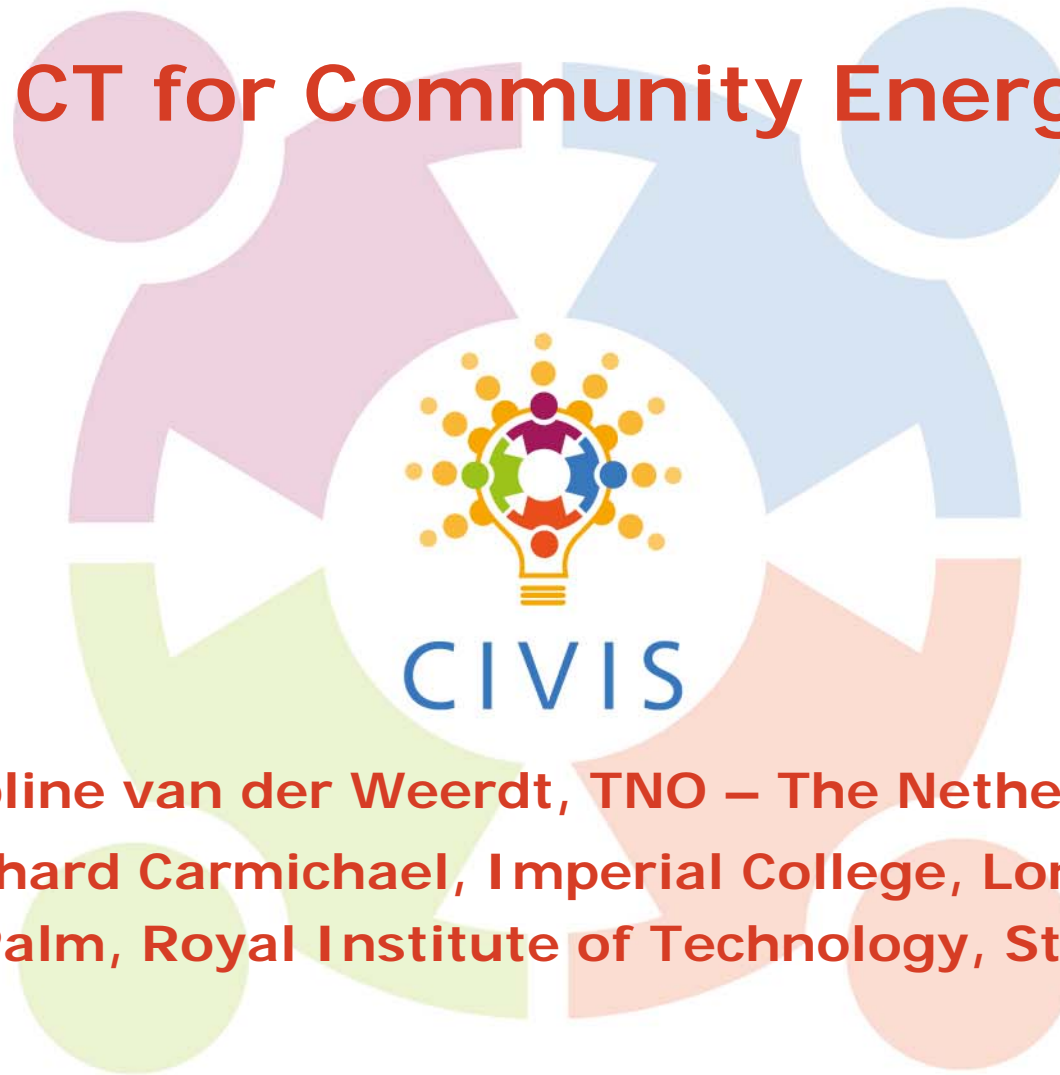


ICT for Community Energy



Caroline van der Weerd, TNO – The Netherlands

Richard Carmichael, Imperial College, London

Björn Palm, Royal Institute of Technology, Stockholm



CIVIS project has received research funding from the European Union

What is CIVIS?

The **CIVIS project** is financially supported by the European Union Seventh Framework



Project Title: **CIVIS- Cities as drivers of social change**

Call (part) Identifier: FP7-SMARTCITIES-2013

Duration in months: 36

Starting date: 01.10.2013

Total Project Costs: 4,074,546.00 €

Project website: <http://www.civisproject.eu>

Project facebook page: <https://www.facebook.com/pages/CIVIS-project/762904637099423>



CIVIS project has received research funding from the European Union

Project Participants



- › **University of Trento (IT) - Coordinator**
- › Aalto University (FI)
- › Enel Foundation (IT)
- › Imperial College London (UK)
- › Instituto Superior Tecnico (PT)
- › Karlsruhe Institute of Technology (DE)
- › KTH (SE)
- › Santer Reply SpA (IT)
- › TNO (NL)
- › Technische Universiteit Delft (NL)
- › CREATE-NET (IT)
- › Bruno Kessler Foundation (IT)



CIVIS project has received research funding from the European Union

Objectives



1

Energy System
*more efficient,
sustainable, CO₂- and
energy-aware
behaviour*



2

Social cohesion
*collective management
of energy as a common
good.*

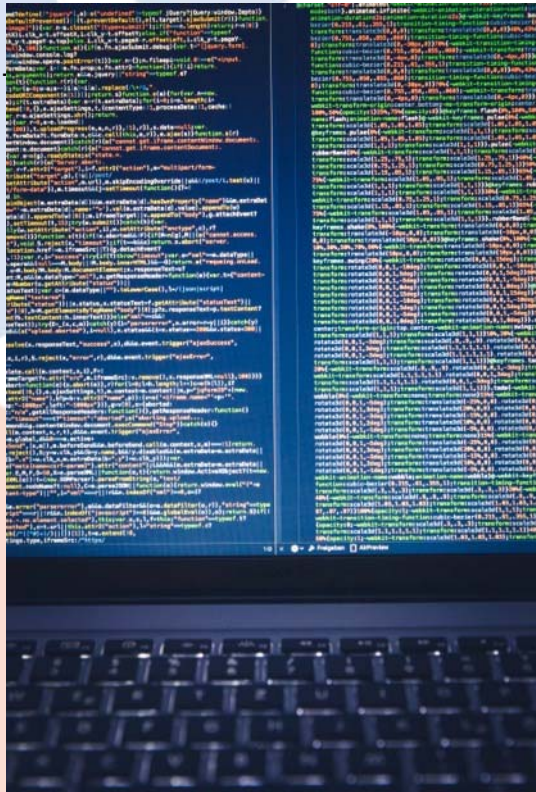


3

Ict
*as a driver of social
innovation in energy
production and
consumption*



Combining ICT, energy and social networks



Goal: “To create integrated ICT solutions able to reduce energy use and carbon emissions by leveraging on the potential of social networks and communities”.



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Pilot Sites Context - Sweden

Hammarby Sjöstad

- *9000 dwellings*
- *Several tenants-owners organizations*
- *District heating, generation from local heat pumps*



Fårdala

- *177 town houses and semi-detached houses*
- *local housing association*
- *Users have the possibility to choose their own electric supplier and can purchase green electricity.*



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Pilot Sites Context - Italy

San Lorenzo in Banale

- 1100 inhabitants
- CEIS consortium (3300 members)
- 73 PV plants
- 20 associations



Storo

- 4600 inhabitants
- CEdiS consortium (3200 members)
- 330 PV plants
- 56 associations



CIVIS project has received research funding from the European Union

Stockholm measures



01

Decreasing household impact through data visualisation, tips, and household/community social networks.

02

Community level energy awareness, bringing change in focus.

03

Appliance level insights and interaction through Smappee.

04

Control of electrical appliances through Smappee.

05

Heating system control through Max EQ3 system.

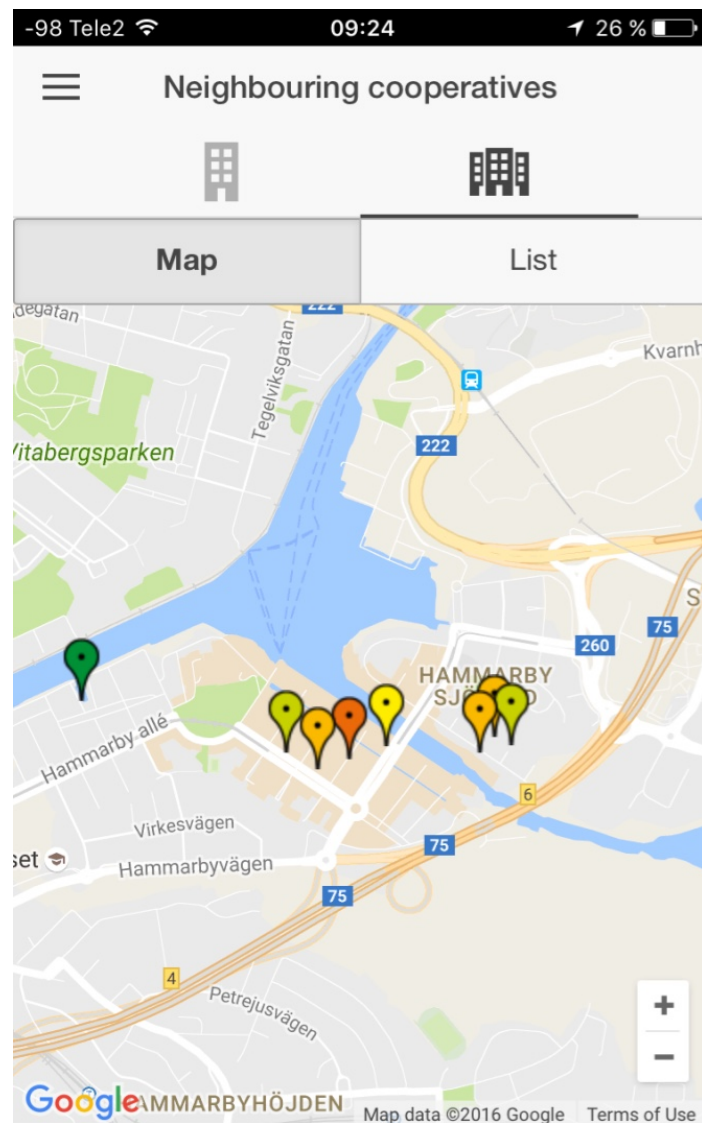
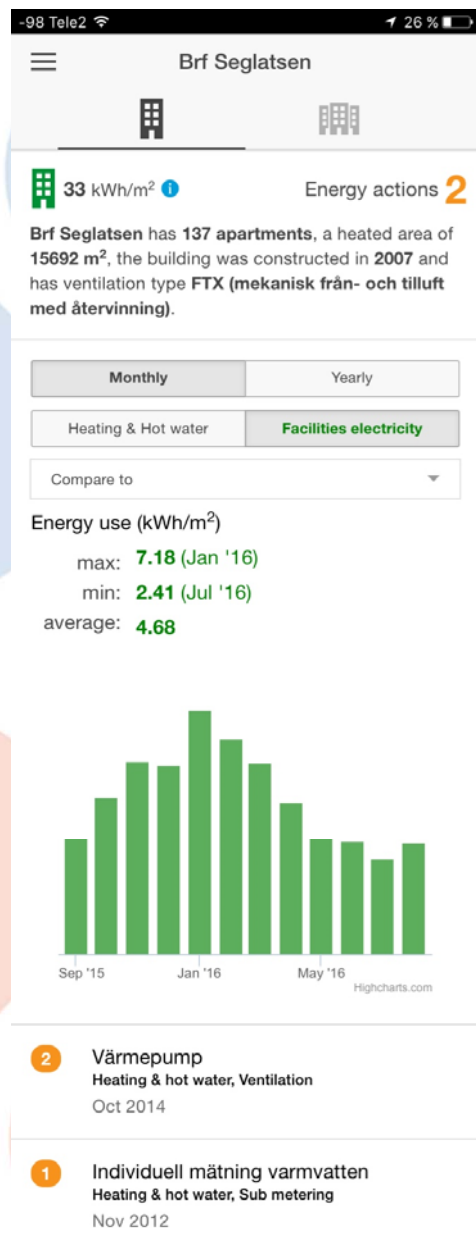


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Association Level Data Collection



BRF	Area (m2)	Apartments	Construction year	Ventilation type
Älven	8231	69	2003	FVP
Grynnan	10974	121	2004	F
Holmen	12914	114	2002	FTX
Sjöportalen 1	8447	89	2003	FTX
Sjöstaden 1	16616	167	2003	F
Sjöstadsviken	8349	83	2007	F
Strandkanten	3941	50	2004	F
Redaren	8072	104	2008	F
Sickla Kanal	7706	66	2002	FTX
Seglatsen	15692	137	2007	FVP
Slusstornet	9186	82	2004	F
Båtbyggaren 1	13535	135	2008	F
Hammarby Kanal	4889	38	2002	F
Hammarby Ekbake	8405	60		F



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Household Level Data Collection



- BRF Seglatsen - 137 Apartments
- BRF Gynnan – 121 Apartments



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Smappee – measures and analyzes electricity use

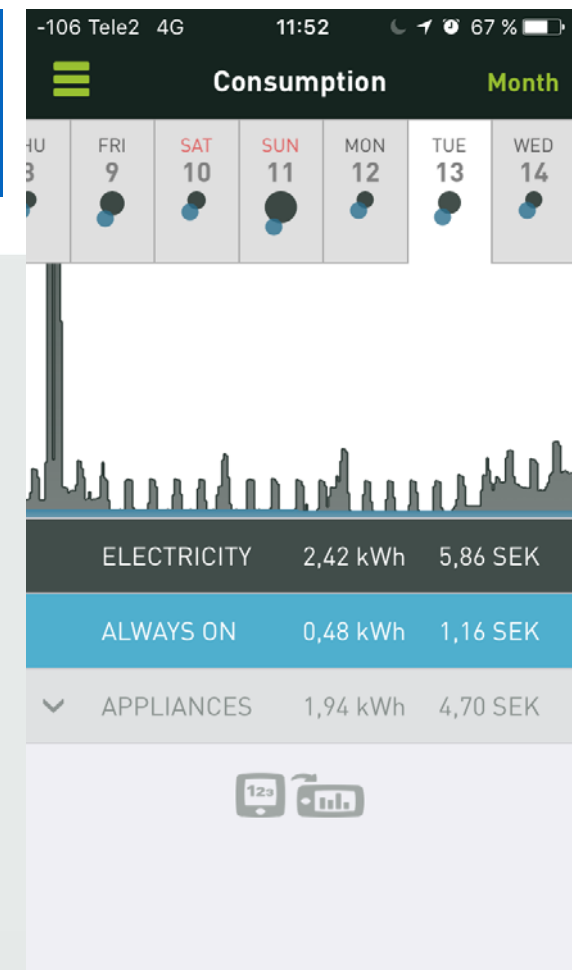
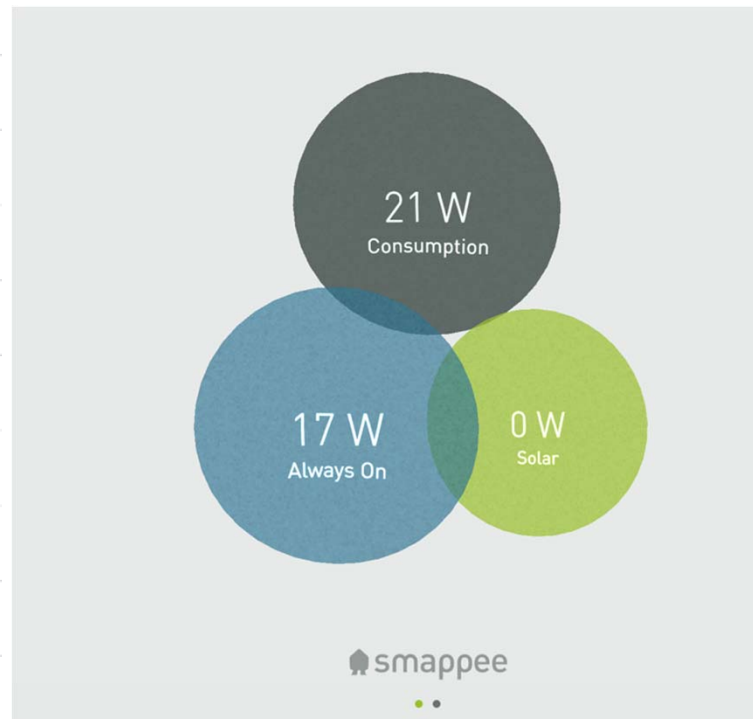


30 Households

Tele2 10:43 84%

Select Appliance

Stove	2135
Iron	1983
Oven	1947
Coffee machine	1564
Vacuum cleaner	1430
Refrigerator	82
Amp	76
TV	75
Bathroom light	56
Amp left on	51
Kitchen light	17



Fårdala



178 Households

Individual Heating,
hot water
measurements

10 Smappees

Individual electricity
through DSO

30 Max EQ3

Local heating
microgrid



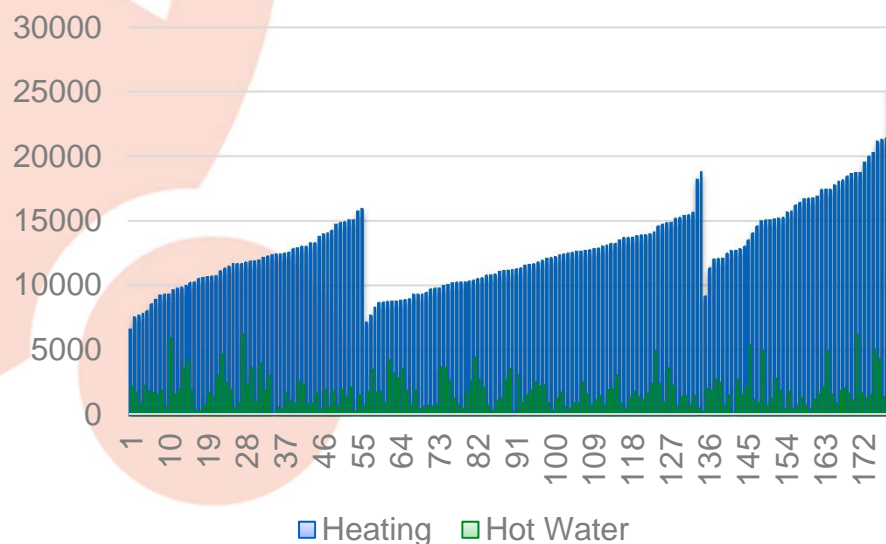
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Hourly and historical Heating,
Hot water and Cold water
consumption Data

Historical and Hourly Electricity
Data from DSO

kWh/year

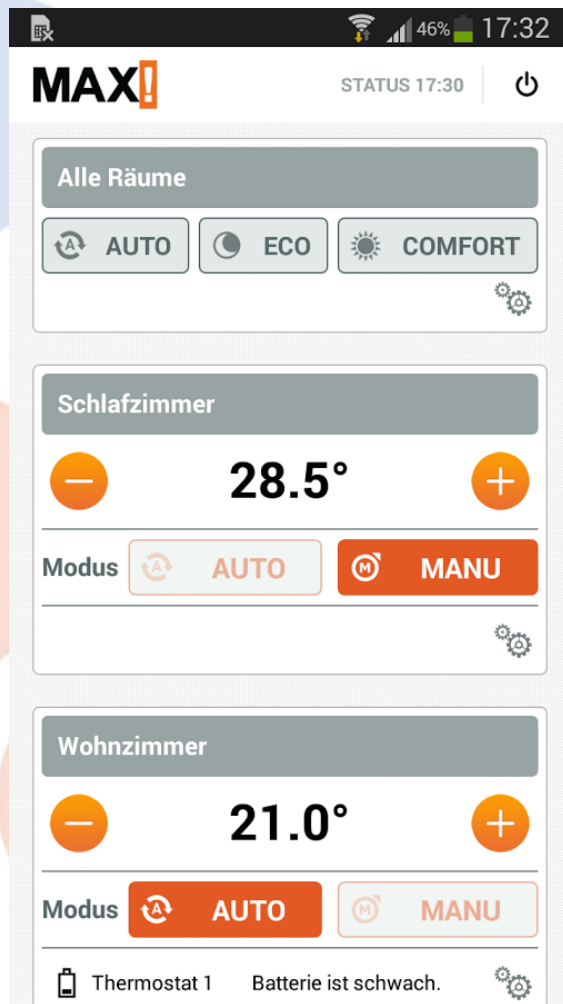
Total Fårdala



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6033760	12019810	31/08/15 01:00	0	62,335	
6033760	12019810	31/08/15 02:00	0	62,335	
6033760	12019810	31/08/15 03:00	0	62,335	
6033760	12019810	31/08/15 04:00	0	62,349	
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MAX EQ3



Pilot Sites Context - Italy

San Lorenzo in Banale

- 1100 inhabitants
- CEIS consortium (3300 members)
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- 20 associations



Storo

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- 330 PV plants
- 56 associations



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Integrating Energy, ICTs and Social aspects: the Participatory Energy Budgeting



(Capaccioli et. al, 2016)



project has received research
funding from the European Union

ICTs: Energy Tips



< Indietro Azioni consigliate

→ Cerca di usare lavatrice e lavastoviglie solo a pieno carico.

Impatto  Impegno   3

Cerca di utilizzare la lavatrice solo a pieno carico. Anche se hai una lavatrice moderna che pesa la biancheria e riduce l'acqua di conseguenza, non usare i programmi a mezzo carico è sempre l'opzione più efficiente.

6 Partecipanti Seleziona quest'azione per avere più informazioni

☒ Lo faccio già abitualmente.

☐ Voglio farlo.

☐ Non voglio farlo

☐ Non posso farlo/Non mi è utile

< Torna alle tue azioni

- Suggest tips for energy saving
- Section in common with the Swedish pilot sites



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ICTs: Data visualization



- Visualization of real-time data consumption and production (for prosumers)
- Visualization of historical data
- Visualization of consumption from appliances



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Energy Sensors

- Smart-meters (already in place)
- Amperometric clamps (production and consumption)
- In-home monitor
- Smart plugs
- Gateway for data transmission to CIVIS server



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ICTs: Time-of-Use Signal



< Indietro Previsioni per le prossime 30 ore

Fascia oraria	Meteo Energia
18-03 03:00 - 18-03 06:00	😊
18-03 06:00 - 18-03 09:00	😊
18-03 09:00 - 18-03 12:00	😞
18-03 12:00 - 18-03 15:00	😞
18-03 15:00 - 18-03 18:00	😊
18-03 18:00 - 18-03 21:00	😞
18-03 21:00 - 19-03 00:00	😞
19-03 00:00 - 19-03 03:00	😞
19-03 03:00 - 19-03 06:00	😊

How it works:

- Based on production and consumption historical data
- Suggest the best time to consume energy produced by the consortium
- Consuming in the “*green time*” account for the energy bonus



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Project Approach



Emphasis on bottom-up 'participatory action research' embedded in local contexts



The Participatory Energy Budgeting outcomes



2 projects funded:

- New books for the local kindergarden library
- New furnishing for rehabilitation in the local nursing home for elderly

11 MWh donation



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Business models and agents of change



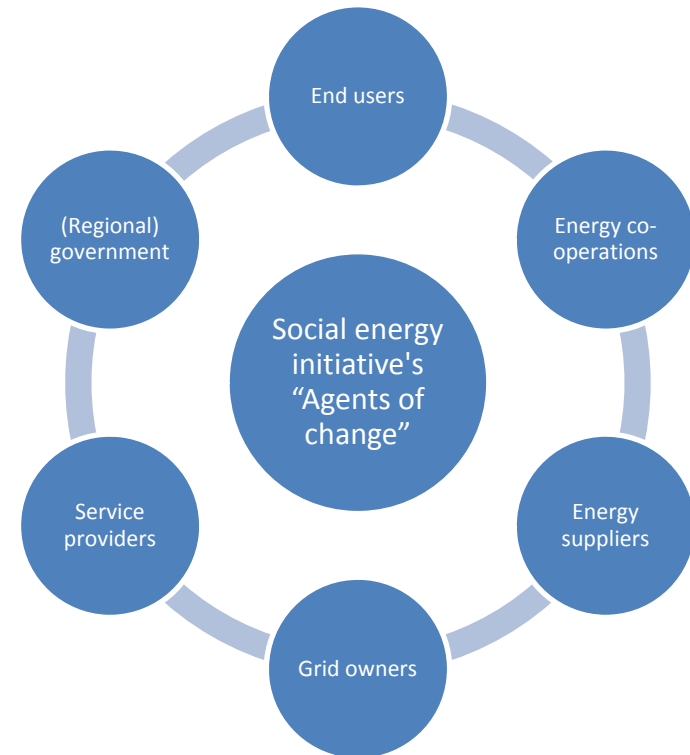
- We aim to achieve the goals by designing the appropriate business model for emerging and developing social energy initiatives.
- Following is the role of the so-called 'agents of change' and different lines of development of a business model.



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Agents of Change

- Usually stemming from a small, volunteer based, idealistic origin, social initiatives need to develop as maturity progresses.
- Behind any intentional change lies someone's intentions: an agent of change.
- Agents can contribute to the social energy initiative's goals, thus creating new business models.



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Agents of Change



Who will help you?

KEY PARTNERS

How do you do it?

KEY ACTIVITIES

What do you do?

VALUE PROPOSITION

How do you interact?

CUSTOMER RELATIONSHIPS

Who do you help?

CUSTOMER SEGMENT

What do you need?

KEY RESOURCES

START
HERE

How do you reach them?

DISTRIBUTION CHANNELS

What will it cost?

COST STRUCTURE

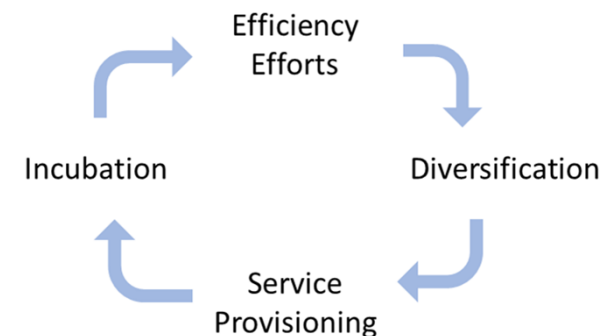
How much will you make?

REVENUE STREAM

Business model lines of development

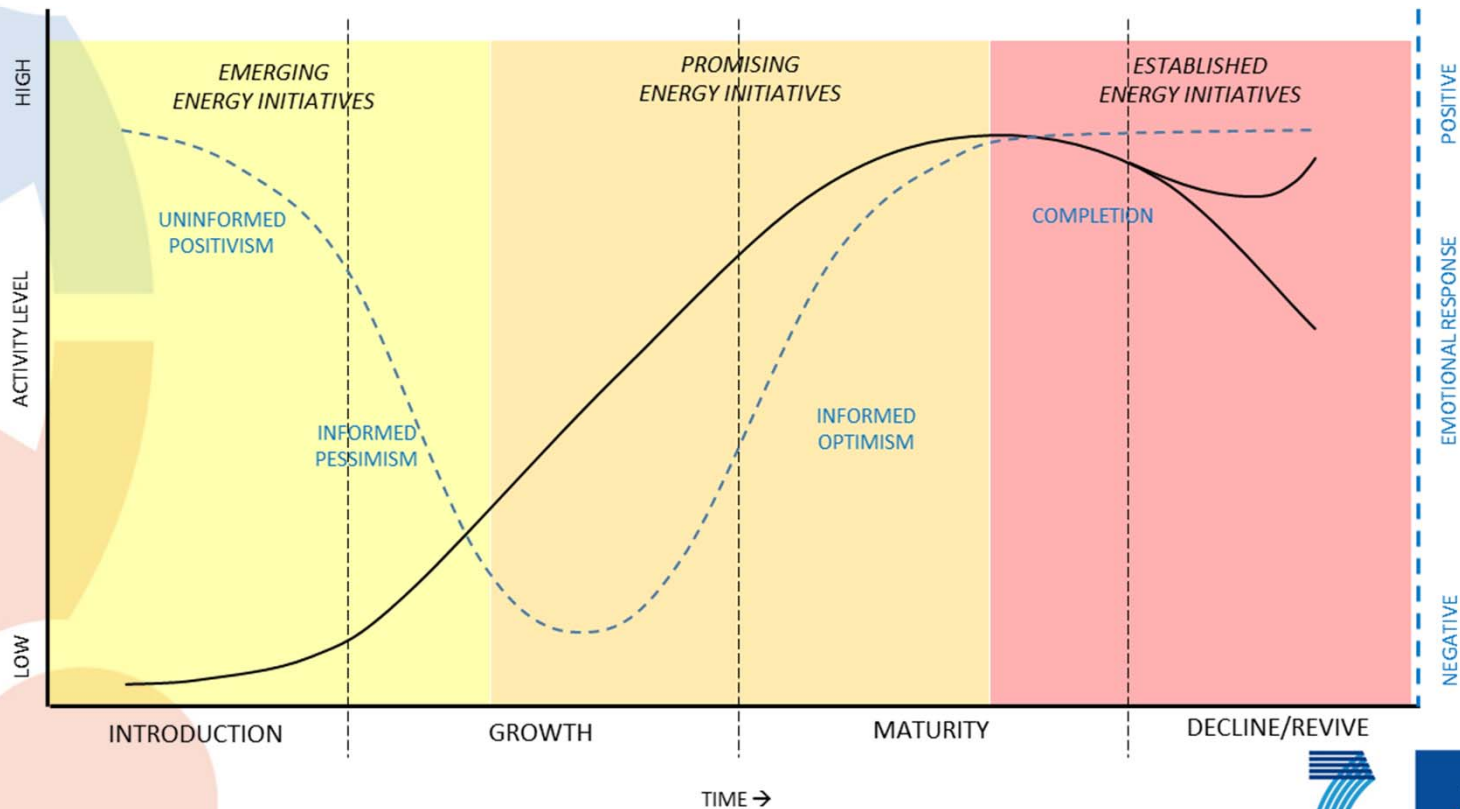


- The CIVIS project has established four main avenues in which organisations can choose to develop their own business model:
 - **Efficiency effects:** becoming better at what you are doing.
 - **Diversification:** introducing products and services that are different than the initial domain of the organisation.
 - **Service provisioning:** facilitating others with available expertise.
 - **Incubation:** enabling innovation.



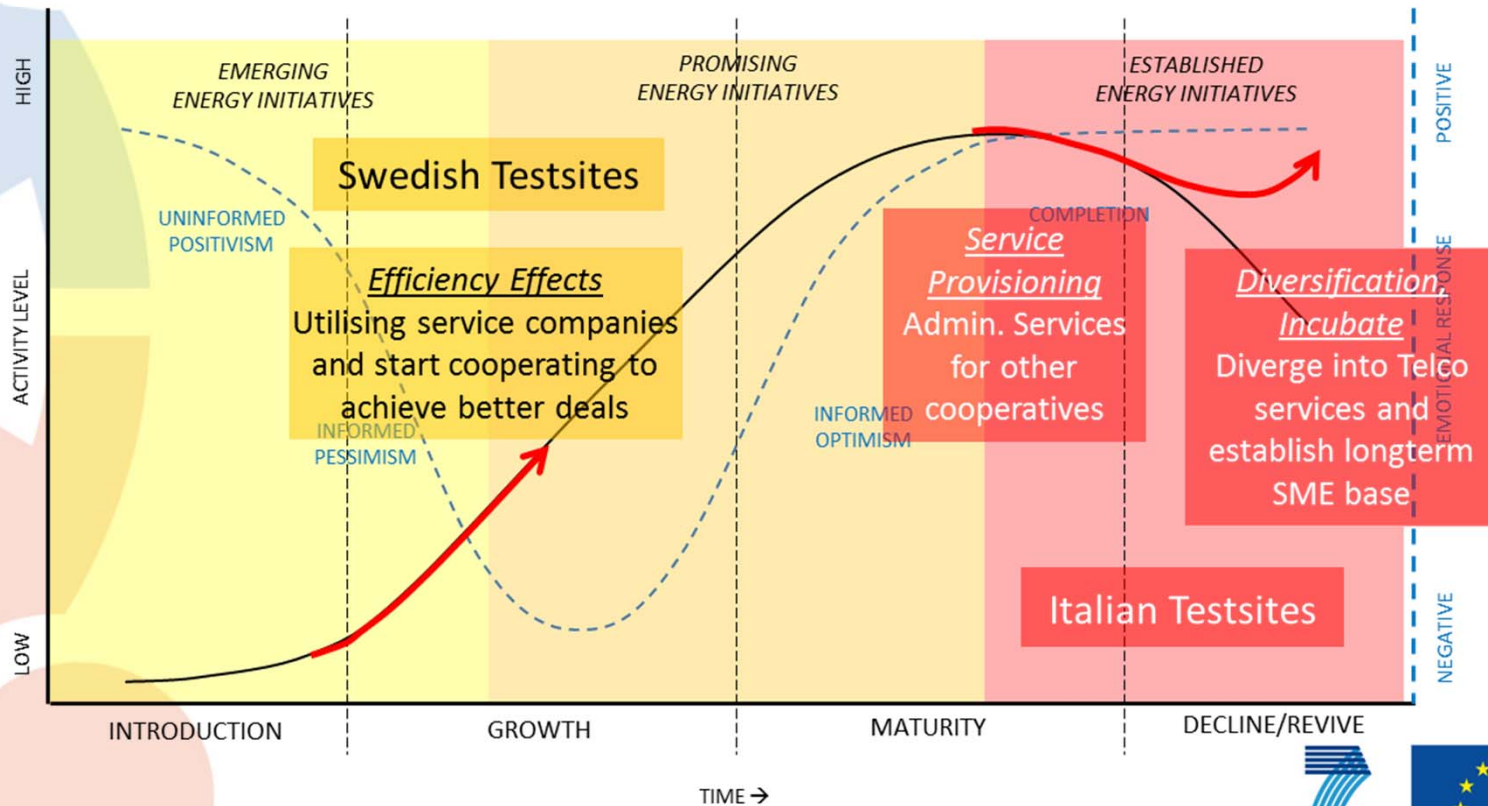
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CIVIS Maturity Scheme



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CIVIS Maturity Scheme



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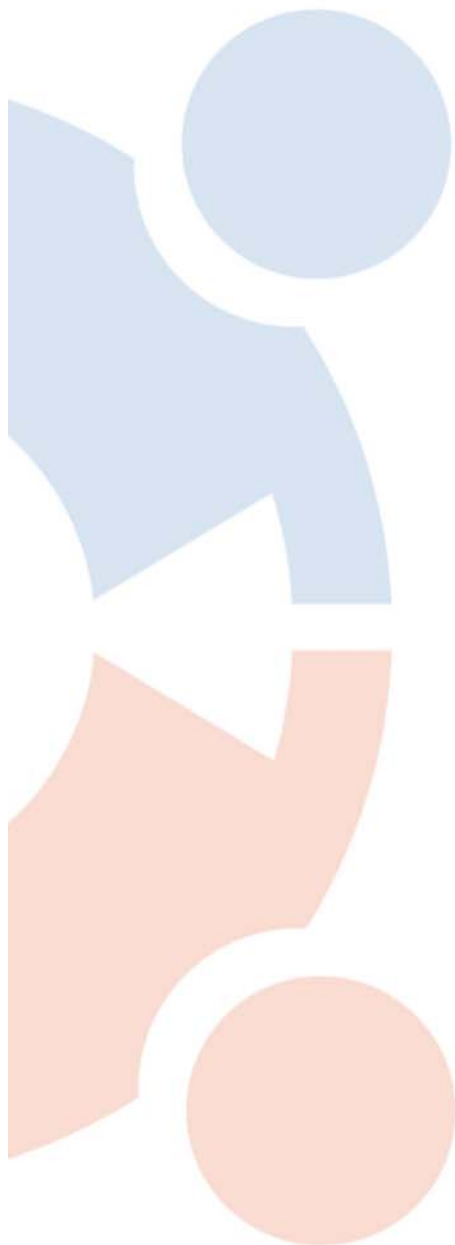
What we have learned



- It is not so much about inventing revolutionary new business models, but about how a business model is applied.
- For social energy cooperatives, it is important to build business models that go further than just financial goals.
- Social energy initiatives should include and empower their social nature to allow for environmentally as well as sustainable solutions, that would otherwise not come to fruition.



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THANK YOU



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