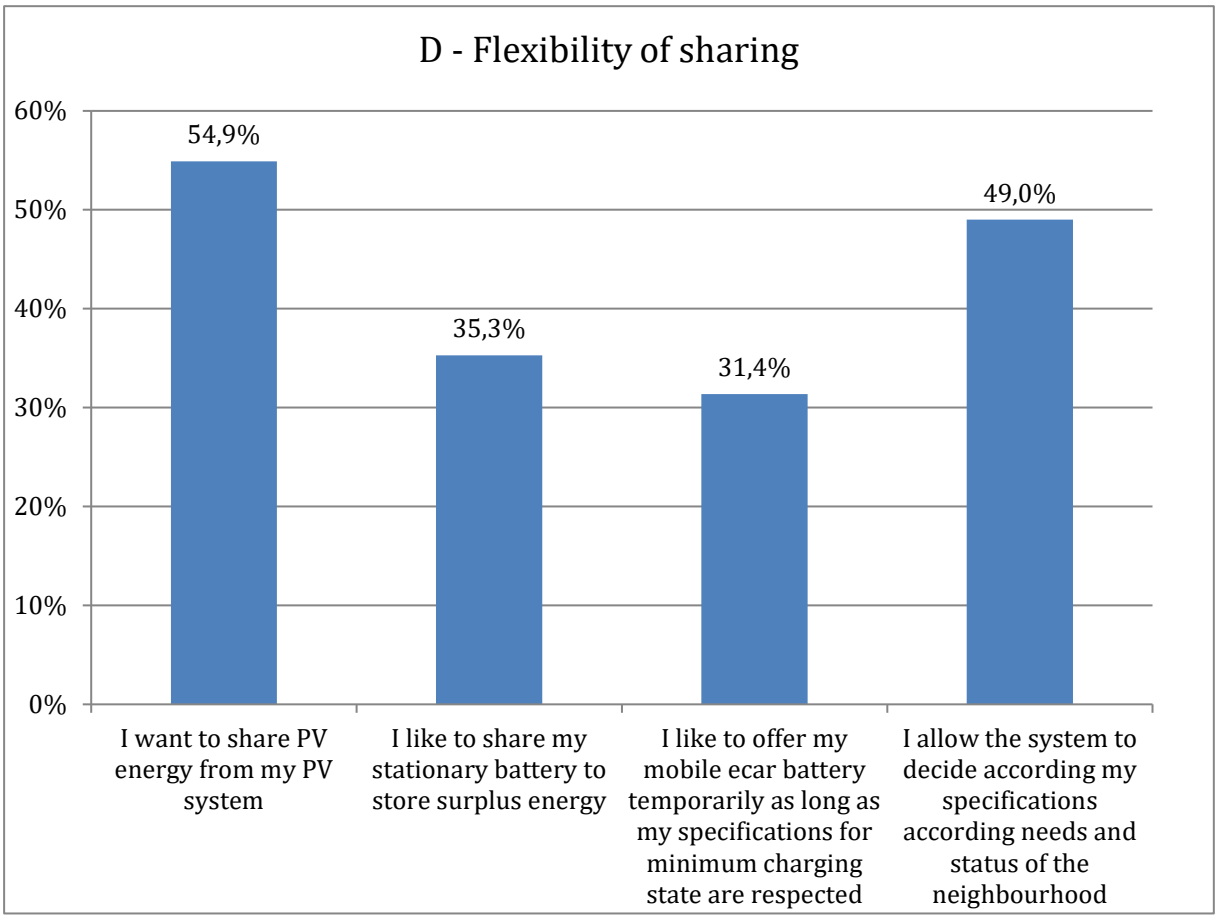
- Furthermore about a dozen individual ideas to this topic could be collected from the participants.

4.3.4 Access for device control



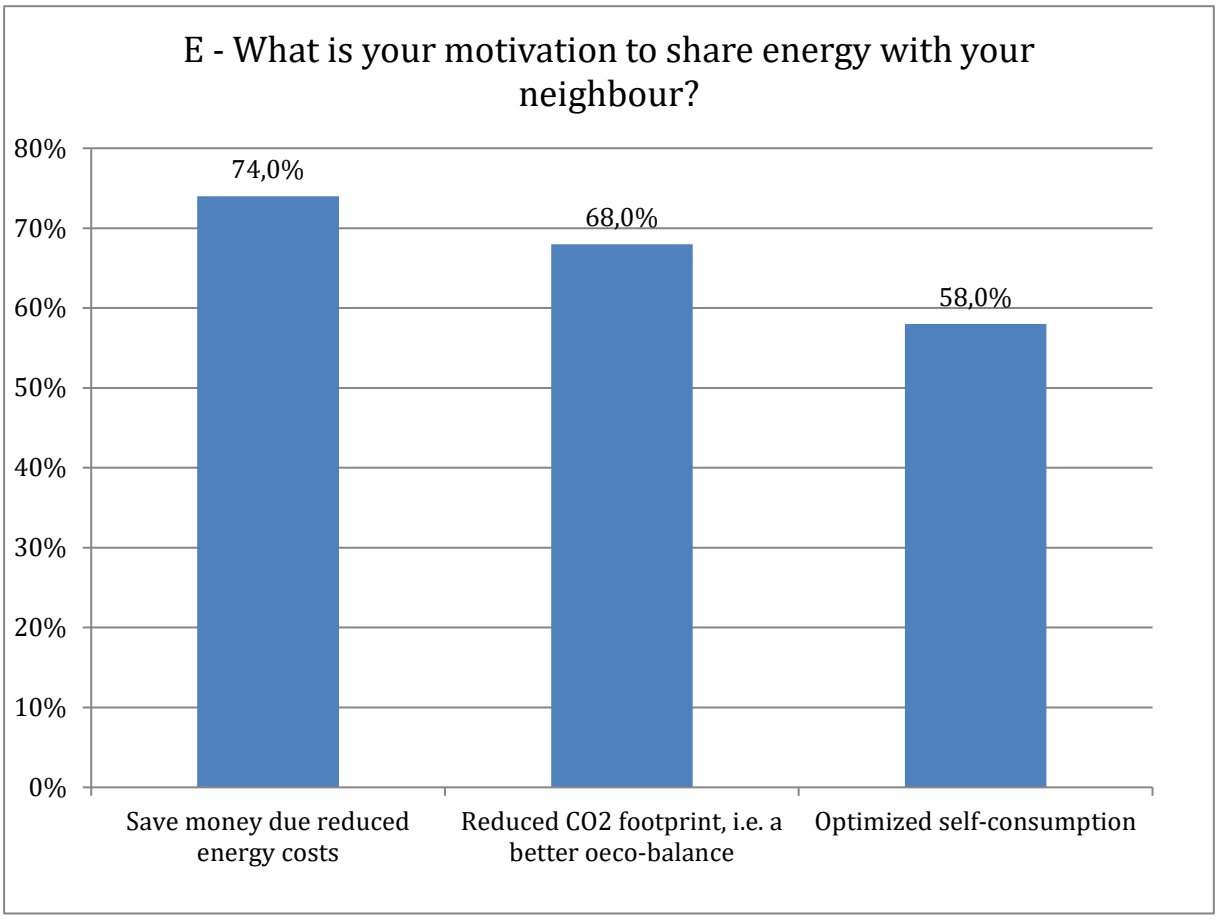
- About 50% of the participants would like to use the device control panel, and even about two-thirds when extended to mobile access whereas only about one-third of the participants would use mobile devices to control and monitor when away from home. Worth to mention that more than one answer / participant was possible.

4.3.5 Flexibility of sharing



- About 55% of the participants would share solar energy produced from PV panels, and also about half of the participants would allow the system to decide with reference to their preferences and specifications when to start and stop the appliances according to their needs and the situation of the neighbourhood. Worth to mention that more than one answer / participant was possible.

4.3.6 Benefit of sharing



- It is interesting to see that 74% of the participants agreed on the answer to save money, but this result is only slightly ahead followed by reducing CO_2 footprint by 68% of all participants and optimizing the self consumption by 58% of the participants. That shows us that not only money counts but also the increase of self consumption and the savings of CO_2 exhaust. Worth to mention that more than one answer / participant was possible.

In the following table individual answers and comments are listed which came up from the participants under question C of Energy awareness and mentioned in the second line under the given running number and for the answer yes for the question: are you already using software, technical systems or smart phone apps, if yes please tell us listed in the first line under the given running number.

4.3.7 Supplementary comments of the participants

Remarks from the participants marked with anonymous numbers: If there are from one participant inputs for both items the 1st numbered row comes from the question "do you use soft/hardware tech. systems or smartphone apps" wenn ja = if yes" question A, the 2nd numbered row: eigene Ideen = own ideas of question B, otherwise it is only the input A mentioned	**#**
Fronius-Portal	**2**

Fernüberwachung über www.solarcomplex.de PV-Anlasge + Wasserkraft	**3**
smart-meter, E-sight, Siemens Insight BMS	**5**
Stromzähler für Steckdose	**16**
wenig Nutzer werden sich langfristig damit beschäftigen, deshalb hoher Automatisierungsgrad nötig	**16**
Datenlogger zur Optimierung der Anlageneffizienz	**18**
Quartiersbatterie	**18**
CoSSMic	**25**
AVM intelligente Steckdosen, E3DC-S10 Hauskraftwerk	**27**
E3DC HP App	**28**
smart meter (ubitronix), smart phone app um zu sehen ob ich verbrauche oder einspeise	**30**
Geschirrspüler + Waschmaschine muß unter meiner Kontrolle bleiben, Heisswasser + Heizung muss funktionieren	**30**
analoger Stromzähler	**31**
Smartphone App, um Eingriff in automatische Steuerung vorzunehmen	**31**
No input	**32**
Prinzipiell hat sich das System dem Benutzer anzupassen und nicht umgekehrt	**32**
youless Verbrauchsoptimierung	**38**
	39
Ich möchte selbständig auf einen flexiblen Strompreis reagieren können	**39**
jedoch keine Smartphone Apps, will nicht teilen!	**47**
"smart-me"	**49**
Analoge und damit manuelle Überwachung der Energieerzeugung und von Verbrauch & Steuerung	**51**
mir macht die fehlende Sicherheit (Hackerangriffe) auf vernetzte Systeme große Sorgen!	**51**
Minicomputer Banana-Pi, SW selbst programmieren; Netzkosten!?	**52**

5 Case interview with participating trial users

There have been done early evaluations based on user-centred design principles and user involvement. User requirements have been collected from interviews and workshops at the two trial sites in Germany and Italy with potential trial users. Furthermore, the GUI has been designed following user-centred approach, and the concepts have been co-developed and validated with stakeholders and users in user centred design workshops.

For details of user interviews please consult the CoSSMic homepage www.cossmic.eu under: http://cossmic.eu/presentations-and-videos-from-the-smart-energy-workshop-2015-konstanz-germany/, where you can find given user interviews in German.

As examples for the direct feedback from the trials one user without own PV installation, i. e. KN08 and one user with own PV installation, i. e. KN10 are selected and some of their gathered details presented.

KN08

At least one user KN08 returned the questionnaire CoSSMic GUI Likert Scale!

Below are some features that came up during personal conversations as held face to face or on the telephone line.

The user wanted to have a higher time resolution of the measured data just to see when he is installing or manipulating his electrical system or device at home.

In a phone call on the 22nd Sep. 2016 the user informed the CoSSMic team that he wanted to have direct access to consumption loads of single devices, which could be done by direct access to emoncms feeds within a certain time resolution of i. e. < 180s. The user stepped back from his request, because of too slow time resolution. He wanted to have detection within seconds.

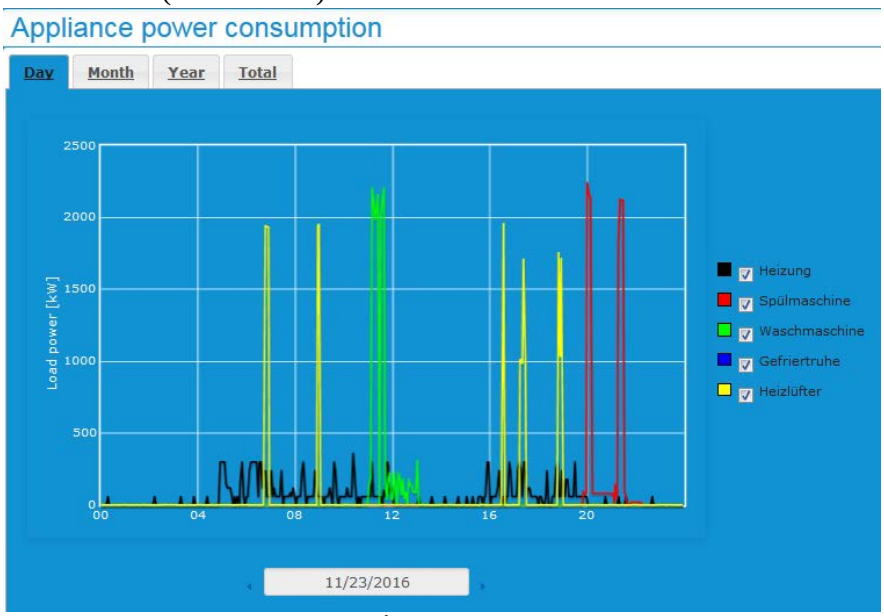
During another phone call on the 23rd Nov. 2016 two feedback items were mentioned and discussed:

A) The freezer which was taken from the trial already in June 2016 and exchanged by a heater showed up for one day on the 23rd Nov. 2016, with an energy consumption of 0.6kWh. So the user was curious how this could happen.
B) There was no way to retrieve his History view data from the past. But this was possible for the appliances view. So in the next refresh of the GUI software this will be taken into account.

The item A) should be further explained: The reason to exchange the freezer by a heater came as an inquiry of KN08 household because of a new born baby to have it comfortable during diaper change. Therefore on the 10th June 2016 at noon time, the smart plug was removed from the freezer and dedicated to the heater, see figure below:

GUI of the day of exchange of the freezer (blue) by the heater (yellow) on the 10th June 2016.

Our comment regarding the heater showing up for one day on the 23rd Nov. 2016, with an energy consumption of 0.6kWh was a misinterpretation of data. In the figure below we can see the power of all relevant consumers on Nov. 23rd 2016. The energy of 0.6kWh belongs to the heater (Heizlüfter) and not to the freezer (Gefriertruhe).



GUI display of KN08 for the 23rd Nov 2016, still with freezer (Gefriertruhe) but without trace and consumption.

Remark: The CoSSMic team and a member of the household KN08 directly clarified this appearance by cross-checking the depiction of the involved energy measurement data path in emoncms.

Despite not yet having an own PV panel installation the user is very interested in the idea of energy sharing and would very welcome to participate in active load shift to reduce the own but also the neighbourhood maximum power load.

Th e	**Fragen**	Geringe Zustimmung		Starke Zustimmung

filled out CoSSMic GUI Likert Scale questionnaire of user KN08 follows.#						
KN08	**Bewertung**	**1**	**2**	**3**	**4**	**5**
1	Die GUI-Elemente bieten genügend Information, um mir zu helfen energieeffizienter zu sein.		X			
2	Ich glaube, durch die Nutzung der GUI, energieeffizienter zu werden.				X	
3	Ich empfinde die GUI nützlich für mein tägliches Leben.		X			
4	Ich kann mir gut vorstellen, dass Konsultation und Verwendung der GUI Teil meines Tagesablaufs wird.			X		
5	Die GUI anzuwenden war einfach zu lernen.			X		
6	Ich finde es einfach das System so einzusetzen, dass es macht, was ich möchte.		X			
7	Das Zusammenspiel mit dem System ist klar und verständlich.			X		
8	Für mich ist das System flexible in seinem Gebrauch.			X		
9	Es war einfach für mich das System nutzbringend zu verwenden.	X				
10	Die GUI stellt mir genügend Information zur Verfügung, um bewusst	X				

	über meinen Energieverbrauch zu entscheiden.					
11	Der Vergleich mit Nachbarn wird mich antreiben meine Energieeffizienz zu steigern.				X	
12	Die GUI ist attraktiv und angenehm.			X		
13	Die Bewertung finde ich nützlich, mein Energieverhalten im Auge zu behalten.			X		
14	Ich mag die CoSSMunity Bilder von Baum und Wald.				X	
15	Eine niedrige Bewertung spornt mich an meine Energie Gewohnheiten zu überdenken.					X
16	Eine niedrige Bewertung wird mich veranlassen das System heranzuziehen, um mein Energieverhalten zu verbessern.					X

KN10

At the beginning of the project and later in the trial start up phase the user KN10 was very enthusiastically to answer the questionnaire about the own household with respect to energy consumption and generation, household preferences and demands and new ideas of renewable energy sharing and load shifting.

A filled out questionnaire shows in the following his answers concerning the trial participation.

Collaborating Smart Solar-powered Micro-grids
(Zusammenarbeitende intelligente solarbetriebene Mikro-Netze)
Workshop II (18. 03. 2014): Erwartungen und Anforderungen der Teilnehmer

Befragung der Teilnehmer

A. Hintergrund der Nutzer

1 . Was ist Ihr Hintergrund?
Physiker, Solar-Pionier, technisch interessiert, Energiewende-Fanatiker

2 . Warum haben Sie beschlossen an dem Projekt teilzunehmen?
Interesse am detailliert aufgeschlüsselten Energieverbrauch, gegebenenfalls Erwerb von elektronischen Smart Grid-Komponenten.

3 . Welche Art von Gebäude bringen Sie in die CoSSMic Studie mit ein?
Einfamilienhaus mit PV-Anlage

4 . Wie viele Menschen nutzen bzw. bewohnen das Gebäude bzw. den Haushalt?
4 Personen

5 . Haben Sie eine PV-Anlage installiert?
Ja, 10,2 kWp

6 . Können Sie angeben, welchen Altersgruppe (n), die Nutzer des Gebäudes angehören?

0 10 20 30 40 50 60 70 80 90 Jahre
11, 13, 46, 48

7. Wer ist Ihr Stromlieferant?
Stadtwerke Konstanz

8. Wie hoch ist Ihr monatlicher durchschnittlicher Stromverbrauch?
375 kWh

9. Kennen Sie die Hauptursachen Ihres Verbrauchs?
Elektrische Wärmepumpe (ca. 50%)

10. Kennen Sie die Zeiträume, zu denen Ihr Haushalt am meisten/wenigsten Strom verbraucht?
Dezember-Februar: Doppelt so viel Stromverbrauch wie im Sommer

11. Überprüfen Sie in regelmäßigen Abständen Ihren Energieverbrauch?
Ja, mindestens monatlich

12. Wissen Sie, wie Ihr Strom produziert wird?
Nein, nicht genau, angeblich ist es Öko-Strom

13. Welche anderen Energiequellen nutzen Sie und wofür werden diese verwendet?
Solarthermie, Kerzen, Kaffee

Wenn Sie eine Photovoltaik Anlage betreiben:

14. Nutzen Sie Anwendungen, um die Produktion Ihrer Anlage zu überwachen?
Eigenes Excel-Sheet, manueller Eintrag monatlich

15. Wissen Sie z. B. wie man einen Wechselrichter installiert, oder die PV-Anlage wartet, etc.?
Ja, das alles weiß ich

B. Bedürfnisse der Nutzer

1 . Was erwarten Sie von dieser Projekt -Studie?
(z. B. Energiebewusstsein Nachbarschaft Verbrauch / Produktion Austausch, Kontrolle über den Energieverbrauch?)
Kontrolle über den Energieverbrauch, Energiebewusstsein Nachbarschaft Verbrauch

2 . Welches Maß an Kontrolle möchten Sie über die ausgewählten Geräte erzielen?
(z. B. Einstellung, wann der Geschirrspüler starten und enden soll)
Kontrolle über Wärmepumpe, E-Fahrzeug und Geschirrspüler

- Wie würden Sie eine Aufgabenzuordnung beschreiben *(z. B. wann den Geschirrspüler starten)* und Vorlieben (*z. B. Wäsche waschen tagsüber um, aber nicht zwischen, ...)*
Wärmepumpe nur an, wenn Raumtemperatur unter 20°C. Geschirrspüler bevorzugt wenn PV-Strom verfügbar. Laden des E-Fahrzeuges nur tags bei genügend Sonne. Kühlschrank/Gefrierschrank bevorzugt mit PV betreiben.

3 . Wie nützlich ist es für Sie Haushaltsgeräte für die Datenerhebung zu vernetzen? Können Sie ein Beispiel angeben, in welchem Zusammenhang Sie dies verwenden würden?
Es wäre interessant zu erfahren, ob die Kühlgeräte im Sommer mehr Strom verbrauchen als im Winter. Die Wärmepumpe soll nicht eingeschaltet werden, wenn der Elektroherd oder andere große Verbraucher an sind.

- Welche Informationen möchten Sie von Zielgeräten angezeigt bekommen? *(z. B. wie oft ein Gerät ein- und ausgeschaltet wurde? Welche gemessenen Werte? etc.)*
Wie oft wurden Waschmaschine und Geschirrspülmaschine eingeschaltet und wie viel Energie haben diese verbraucht. Wie viel Strom würde gespart werden, wenn der E-Herd auf Gas umgestellt werden würde.

4 . Welches Maß an Kontrolle möchten Sie CoSSMic Forschern über Ihre Geräte zugestehen?
(z. B. Eingabe, wann der Geschirrspüler starten und enden soll? Prioritäten in der Steuerung und Kooperation zw. PV-Anlage, Speicher und verschiedenen Verbrauchern?)
CoSSMic-Forscher dürfen alle diese Daten einsehen, nicht aber die Öffentlichkeit.

C. Installation der Hardware Komponenten

CoSSMic will mehrere Hardware-Komponenten (z. B. ein Computer System und intelligente Stecker und Schalter) in den beteiligten Häusern und Haushalten installieren. Die Hardware wird Software ausführen und automatisch Daten bezüglich des Energieverbrauchs unter verschiedenen Gesichtspunkten erheben. Die Software-Schnittstelle kann z. B. über ein Smartphone, ein Tablet oder eine Website einsehbar und steuerbar sein. Das System wird weiterhin auch an bereits installierte PV-Anlagen und auch an Sekundärbatterie-Speicher angeschlossen werden.

1. Gibt es Ihrerseits irgendwelche Bedenken wegen der Hardware-Installation?
Nein.

2. Welche Software-Schnittstellen glauben Sie, werden Sie im Projekt verwenden?
Tablett und mobiles Smartphone.

3. Hat Ihr Haushalt z. B. eine DSL-Flat Verbindung und Ihr Router DSL und Wireless?
DSL-Flat und WLAN ist vorhanden und verfügbar

4. Möchten Sie diese Verbindung zur Datenübertragung nutzen?
Ja

5. Sind Sie damit einverstanden dass Ihr Stromverbrauch über intelligente Steckdosen aufgezeichnet wird?
Ja

6. Gibt er örtliche Einschränkungen, wo keine Messgeräte installiert werden sollen?
Nein

7. Willigen Sie ein, dass ein qualifizierter Fachmann Ihren Zähler in CoSSMic einbindet?
Ja

D. Daten

Daten, die bereits für die Erhebung vorgesehen sind: Adresse des Haushalts, Status und Verbrauch einzelner elektronischer Geräte und Apparate, monatliche Rechnung des Energieverbrauchs des Nutzers, Preise vom Energiemarkt in der Nachbarschaft, Energieverträge mit Anbietern, Wettervorhersage und weitere Nutzer Eigenschaften.

1 . Gibt es Ihrerseits Bedenken bezüglich der vorgeschlagenen zu erhebenden Daten?
Nein, soweit keine Bedenken

2 . Gibt es außerdem Daten, die Sie gerne zusätzlich mit einbeziehen würden?
Raumtemperatur an einer zentralen Stelle im Haus, wenn möglich

Nachname, Name KN10

Anschrift Konstanz
Die Datenerfassung zur Nutzung von personenbezogenen Daten hinsichtlich Erhebung, Aufbereitung und Speicherung, im Rahmen des Projektvorhabens CoSSMic, ist konform mit dem Bundesdatenschutzgesetz § 40. Der/Die Unterzeichnende stimmt dieser Nutzung zu.

Ort Konstanz , der 18. März 2014 Unterschrift KN10

6 Conclusion

The participants of the three users workshops in Trondheim (Norway), Caserta (Italy and Konstanz (Germany) give a representative overview about potential users of smart energy and smart grid neighbourhoods with a clear potential to open their single users consumption and self consumption behaviour towards renewable energy generation with a high and pronounced attitude for energy sharing with neighbours to save money but also to reduce the CO2 footprint of each single users household and the whole community.

The challenge of realising the smart grid community is at least as much socially shaped as technical. The analysis and results show that, when striving for end user engagement to increase the success of smart grid products and services, there are several actions that can be taken by project owners and executors. These actions include responsiveness towards the end users, building relationships with and between end users, communication and involvement of end users in the process. On the other hand, there are a number of pitfalls that have shown to be devastating to end user engagement, and which should – and can – be avoided. Based on the identified success factors, the main conclusions are that the end user is not a black box, and that context sensitivity is crucial to succeed in end user engagement. Additionally, successful smart grid projects tend to use multiple incentives and engagement strategies combined with several other factors, such as clear communication, the right type of feedback etc.

The interest shown by the trial users to engage in a community of CoSSMic users was disappointing. It appears that the creation of CoSSMic neighbourhoods would require strong commitment and encouragement from some sort of authority providing related services, e.g. retailers/DSOs or City administrations, or a commercial company trying to make profit from selling equipment and related services.

Ultimately, the most effective smart grid will be one in which intelligence is sourced from users as well as devices. The conclusions and recommendations drawn from this experience are important for CoSSMic to effectively advise the European Commission in developing the future European policy framework for smart grids.

7 Appendix:

In the following you find the distributed questionnaires in German, Italian, Norwegian and English language, respectively, from Konstanz in Germany, Trondheim in Norway and Caserta in Italy.

7.1 Konstanz: Sagen Sie uns Ihre Meinung zu: „Energie gemeinsam nutzen“

Sagen Sie uns Ihre Meinung zum Thema: „Energie gemeinsam nutzen“

Wir arbeiten mit einem intelligenten IKT-System (**I**nformation und **K**ommunikation **T**echnik), das den Energieverbrauch und die Speicherung in einer Gruppe von Gebäuden (d. h. einer Nachbarschaft) koordinieren kann. Ziel ist es, die gemeinsame Nutzung der lokal gewonnenen Solarenergie und der Batteriekapazitäten unter den Nachbarn zu ermöglichen, um sowohl die Stromkosten als auch die Spitzenwerte im öffentlichen Stromnetz zu senken. Auf Grund der negativen Auswirkungen der fossilen Stromerzeugung werden muss das weitere Wachstum des Stromverbrauchs durch andere Energiequellen abgedeckt werden. Solarpaneele, die auf Dächern und Gebäudefassaden installiert werden, sind dafür vielversprechende Alternativen. Darüber hinaus wird erwartet, dass die zukünftige Elektrifizierung von Parkplätzen zum laden der Batterien von E-Autos das öffentliche Stromnetzes an seine Leistungsgrenze bringt, wenn viele Autos und Busse gleichzeitig geladen werden.
In diesem Kontext möchten wir Ihre Meinung zum Thema Energie Sharing unter Verwendung von Informations- und Kommunikationstechnologien kennenlernen.

A-Energie Bewusstsein

Wählen Sie die Aussage, welche am besten Ihre Einstellung bzgl. Energieeffizienz wiedergibt:

❏ Ich bin an Energieeffizienz nicht interessiert.

❏ Ich bin interessiert, habe aber weder Wissen noch Ausstattung meine Energieeffizienz zu verbessern.

❏ Ich bin mir dem Thema Energieeffizient bewusst, habe aber noch nicht die nötigen Schritte eingeleitet.

❏ Ich habe schon Maßnahmen eingeleitet, bin mir aber über die Auswirkungen nicht im Klaren.

❏ Ich habe ein langfristiges Ziel zur Energieeffizienz und verfolge kontinuierlich, wie nah ich dem bin.

Nutzen Sie Software, technische Systeme oder Smartphone-Anwendungen zur Überwachung Ihres Energieverbrauchs und / oder zur Steigerung der Energieeffizienz / -bewusstsein?

❏ Nein

❏ Ja

Wenn ja, sagen Sie uns doch bitte z. B. welche Software, technischen Systeme oder Smartphone-Apps Sie bereits nutzen.

……
……
……

B-Automatisierungsgrad

Das IKT-System ermöglicht es Ihnen, Ihre Wünsche durch die Einstellungen der Gerätebedienung (z. B. die früheste Start-Zeit der Spülmaschine, den spätesten Zeitpunkt, zu dem der Geschirrspüler fertig sein sollte) festzulegen. Was für einen Grad der Automatisierung wünschen Sie sich dafür?

❏ Ich möchte die volle Kontrolle über den Einsatz meiner Haushaltsgeräte haben, d. h. wann und wie die Geräte laufen. Das IKT-System sollte auf die Darstellung relevanter Informationen über Energieverbrauch und Produktion beschränkt sein.

❏ Ich möchte, dass das System vorschlägt, wann und wie die Geräte nach meinen Vorgaben laufen sollten, aber ich möchte die Einstellungen kontrollieren und selbst ein- und ausschalten.

❏ Ich möchte, dass das System automatisch nach den von mir festgelegten Vorgaben arbeitet

❏ Ihre Ideen dazu:

……
……..
……
……

C-Zugriff auf die Gerätesteuerung

Was bevorzugen Sie, um Haushaltsgeräte zu steuern und zu überwachen, d. h. Programme und Einstellungen auswählen, Gerät zu starten und zu stoppen?

❏ Verwenden des Gerätebedienfelds.

❏ Verwenden von Mobiltelefon bzw. Tablet als bequeme Fernbedienung.

❏ Verwenden von Mobiltelefon bzw. Tablet zur Steuerung und Überwachung, auch von unterwegs.

D-Flexibilität in der gemeinsamen Nutzung

Wenn Sie in einer Nachbarschaft wohnten, in der die meisten Häuser mit Solaranlagen auf den Dächern und stationären Batterien ausgestattet wären, in welchem Umfang würden Sie dem IKT-System erlauben, die Nutzung Ihrer Geräte und Batterien mit denen Ihrer Nachbarn für den gemeinsamen Nutzen in der Nachbarschaft zu koordinieren? Nehmen Sie dazu an, dass die Nachbarn mit niedrigeren Stromrechnungen belohnt werden, je nachdem, wie viel Sie zur Erreichung des gemeinsamen Nutzens beitragen?

❏ Ich möchte Sonnenenergie aus meiner PV-Anlage teilen.

❏ Ich möchte meine stationäre Batterie für die Speicherung von überschüssiger Energie teilen.

❏ Ich möchte die Batterie meines Elektroautos als vorübergehenden Speicher von überschüssiger Energie anbieten, solange meine Vorgabe zum minimalen Ladezustand der Autobatterie berücksichtigt wird.

❏ Ich erlaube dem System nach meinen Vorgaben zu entscheiden, wann und wie meine Geräte nach den Bedürfnissen und der aktuellen Situation der Nachbarschaft eingesetzt werden.

E-Vorteil des Teilens („Sharing“)

Was würde Sie dazu motivieren, mit Nachbarn Energie zu teilen?

❏ Geld sparen durch günstigere Stromkosten

❏ Reduzierter CO_2 Fußabdruck, d. h. eine bessere Öko-Bilanz

❏ Optimierter Eigenverbrauch

Alter:	❑ bis 20 Jahre ❑ zw. 21 bis 30 Jahre ❑ zw. 31 bis 40 Jahre ❑ zw. 41 bis 50 Jahre ❑ über 50 Jahre	Geschlecht:	❑ männlich ❑ weiblich
Ausbildung:	❑ ohne Ausbildung ❑ Facharbeiter ❑ Meister ❑ Ingenieur ❑ allg. Hochschulabschluss	Haushalt:	❑ Single ❑ Paar ❑ Familie mit einem Kind ❑ Familie mit zwei Kindern ❑ Familie mit drei Kindern ❑ Familie mit vier und mehr Kindern

Vielen Dank für Ihre Teilnahme. Sind Sie weiterhin interessiert am Projekt CoSSMic, in dessen Rahmen diese Umfrage stattfindet, besuchen Sie bitte unsere Internetseite unter www. cossmic.eu, wo wir demnächst auch die Ergebnisse dieser Umfrage veröffentlichen werden.

7.2 Caserta: Dacci la tua opinione sulla condivisione di energia

Dacci la tua opinione sulla condivisione di energia

Stiamo lavorando allo sviluppo di un sistema ICT intelligente che può coordinare l'uso e l'immagazzinamento di energia in un gruppo di edifici (il vicinato). L'obiettivo è permettere la condivisione di energia prodotta dai pannelli solari delle singole abitazioni chiedendo agli utenti di essere più flessibili nell'uso dei propri elettrodomestici e delegando il controllo a un sistema informatico. In cambio gli utenti potranno monitorare i propri consumi e la loro produzione, risparmieranno sulla bolletta, contribuiranno a ridurre l'inquinamento.

Vorremmo conoscere la tua opinione riguardo alla condivisione di energia e all'uso dell'ICT in questo processo.

Età:
- ❑ Meno di 20
- ❑ Tra 21 e 30
- ❑ Tra 31 e 40
- ❑ Tra 41 e 50
- ❑ Più di 50

Sesso:
- ❑ M
- ❑ F

Istruzione:
- ❑ Scuola media inferiore
- ❑ Scuola media superiore
- ❑ Università
- ❑ Dottorato di Ricerca

Nucleo Fam.:
- ❑ Single
- ❑ Coppia
- ❑ Famiglia con 1 figlio
- ❑ Famiglia con 2 figli
- ❑ Famiglia con 3 figli
- ❑ Famiglia con 4 figli o più figli

Efficienza Energetica

Scegli la riposta che meglio descrive il tuo atteggiamento nei confronti dell'efficienza energetica:

❑ Non mi interesso di efficienza energetica.

❑ Sono interessato, ma non ho né la conoscenza né l'attrezzatura adatta per migliorare la mia efficienza

❑ So cosa bisognerebbe fare per avere una maggiore efficienza energetica, ma non l'ho mai fatto

❑ Attualmente sto effettuando una serie di attività per essere più efficiente, ma non sono molto sicuro del risultato di tali attività.

❑ Ho un chiaro obiettivo di efficienza energetica a lungo termine e verifico costantemente quanto sono vicino a raggiungere questo obiettivo.

Utilizzi software, sistemi o applicazioni per smartphone per monitorare i tuoi consumi di energia e/o migliorare la tua efficienza energetica?

❑ No

❑ Sì. Per favore indica cosa utilizzi:

Grado di automazione

I sistemi ICT ti permettono di impostare le tue preferenze per il funzionamento dei vari dispositivi: (per esempio: l'orario minimo di accensione di una lavastoviglie, l'orario massimo in cui vorresti che la lavastoviglie termini il suo lavoro). Qual è il grado di automazione che vorresti?

❏ Vorrei avere il massimo controllo di quando e come i dispositivi debbano essere accesi. I sistemi ICT dovrebbero limitarsi a mostrare informazioni importanti sull'uso e sulla produzione di energia.

❏ Vorrei che il sistema mi suggerisse quando e come i dispositivi dovrebbero essere accesi, rispettando le mie preferenze, ma preferirei essere io a controllarli e accenderli/spegnerli.

❏ Vorrei che il sistema lavorasse in maniera totalmente autonoma semplicemente seguendo le mie preferenze.

Accesso per il controllo dei dispositivi

Come preferiresti controllare e monitorare gli elettrodomestici, per esempio: selezionare il programma di una lavatrice o altre impostazioni, accendere o spegnere un dispositivo?

❏ Preferirei utilizzare il pannello di controllo del dispositivo.

❏ Preferirei utilizzare uno smartphone/tablet per poterli controllare da remoto (all'interno dell'abitazione).

❏ Preferirei utilizzare uno smartphone/tablet per controllarli e monitorarli quando non sono a casa.

Flessibilità della condivisione

Vorremmo sapere quanto sei disponibile a cambiare le tue abitudini per il tuo bene e il risparmio, e per il bene di tutta la comunità.
Sei disposto a cambiare le tue abitudini nell'utilizzo dei tuoi dispositivi, come ad esempio cambiare gli orari di utilizzo di elettrodomestici?

❏ Si ❏ Solo per alcuni

❏ No ❏ Non so

Con che frequenza si utilizza la lavatrice nella tua famiglia:

❏ una volta a settimana ❏ tutti I giorni

❏ 2 volte a settimana ❏ non so o non ho una lavatrice

❏ 3 volte a settimana

In quale fascia oraria si utilizza la lavatrice nella tua famiglia:

❏ 6:00-10:00 ❏ 14:00-18:00 ❏ 22:00-6:00

❏ 10:00-14:00 ❏ 18:00-22:00 ❏ non so

Con che frequenza si utilizza la lavastoviglie nella tua famiglia:

❏ una volta a settimana ❏ tutti I giorni

❏ 2 volte a settimana ❏ non so

❏ 3 volte a settimana

In quale fascia oraria si utilizza la lavastoviglie nella tua famiglia:

- ❑ 6:00-10:00
- ❑ 14:00-18:00
- ❑ 22:00-6:00
- ❑ 10:00-14:00
- ❑ 18:00-22:00
- ❑ non so

Come riscaldi la tua casa o il tuo ufficio?

- ❑ Energia elettrica
- ❑ Pellet
- ❑ Altro
- ❑ Gas
- ❑ Camino
- ❑ non so

Qual è la temperatura di comfort per la tua casa in inverno?

- ❑ 17-20°C
- ❑ 24-26°C
- ❑ 20-22°C
- ❑ non so
- ❑ 22-24°C

Qual è la fascia di funzionamento del tuo riscaldamento (sono ammesse più risposte)?

- ❑ 6:00-10:00
- ❑ 14:00-18:00
- ❑ 22:00-6:00
- ❑ 10:00-14:00
- ❑ 18:00-22:00
- ❑ non so

Possiedi dei condizionatori per rinfrescare la tua casa?

- ❑ Si, ma solo per rinfrescare le stanze principali
- ❑ Si, per rinfrescare tutta la casa
- ❑ No

Qual è la temperatura di comfort quando usi il condizionatore per rinfrescare la tua casa?

- ❑ 17-20°C
- ❑ 24-26°C
- ❑ 20-22°C
- ❑ non so
- ❑ 22-24°C

Qual è la fascia di funzionamento dei tuoi condizionatori (sono ammesse più risposte)?

- ❑ 6:00-10:00
- ❑ 14:00-18:00
- ❑ 22:00-6:00
- ❑ 10:00-14:00
- ❑ 18:00-22:00
- ❑ non so

Utilizzi energia elettrica per cucinare?

- ❑ No, solo gas
- ❑ Si, ma solo nei weekend
- ❑ Si una volta al giorno
- ❑ Mai
- ❑ Si 2 volte al giorno

Supponi che i tuoi dispositivi potessero decidere autonomamente quando accendersi, e come funzionare.

In quale fascia oraria saresti disposto a lasciare che lavatrice si accenda in cambio di un risparmio sulla bolletta (è ammessa più di una risposta):

- ❑ 6:00-10:00
- ❑ 14:00-18:00
- ❑ 22:00-6:00
- ❑ 10:00-14:00
- ❑ 18:00-22:00
- ❑ non so

Qual è il massimo ritardo che accetteresti per la lavatrice in cambio di un vantaggio in termini di risparmio sulla bolletta:

- ❑ 30 minuti
- ❑ 3 ore
- ❑ tutta la giornata
- ❑ 1 ora
- ❑ fino a 6 ore
- ❑ nessun ritardo
- ❑ 2 ore

In quale fascia oraria saresti disposto lasciare che lavastoviglie si accenda in cambio di un risparmio sulla bolletta (è ammessa più di una risposta):

- ❑ 6:00-10:00
- ❑ 10:00-14:00
- ❑ 14:00-18:00
- ❑ 18:00-22:00
- ❑ 22:00-6:00
- ❑ non so

Qual è il massimo ritardo che accetteresti per la lavastoviglie in cambio di un vantaggio in termini di risparmio sulla bolletta:

- ❑ 30 minuti
- ❑ 1 ora
- ❑ 2 ore
- ❑ 3 ore
- ❑ fino a 6 ore
- ❑ tutta la giornata
- ❑ nessun ritardo

Qual è il massimo ritardo che accetteresti per il forno in cambio di un vantaggio in termini di risparmio sulla bolletta:

- ❑ 30 minuti
- ❑ 1 ora
- ❑ nessun ritardo

Qual è il massimo discostamento che accetteresti per la temperatura di confort della tua casa o del tuo ambiente di lavoro in inverno?

- ❑ 1 grado
- ❑ 2 gradi
- ❑ più di 3 gradi
- ❑ nessuno
- ❑ 3 gradi

Qual è il massimo discostamento che accetteresti per la temperatura di confort della tua casa o del tuo ambiente di lavoro in estate?

- ❑ 1 grado
- ❑ 2 gradi
- ❑ più di 3 gradi
- ❑ nessuno
- ❑ 3 gradi

Quale percentuale di risparmio considereresti accettabile per cambiare le tue abitudini:

- ❑ < 5%
- ❑ tra il 5% e il 10%
- ❑ tra il 10% e il 20%
- ❑ >20%

Benefici della condivisione di energia

Cosa ti motiverebbe a condividere l'energia con i tuoi vicini?

- ❑ Risparmiare soldi (bolletta della corrente più economica)
- ❑ Ridurre le emissioni di CO2
- ❑ Ottimizzare l'autoconsumo

Se vuoi puoi lasciarci un tuo contatto. Potremmo invitarti a rispondere ad altre domande e inviarti aggiornamenti sul progetto CoSSMic.

Nome: Email:

Seconda Università di Napoli (Italy)

7.3 Trondheim: Tell us about your opinion on energy sharing

Tell us about your opinion on energy sharing

We work with a smart ICT system that can coordinate the energy use and storage in a group of buildings (called neighbourhood). The goal is to enable sharing of local solar energy and battery capacities among neighbours in order to reduce both the electricity cost and the peaks on the public power grid. Although energy supply in Norway currently is provided by green hydropower, suitable watercourses have mostly been utilized and further growth in electricity consumption needs to be covered by other energy sources. Solar panels installed on rooftops and building façades are thus promising alternatives. Furthermore, electrification of car parks is expected to cause problems for the capacity of the power grid when many cars and buses are charged simultaneously.
We would like to know your opinion about energy sharing and the use of ICT in this process.

Age:
- ❑ Up to 20Y
- ❑ From 21Y to 30Y
- ❑ From 31Y to 40Y
- ❑ From 41Y to 50Y
- ❑ Over 50Y

Gender:
- ❑ Male
- ❑ Female

Education:
- ❑ High school (VGS) or below
- ❑ College
- ❑ University
- ❑ Graduate school
- ❑ PhD

Household:
- ❑ Single person
- ❑ Couple
- ❑ Family with 1 child
- ❑ Family with 2 children
- ❑ Family with 3 children
- ❑ Family with 4 or more children

Energy awareness

Choose the statement which best describes your attitude towards energy efficiency:

❑ Not interested in energy efficiency.

❑ Interested, but lack knowledge and equipment to improve my energy efficiency.

❑ I am aware of the steps to become more energy efficient but I have not acted on these steps.

❑ Currently following steps to be more energy efficient, but not very sure of the impact of those steps.

❑ Have a clear energy efficiency long-term target and I constantly following how close I am to reaching the target.

Do you use software, technical systems or smart phone applications to monitor your energy consumption and/or increase energy efficiency/awareness?

❑ No

❑ Yes. Please tell us what you use:

Degree of automation

The ICT system allows you to specify your preferences and settings for device operation (e.g., the earliest time to start a dishwasher, the latest time the dishwasher should finish). What is the degree of automation you want?

❑ I would like to have full control of when and how the devices work. The ICT system should be limited to displaying relevant information on energy use and production.

❑ I would like the system to suggest when and how the devices should work according to my preferences, but prefer to control settings and switch on and off myself.

❑ I would like the system to work automatically according to the preferences I specified.

Access for device control

What do you prefer to control and monitor household appliances, e.g. select programme and other settings, start and stop the device?

❑ Use the device control panel.

❑ Use mobile phone/tablet as a remote controller.

❑ Use mobile phone/tablet to control and monitor when I am not at home.

Flexibility of sharing

If you lived in a neighbourhood where most houses had solar panels on the roofs and stationary batteries, to which extent would you allow the ICT system to coordinate the use of your appliances and batteries with those of your neighbours for the common benefit of the neighbourhood (assuming that neighbours are rewarded with lower electricity bills according to how much they contribute to achieving the common benefit)?

❑ I can share solar energy produced from my PV panels.

❑ I can share my stationary battery for temporary storage of excessive energy.

❑ I can share the battery of my eCar as temporary storage of excessive energy as long as my constraints on minimal charging level can be satisfied.

❑ I can allow the system to decide when to start and stop my appliances according to the needs and situation of the neighbourhood.

Benefits of sharing

What would motivate you to share with neighbours?

❑ Save money (cheaper electricity bill)

❑ Reduce CO2 footprint

❑ Optimize self-consumption

Thank you for sharing with us. If you are interested in participating in a future trial for sharing energy with others using ICT, please give your name and contact information.

Name: Mobile: Email: